APPENDICES

Appendix A

This appendix section shall contain all compliance and reporting related documents

Appendix A-1	**DWR Recommended Tables**
Appendix A-2	**DWR Checklist**
Appendix A-3	**SBX7-7 Compliance Form**
Appendix A-4	**AWWA Water Audit Form**

Appendix B

This appendix section shall contain all agency related documents

Appendix B-1	**Resolution Adopting the 2015 UWMP**
Appendix B-2	**Copies of General Notice Publications**
Appendix B-3	**Copies of Notification Letters**

Appendix C

This appendix section shall contain supply related documents

Appendix C-1	**Water Supply Documents**
C-1.1:	**Participating Agency Contract 2013**
C-1.2:	**DWR Settlement Agreement**
C-1.3:	**Solano Irrigation District Agreement**
C-1.4:	**Vallejo Agreement**
C-1.5:	**Sulphur Springs Creek Water Right License**
C-1.6:	**Vacaville Purchase Agreement**
Appendix C-2	**Valero-Benicia Water Supply Agreement**

Appendix D

This appendix section shall contain conservation related documents

Appendix D-1	**CUWCC Report**
Appendix D-2	**Water Shortage Contingency Plan**
Appendix D-3	**Administrative Preliminary Draft Design Report for the Benicia Water Reuse Project**
Appendix D-4	**Climate Change Vulnerability Assessment**

Appendix A-1: DWR Recommended Tables

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NOTES FOR REGIONAL URBAN WATER MANAGEMENT PLANS (RUWMPs)
RUWMPs will report data for each agency in the RUWMP, requiring duplicates of the standardized tables. The supplier will copy the needed tables and notate each of the copies with the name of the agency, or some other designation, identifying the table with the corresponding agency.
WUEdata upload tool for RUWMPs
RUWMPs will submit data to the WUEdata upload tool on an individual agency basis.
If the RUWMP contains a Regional Alliance, the Regional Alliance information will be uploaded separately from the individual agency information.

Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
CA 4810001	City of Benicia	9,750	4,189
	TOTAL	9,750	4,189
NOTES: See Chapter 4			

Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable* *drop down list*
☒	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Type of Agency (select one or both)	
☐	Agency is a wholesaler
☒	Agency is a retailer
Fiscal or Calendar Year (select one)	
☒	UWMP Tables Are in Calendar Years
☐	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF
NOTES:	

Table 2-4 Retail: Water Supplier Information Exchange
The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
Wholesale Water Supplier Name *(Add additional rows as needed)*
Solano County Water Agency
Solano Irrigation District
NOTES: See Chapter 3

Table 3-1 Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040*(opt)*
	27,689	27,908	29246	30650	32120	33,661
See Section 2.1 and Section 4.1						

Table 4-1 Retail: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Single Family		Drinking Water	3,033
Multi-Family		Drinking Water	503
Other	Commercial/Instituational	Drinking Water	557
Landscape			706
Other	Valero Raw	Raw Water	5,011
		TOTAL	9,810
NOTES: See Section 4.3			

Table 4-2 Retail: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool*		2020	2025	2030	2035	2040-opt
Single Family		3,886	3,458	3,216	3,296	3,393
Multi-Family		489	475	460	461	462
Other	Commercial/Institutional	546	546	609	686	726
Landscape		684	684	676	706	706
Other	Valero	3,800	3,800	3,800	3,800	3,800
Losses		835	573	551	572	587
	TOTAL	10,240	9,536	9,312	9,521	9,674

NOTES: See Section 4.3. Valero demand is 5,800AF with 2,000AF met from future recycled water supplies. (Beginning in 2020)

Table 4-3 Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040 *(opt)*
Potable and Raw Water *From Tables 4-1 and 4-2*	9,810	10,240	9,536	9,312	9,521	9,674
Recycled Water Demand* *From Table 6-4*	0	2,000	2,000	2,000	2,000	2,000
TOTAL WATER DEMAND	9,810	12,240	11,536	11,312	11,521	11,674
**Recycled water demand fields will be blank until Table 6-4 is complete.*						
NOTES:						

Table 4-4 Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
01/2015	1153
** Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.*	
NOTES: See Appendix A-4	

Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc… utilized in demand projections are found.	Section 4.3
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes
NOTES: See Sectiion 4.3	

Table 5-1 Baselines and Targets Summary
Retail Agency or Regional Alliance Only

Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*1997*	*2006*	*193*	*186*	*179*
5 Year	*2003*	*2007*	*193*		

*All values are in Gallons per Capita per Day (GPCD)

NOTES: See Appendix A-3 and Chapter 4.

Table 5-2: 2015 Compliance

Retail Agency or Regional Alliance Only

Actual 2015 GPCD*	2015 Interim Target GPCD*	Optional Adjustments to 2015 GPCD Enter "0" if no adjustment is made *From Methodology 8*					2015 GPCD* *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
		Extraordinary Events*	Economic Adjustment*	Weather Normalization*	TOTAL Adjustments*	Adjusted 2015 GPCD*		
135	186	0	0	0	0	135	135	Yes

**All values are in Gallons per Capita per Day (GPCD)*

NOTES: See Section 4.1 and 4.2

Table 6-1 Retail: Groundwater Volume Pumped						
☒	Supplier does not pump groundwater. The supplier will not complete the table below.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2011	2012	2013	2014	2015
Add additional rows as needed						
	TOTAL	0	0	0	0	0
NOTES: See Section 4						

Table 6-2 Retail: Wastewater Collected Within Service Area in 2015						
☐	There is no wastewater collection system. The supplier will not complete the table below.					
	Percentage of 2015 service area covered by wastewater collection system *(optional)*					
	Percentage of 2015 service area population covered by wastewater collection system *(optional)*					
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2015	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
Add additional rows as needed						
City of Benicia	Metered	2,048	City of Benicia	Benicia Waste Water Treatment Plant	Yes	No
Total Wastewater Collected from Service Area in 2015:		2,048				

NOTES: See Chapter 2 and 3

Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2015										
☐	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.									
							2015 volumes			
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)*	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level *Drop down list*	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
Add additional rows as needed										
Benicia Water Treatment Plant	City of Benicia Discharge Location	City of Benicia Discharge Location		Bay or estuary outfall	no	Tertiary	2,048	2,048	0	0
						Total	2,048	2,048	0	0
NOTES: See Chapter 2										

Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area								
|	Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.							
Name of Agency Producing (Treating) the Recycled Water:		City of Benicia						
Name of Agency Operating the Recycled Water Distribution System:		City of Benicia						
Supplemental Water Added in 2015		0						
Source of 2015 Supplemental Water		N/A						
Beneficial Use Type	General Description of 2015 Uses	Level of Treatment *Drop down list*	2015	2020	2025	2030	2035	2040 (opt)
Agricultural irrigation								
Landscape irrigation (excludes golf courses)								
Golf course irrigation								
Commercial use								
Industrial use	Supply for Valero Benicia Refinery	Tertiary	0	2,000	2,000	2,000	2,000	2,000
Geothermal and other energy production								
Seawater intrusion barrier								
Recreational impoundment								
Wetlands or wildlife habitat								
Groundwater recharge (IPR)*								
Surface water augmentation (IPR)*								
Direct potable reuse								
Other *(Provide General Description)*								
		Total:	0	2,000	2,000	2,000	2,000	2,000
**IPR - Indirect Potable Reuse*								
NOTES: See Chapter 3								

Table 6-5 Retail: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual			
☒	Recycled water was not used in 2010 nor projected for use in 2015. The supplier will not complete the table below.		
Use Type		**2010 Projection for 2015**	**2015 Actual Use**
Agricultural irrigation			
Landscape irrigation (excludes golf courses)			
Golf course irrigation			
Commercial use			
Industrial use			
Geothermal and other energy production			
Seawater intrusion barrier			
Recreational impoundment			
Wetlands or wildlife habitat			
Groundwater recharge (IPR)			
Surface water augmentation (IPR)			
Direct potable reuse			
Other	*Type of Use*		
	Total	0	0
NOTES:			

|	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
Page 3-18	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use
Add additional rows as needed			
Treatment Facility Upgrade	Teaming arrangment with Valero	2016-2020	2,000
		Total	2,000
NOTES: See Chapter 3			

Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☒	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Section 3.6 at Page 3-16	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Agency *This may be a range*
	Drop Down List (y/n)	*If Yes, Agency Name*				
Add additional rows as needed						
NOTES:						

Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Actual Volume	Water Quality *Drop Down List*	Total Right or Safe Yield *(optional)*
Add additional rows as needed				
Surface water	License 4900	750	Drinking Water	
Purchased or Imported Water	Vallejo Agreement	1,100	Drinking Water	
Surface water	DWR Settlement	504	Drinking Water	
Purchased or Imported Water	SWP Allocation	4,300	Drinking Water	
Purchased or Imported Water	Other SWP Supplies	5,247	Drinking Water	
	Total	11,901		0
NOTES: See Chapter 3				

Table 6-9 Retail: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*									
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		**2020**		**2025**		**2030**		**2035**		**2040** *(opt)*	
		Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*
Add additional rows as needed											
Surface water	License 4900	750		750		750		750		750	
Purchased or Imported Water	SWP Supplies	27,056		27,056		27,056		27,056		27,056	
Purchased or Imported Water	Vallejo Agreement	1,100		1,100		1,100		1,100		1,100	
Purchased or Imported Water	SID Water Supplies	2,000		2,000		2,000		2,000		2,000	
Recycled Water		2,000		2,000		2,000		2,000		2,000	
	Total	32,906	0	32,906	0	32,906	0	32,906	0	32,906	0
NOTES: See Section 3.7											

Table 7-1 Retail: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☒ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _Section 3.7_____	
		☐ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available	**% of Average Supply**
Average Year			100%
Single-Dry Year			
Multiple-Dry Years 1st Year			
Multiple-Dry Years 2nd Year			
Multiple-Dry Years 3rd Year			
Multiple-Dry Years 4th Year *Optional*			
Multiple-Dry Years 5th Year *Optional*			
Multiple-Dry Years 6th Year *Optional*			
Agency may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If an agency uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.			
NOTES:			

Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 *(Opt)*
Supply totals (*autofill from Table 6-9)*	32,906	32,906	32,906	32,906	32,906
Demand totals *(autofill from Table 4-3)*	12,240	11,536	11,312	11,521	11,674
Difference	20,666	21,370	21,594	21,385	21,232
NOTES: See Chapter 7					

Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 (Opt)
Supply totals	14,594	14,594	14,594	14,594	14,594
Demand totals	12,563	11822.489	11,532	11,750	11,909
Difference	2,031	2,772	3,062	2,844	2,685
NOTES: See Section 7.2					

Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040 (Opt)
First year	Supply totals	14,938	14,938	14,938	14,938	14,938
	Demand totals	12,563	11,822	11,532	11,750	11,909
	Difference	2,375	3,116	3,406	3,188	3,029
Second year	Supply totals	13,608	13,608	13,608	13,608	13,608
	Demand totals	11,886	11,220	10,959	11,155	11,298
	Difference	1,722	2,388	2,649	2,453	2,310
Third year	Supply totals	13,264	13,264	13,264	13,264	13,264
	Demand totals	11,210	10,618	10,386	10,560	10,687
	Difference	2,054	2,646	2,878	2,704	2,577
NOTES: See Section 7.3						

Table 8-1 Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction[1] *Numerical value as a percent*	Water Supply Condition (*Narrative description)*
Add additional rows as needed		
Stage 1	0%	See Section 6.5
Stage 2	10%	See Section 6.6
Stage 3	25%	See Section 6.7
Stage4	35%	See Section 6.8
Stage 5	50%	See Section 6.9
[1] *One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.*		
NOTES:		

Table 8-2 Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? *Drop Down List*
Add additional rows as needed			
Stage 1	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
Stage 1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner		Yes
Stage 1	Other	Irrigation restrictions during rain events	Yes
Stage 2	CII - Restaurants may only serve water upon request		Yes
Stage 2	Other - Prohibit use of potable water for construction and dust control		Yes
Stage 3	Landscape - Limit landscape irrigation to specific times		Yes
Stage 3	Landscape - Limit landscape irrigation to specific days		Yes
Stage 4	Other	Disable automatic timers for sprinklers	Yes
Stage 5	Landscape - Prohibit certain types of landscape irrigation		Yes
NOTES: See Appendix D-2, Section 6.5			

Table 8-3 Retail Only: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*
Add additional rows as needed		
Stage 1	Implement or Modify Drought Rate Structure or Surcharge	Implemented by the City Council as needed. See Appendix D-2
Stage 2	Other	Penalties imposed for violations, see Section 6.4
Stage 2	Expand Public Information Campaign	See Section 6.5 and Appendix D-2
NOTES: See Chapter 6 and Appendix D-2 for more details		

Table 8-4 Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	12,938	11,608	11,264
NOTES: See Section 6.10			

Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Vallejo	☒	☒
Fairfield	☒	☒
Vacaville	☒	☒
Dixon	☒	☒
Rio Vista	☒	☒
Suisun City	☒	☒
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Solano County	☒	☒
	☐	☐
Additional entities notified that are not Cities of Counties. Please see Section 1.2 and Appendix B-3.		

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Appendix A-2: DWR Checklist

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2015 UWMP Checklist

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location *(Optional Column for Agency Use)*
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	Section 1.1
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	Section 1.2, App. B-3
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	Plan Preparation	Section 2.5.2	Section 1.2, 1.3; and App B-2
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Section 2.1
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Section 2.1.1
10631(a)	Provide population projections for 2020, 2025, 2030, and 2035.	System Description	Section 3.4	Section 2.1.2
10631(a)	Describe other demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	Section 2.1.3
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	Section 2.1.2
10631€(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Section 4.3.1
10631€(3)(A)	Report the distribution system water loss for the most recent 12-month period available.	System Water Use	Section 4.3	Sec.1.3.1, 4.3.4, App A-4
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	Section 4.3.5
10608.20(b)	Retail suppliers shall adopt a 2020 water use target using one of four methods.	Baselines and Targets	Section 5.7 and App E	Section 4.1
10608.20€	Retail suppliers shall provide baseline daily per capita water use, urban water use target,	Baselines and Targets	Chapter 5 and App E	Section 4.1

	interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.			
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	Section 4.1
10608.24(a)	Retail suppliers shall meet their interim target by December 31, 2015.	Baselines and Targets	Section 5.8 and App E	4.2
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.8.2	4.2
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	n/a
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	App A-1
10631(b)	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.	System Supplies	Chapter 6	3.7.4
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	2.3.1
10631(b)(1)	Indicate whether a groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	1.4
10631(b)(2)	Describe the groundwater basin.	System Supplies	Section 6.2.1	3.1
10631(b)(2)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	2.1, 3.1
10631(b)(2)	For unadjudicated basins, indicate whether or not the department has identified the basin as overdrafted, or projected to become overdrafted. Describe efforts by the supplier to eliminate the long-term overdraft condition.	System Supplies	Section 6.2.3	2.1, 3.1
10631(b)(3)	Provide a detailed description and analysis of the location, amount, and sufficiency of	System Supplies	Section 6.2.4	3.6.3

	groundwater pumped by the urban water supplier for the past five years			
10631(b)(4)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Sections 6.2 and 6.9	3.6.3
10631(d)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	3.6.2
10631(g)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years.	System Supplies	Section 6.8	3.6.7
10631(h)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	3.6.5
10631(j)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) – if any – with water use projections from that source.	System Supplies	Section 2.5.1	3
10631(j)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	n/a
10633	For wastewater and recycled water, coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.1	2.3.2
10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area. Include quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	System Supplies (Recycled Water)	Section 6.5.2	2.2, 3.5
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5.2.2	2.3.2, 3.6.6
10633©	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.3 and 6.5.4	2.3.2, 3.6.6
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4	2.3.2, 3.6.6, 3.6.7
10633€	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in	System Supplies (Recycled Water)	Section 6.5.4	3.6.6

	comparison to uses previously projected.			
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5	3.6.6
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5	3.6.6
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	5.1
10631©(1)	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.	Water Supply Reliability Assessment	Section 7.1	3.7
10631©(1)	Provide data for an average water year, a single dry water year, and multiple dry water years	Water Supply Reliability Assessment	Section 7.2	3.7
10631©(2)	For any water source that may not be available at a consistent level of use, describe plans to supplement or replace that source.	Water Supply Reliability Assessment	Section 7.1	3.7
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1	3.6
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	7.1, 7.2, 7.3
10632(a) and 10632(a)(1)	Provide an urban water shortage contingency analysis that specifies stages of action and an outline of specific water supply conditions at each stage.	Water Shortage Contingency Planning	Section 8.1	6.2, 6.5, App D-3
10632(a)(2)	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency.	Water Shortage Contingency Planning	Section 8.9	6.10
10632(a)(3)	Identify actions to be undertaken by the urban water supplier in case of a catastrophic interruption of water supplies.	Water Shortage Contingency Planning	Section 8.8	6.9, App D-4
10632(a)(4)	Identify mandatory prohibitions against specific water use practices during water shortages.	Water Shortage Contingency Planning	Section 8.2	6.3, App D-3
10632(a)(5)	Specify consumption reduction methods in the most restrictive stages.	Water Shortage Contingency Planning	Section 8.4	6.5.5, App D-3
10632(a)(6)	Indicated penalties or charges for excessive	Water Shortage	Section 8.3	6.5,6.4

	use, where applicable.	Contingency Planning		
10632(a)(7)	Provide an analysis of the impacts of each of the actions and conditions in the water shortage contingency analysis on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts.	Water Shortage Contingency Planning	Section 8.6	6.6
10632(a)(8)	Provide a draft water shortage contingency resolution or ordinance.	Water Shortage Contingency Planning	Section 8.7	App D-3
10632(a)(9)	Indicate a mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.	Water Shortage Contingency Planning	Section 8.5	6.8
10631(f)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and 9.3	5.1
10631(f)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	n/a
10631(i)	CUWCC members may submit their 2013-2014 CUWCC BMP annual reports in lieu of, or in addition to, describing the DMM implementation in their UWMPs. This option is only allowable if the supplier has been found to be in full compliance with the CUWCC MOU.	Demand Management Measures	Section 9.5	5.1
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Section 10.3	1.3, App B-2
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	1.3, 1.2, App B-3
10621(d)	Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	1.2
10635(b)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	App D-3
10642	Provide supporting documentation that the urban water supplier made the plan available	Plan Adoption, Submittal, and	Sections 10.2.2, 10.3,	App B-2,

	for public inspection, published notice of the public hearing, and held a public hearing about the plan.	Implementation	and 10.5	B-3
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Sections 10.2.1	1.3, App B-2
10642	Provide supporting documentation that the plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	1.3, App B-1
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3	1.3, App B-1
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	1.3 App B-1
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	1.3
10645	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	1.3

Appendix A-3: SBX7-7 Compliance Forms

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SB X7-7 Verification Form Version FINAL.1

Table 4-C.4 has been modified from the FINAL version.

WUEdata Entry Exceptions
The data from the tables below will not be entered into WUEdata tables (the tabs for these tables' worksheets are colored **purple**). These tables will be submitted as separate uploads, in Excel, to WUEdata.
Process Water Deduction SB X7-7 tables 4-C, 4-C.1, 4-C.2, 4-C.3, 4-C.4 and 4-D A supplier that will use the process water deduction will complete the appropriate tables in Excel, submit them as a separate upload to the WUE data tool, and include them in its UWMP.
Target Method 2 SB X7-7 tables 7-B, 7-C, and 7-D A supplier that selects Target Method 2 will contact DWR (gwen.huff@water.ca.gov) for SB X7-7 tables 7-B, 7-C, and 7-D.
Target Method 4 These tables are only available online at http://www.dwr.water.ca.gov/wateruseefficiency/sb7/committees/urban/u4/ptm4.cfm A supplier that selects Target Method 4 will save the tables from the website listed above, complete the tables, submit as a separate upload to WUE data, and include them with its UWMP.

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	5,090	Acre Feet
	2008 total volume of delivered recycled water	-	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1, 2]	10	Years
	Year beginning baseline period range	1997	
	Year ending baseline period range[3]	2006	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	
	Year ending baseline period range[4]	2007	

[1] If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period. *[2] The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.*

[3] The ending year must be between December 31, 2004 and December 31, 2010.

[4] The ending year must be between December 31, 2007 and December 31, 2010.

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☒	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES: See Section 4.1	

SB X7-7 Table 3: Service Area Population		
Year		Population
10 to 15 Year Baseline Population		
Year 1	1997	25,905
Year 2	1998	26,040
Year 3	1999	26,753
Year 4	2000	26,865
Year 5	2001	27,032
Year 6	2002	26,962
Year 7	2003	26,811
Year 8	2004	26,624
Year 9	2005	26,674
Year 10	2006	26,565
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2003	26,811
Year 2	2004	26,624
Year 3	2005	26,674
Year 4	2006	26,565
Year 5	2007	27,119
2015 Compliance Year Population		
2015		27,689
NOTES: See Section 4.1		

SB X7-7 Table 4: Annual Gross Water Use *								
Baseline Year *Fm SB X7-7 Table 3*		**Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**Deductions**					**Annual Gross Water Use**
			Exported Water	**Change in Dist. System Storage** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use**	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1997	6,518			-		-	6,518
Year 2	1998	4,916			-		-	4,916
Year 3	1999	5,610			-		-	5,610
Year 4	2000	5,703			-		-	5,703
Year 5	2001	5,848			-		-	5,848
Year 6	2002	5,645			-		-	5,645
Year 7	2003	5,889			-		-	5,889
Year 8	2004	6,271			-		-	6,271
Year 9	2005	5,883			-		-	5,883
Year 10	2006	5,372			-		-	5,372
10 - 15 year baseline average gross water use								**5,766**
5 Year Baseline - Gross Water Use								
Year 1	2003	5,889			-		-	5,889
Year 2	2004	6,271			-		-	6,271
Year 3	2005	5,883			-		-	5,883
Year 4	2006	5,372			-		-	5,372
Year 5	2007	5,496			-		-	5,496
5 year baseline average gross water use								**5,782**
2015 Compliance Year - Gross Water Use								
2015		4,189	-		-		-	**4,189**

* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3

NOTES: City does not use recycled water see Chapter 3. City does not deduct for processed water.

Name of Source	Treated Water			
This water source is:				
☒	The supplier's own water source			
☒	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1997	6,518		6,518
Year 2	1998	4,916		4,916
Year 3	1999	5,610		5,610
Year 4	2000	5,703		5,703
Year 5	2001	5,848		5,848
Year 6	2002	5,645		5,645
Year 7	2003	5,889		5,889
Year 8	2004	6,271		6,271
Year 9	2005	5,883		5,883
Year 10	2006	5,372		5,372
Year 11	0			-
Year 12	0			-
Year 13	0			-
Year 14	0			-
Year 15	0			-
5 Year Baseline - Water into Distribution System				
Year 1	2003	5,889		5,889
Year 2	2004	6,271		6,271
Year 3	2005	5,883		5,883
Year 4	2006	5,372		5,372
Year 5	2007	5,496		5,496
2015 Compliance Year - Water into Distribution System				
2015		4,189		4,189
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES: See Section 3 and Table 4-1, Table 4-4				

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1997	25,905	6,518	225
Year 2	1998	26,040	4,916	169
Year 3	1999	26,753	5,610	187
Year 4	2000	26,865	5,703	190
Year 5	2001	27,032	5,848	193
Year 6	2002	26,962	5,645	187
Year 7	2003	26,811	5,889	196
Year 8	2004	26,624	6,271	210
Year 9	2005	26,674	5,883	197
Year 10	2006	26,565	5,372	181
10-15 Year Average Baseline GPCD				**193**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2003	26,811	5,889	196
Year 2	2004	26,624	6,271	210
Year 3	2005	26,674	5,883	197
Year 4	2006	26,565	5,372	181
Year 5	2007	27,119	5,496	181
5 Year Average Baseline GPCD				**193**
2015 Compliance Year GPCD				
2015		27,689	4,189	**135**
NOTES: See Chapter 4.				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	193
5 Year Baseline GPCD	193
2015 Compliance Year GPCD	135
NOTES: See Chapter 4	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☐	Method 1	SB X7-7 Table 7A
☒	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

LANDSCAPE PARCELS

A narrative describing the method for estimating landscape area must be provided. These estimations must be made in accordance with Methodology 6 Section "Measure Landscape Area". **Provide location of narrative in cell to the right.**	Chapter 4
Enter ETo[1,2] for Service Area (inches/year)	**45.8**

Pre-2010 Landscape (ETAF .8)

Category by Parcel Size in Sq Ft	# of Parcels	Estimated % Landscape Area *fm sampling*	Landscape Area (In Acres)
0 - 4,000 sqft			
4,000 - 8,000 sqft			
8,000 - 12,000 sqft			
12,000 - 16,000 sqft			
16,000 - 20,000 sqft			
20,000 - 24,000 sqft			
Greater than 24,000 sqft			
TOTAL Pre 2010 Landscapes	-		**1,029**

Post-2010 Landscape (ETAF .7)

Category by Parcel Size in Sq Ft	# of Parcels	Estimated % Landscape Area *fm sampling*	Landscape Area (In Acres)
0 - 4,000 sqft			
4,000 - 8,000 sqft			
8,000 - 12,000 sqft			
12,000 - 16,000 sqft			
16,000 - 20,000 sqft			
20,000 - 24,000 sqft			
Greater than 24,000 sqft			
TOTAL Post 2010 Landscapes	-		**-**

Special Landscape Area (SLA) (ETAF 1.0)

Category by Parcel Size in Sq Ft	# of Parcels	Estimated % Landscape Area *fm sampling*	Landscape Area (In Acres)
0 - 4,000 sqft			
4,000 - 8,000 sqft			
8,000 - 12,000 sqft			
12,000 - 16,000 sqft			
16,000 - 20,000 sqft			
20,000 - 24,000 sqft			
Greater than 24,000 sqft			
TOTAL SLA Landscapes	-		**54**
TOTAL LANDSCAPE AREA (In Acres)			**1,083**

[1] If the water supplier's service area spans more than one ETo Zone, the supplier will use multiple versions of the Landscape Parcel Table and SB X7-7 Table 7B for each ETo zone that they serve.

[2] Methods for estimating historical ETo (reference evapotranspiration) are described in the Methodologies document, Methodology 6, in the section "Estimate Reference Evapotranspiration".

NOTES: From 2010 UWMP Chapter 3

SB X7-7 Table 7-B: Target Method 2 Target Landscape Water Use		
Select Unit of Measure from drop down		Acre Feet
ETo[1] for Service Area (inches/year) *from Landscape Parcels Table*		45.8
Landscape Parcels *(from Landscape Parcels Table)*	**Acres**	**Water Use**
Acres of landscape installed pre-2010[2] *(ETAF 0.8)*[3]	1,029	3,142
Acres of landscape installed post-2010[2] *(ETAF 0.7)*[3]	0	-
Acres of Special Landscape Area[2] *(ETAF 1.0)*[3]	54	206
Target Landscape Water Use for 2015 in	**Acre Feet**	**3,348**

[1] If the water supplier's service area spans more than one ETo Zone, the supplier will use multiple versions of the Landscape Parcel Table and SB X7-7 Table 7B for each ETo zone that they serve.

[2] The number of acres is taken from the Landscape Parcels Table.

[3] ETAF - Evapotranspiration Adjustment Factor. Refer to the Model Water Efficient Landscape Ordinance.

NOTES

SB X7-7 Table 7-C: Target Method 2
Target CII Water Use

Baseline Year *Fm SB X7-7 Table 3*	**CII Water Use***	**Process Water Exclusion** (Optional) *Fm SB X7-7 Table(s) 4-D*	**CII Water Use Minus Process Water Exclusion**	**Population** *Fm SB X7-7 Table 3*	**CII GPCD**
	Select Unit of Measure from drop down Must be same as Table 7B				
	Acre Feet				
1997	670	0	670	25,905	23
1998	555	0	555	26,040	19
1999	463	0	463	26,753	15
2000	485	0	485	26,865	16
2001	598	0	598	27,032	20
2002	614	0	614	26,962	20
2003	560	0	560	26,811	19
2004	625	0	625	26,624	21
2005	577	0	577	26,674	19
2006	588	0	588	26,565	20
Average Annual 10 to 15 Year Baseline CII Water Use (GPCD)					19
10% Reduction					2
2020 Target CII Water Use					**17**

**CII water use for each year of the baseline period must be provided.*

NOTES: See Chapter 4

SB X7-7 Table 7-D: Target Method 2 Summary		
27,908	2020 Population	
Sector	Volume Acre Feet	GPCD
Target Indoor Residential Water Use	1,719	55
Target Landscape Water Use* *From SB X7-7 Table 7-B*	3,348	107
Target CII Water Use *From SB X7-7 Table 7-C*	541	17
2020 Target	**5,609**	**179**

**Additional rows may be added for Target Landscape Water Use if the service area spans more than one Eto Zone.*

NOTES: See Chapter 2 and Chapter 4

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target[1]	Calculated 2020 Target[2]	**Confirmed 2020 Target**
193	183	179	**179**

[1]Maximum 2020 Target is 95% of the 5 Year Baseline GPCD *[2]2020 Target is calculated based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target.*

NOTES: See Chapter 4

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	**2015 Interim Target GPCD**
179	193	**187**
NOTES: See Chapter 4		

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*			TOTAL Adjustments	Adjusted 2015 GPCD	2015 GPCD *(Adjusted if applicable)*	**Did Supplier Achieve Targeted Reduction for 2015?**
		Enter "0" if Adjustment Not Used						
		Extraordinary Events	Weather Normalization	Economic Adjustment				
135	187	*A*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	-	135	135	**YES**
NOTES: See Chapter 4								

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Appendix A-4: AWWA Water Audit Form

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AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

American Water Works Association
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? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Benicia (4810001)
Reporting Year: 2015 | 1/2014 - 1/2015

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

Volume from own sources:	10	1,684.145	MG/Yr	10	Pcnt:	Value:	-0.360	MG/Yr
Water imported:		0.000	MG/Yr					MG/Yr
Water exported:		0.000	MG/Yr					MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 1,684.505 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	6	1,358.387	MG/Yr			
Billed unmetered:		0.000	MG/Yr			
Unbilled metered:		0.000	MG/Yr			
Unbilled unmetered:		21.056	MG/Yr	1.25%		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: 1,379.443 MG/Yr

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

305.062 MG/Yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		4.211	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	1	0.000	MG/Yr			MG/Yr
Systematic data handling errors:		3.396	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 7.607 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 297.454 MG/Yr

WATER LOSSES: 305.062 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 326.118 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	1	160.0	miles
Number of active AND inactive service connections:	6	9,822	
Service connection density:		61	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 | 95.0 | psi

COST DATA

Total annual cost of operating water system:	8	$8,118,367	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$30.31	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	8	$4,820.50	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 73 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Customer metering inaccuracies
2: Billed metered
3: Unauthorized consumption

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

American Water Works Association.
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Water Audit Report for: City of Benicia (4810001)
Reporting Year: 2015 | 1/2014 - 1/2015

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 73 out of 100 ***

System Attributes:

	Apparent Losses:	7.607	MG/Yr
+	Real Losses:	297.454	MG/Yr
=	Water Losses:	305.062	MG/Yr
?	Unavoidable Annual Real Losses (UARL):	81.10	MG/Yr
	Annual cost of Apparent Losses:	$308,234	
	Annual cost of Real Losses:	$1,433,879	Valued at Variable Production Cost

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	19.4%	
	Non-revenue water as percent by cost of operating system:	22.7%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	2.12	gallons/connection/day
	Real Losses per service connection per day:	82.97	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.87	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	297.45	million gallons/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	3.67	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

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Water Audit Report for:	City of Benicia (4810001)
Reporting Year:	2015 — 1/2014 - 1/2015
Data Validity Score:	73

Own Sources (Adjusted for known errors): *1,684.505*

Water Imported: *0.000*

System Input: *1,684.505*

Water Exported: *0.000*

Water Supplied: *1,684.505*

Authorized Consumption: *1,379.443*

Water Losses: *305.062*

Billed Authorized Consumption: *1,358.387*

Unbilled Authorized Consumption: *21.056*

Apparent Losses: *7.607*

Real Losses: *297.454*

Billed Water Exported

- **Billed Metered Consumption (water exported is removed)**: *1,358.387*
- **Billed Unmetered Consumption**: *0.000*
- **Unbilled Metered Consumption**: *0.000*
- **Unbilled Unmetered Consumption**: *21.056*
- **Unauthorized Consumption**: *4.211*
- **Customer Metering Inaccuracies**: *0.000*
- **Systematic Data Handling Errors**: *3.396*
- **Leakage on Transmission and/or Distribution Mains**: *Not broken down*
- **Leakage and Overflows at Utility's Storage Tanks**: *Not broken down*
- **Leakage on Service Connections**: *Not broken down*

Revenue Water: 0.000

Revenue Water: 1,358.387

Non-Revenue Water (NRW): 326.118

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Appendix B-1: Resolution Adopting the 2010 UWMP

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RESOLUTION NO. 16- 81

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BENICIA ADOPTING THE 2015 URBAN WATER MANAGEMENT PLAN AND DIRECTING STAFF TO SUBMIT THE PLAN BY THE JULY 1, 2016 DEADLINE

WHEREAS, the Urban Water Management Planning Act requires all urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet annually to update their Urban Water Management Plan (UWMP) at least every five years and to submit the UWMP to the California Department of Water Resources; and

WHEREAS, the City is an urban supplier providing water to a population of approximately 28,000; and

WHEREAS, an UWMP is required in order for a water supplier to be eligible for State administered grants, loans, and drought assistance; and

WHEREAS, the City has updated its UWMP in compliance with the California Water Code; and

WHEREAS, the UWMP was available for public review and comment; and

WHEREAS, a public hearing was held on June 21, 2016.

NOW, THEREFORE, BE IT RESOLVED THAT the City Council of the City of Benicia hereby adopts the 2015 Urban Water Management Plan.

BE IT FURTHER RESOLVED THAT City staff is directed to submit the document to the California Department of Water Resources by the July 1, 2016 deadline.

*****

On motion of Council Member **Strawbridge**, seconded by Council Member **Hughes**, the above resolution was approved by the City Council of the City of Benicia at a regular meeting held on the 21st day of June 2016, by the following vote:

Ayes: **Council Members Campbell, Hughes, Strawbridge, and Mayor Patterson**

Noes: **None**

Absent: **Council Member Schwartzman**

Elizabeth Patterson, Mayor

Attest:

Lisa Wolfe, City Clerk

6-30-16

Date

Appendix B-2: Copies of General Notice Publications

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INVOICE

Benicia Herald
820 First Street
Benicia, California 94510
Phone 745-0733

LEGAL ADVERTISING DEPARTMENT

BENICIA, CALIF., May 27 20 16

City of Benicia
250 East L. St.
Benicia, CA 94510
Attn.: LisaWOlfe

RECEIVED
MAY 25 2016
CITY OF BENICIA
FINANCE DEPT.

YOUR PURCHASE ORDER NUMBER

No.....

DESCRIPTION	
Notice of Public Hearing	Size: Inches/ 9 Squares
	Rate:
	Flat . . . . . $
	1st Insertion per inch/per square . $ 5.50
	Each Additional Insertion . . . $
	Times to run One Time
	Date to start May 27, 2016 Affidavit 1.
	Amount . . $ 50.50

BH-9.

Notice of Public Hearing

In the Matter of . .. .

....

STATE OF CALIFORNIA,
County of Solano. } ss.

Barbara Z. Richardson being duly sworn, deposes and says, that he is and was during all the time herein mentioned, one of the Printers and Publishers of the newspaper called THE BENICIA HERALD and NEW ERA, Published in the City of Benicia, County of Solano and State of California. That said BENICIA HERALD and NEW ERA is a newspaper published for the dissemination of local and telegraphic news and intelligence of a general character; has a bona fide subscription list of paying subscribers and has been established, printed and published in the City of Benicia, County of Solano, State of California, for more than one year and that the Notice of Public Hearing

of which the annexed is a true, printed copy, was published in said newspaper for the period of One Time viz:

commencing on the 27th day of May 20 16

and ending on the same day of 20

and as often during said period as said paper was issued

and that the fee for said publication is 50.50 Dollars

Subscribed and sworn to before me,
this .....
day of ... ... 20 ..

Notary Public
in and for the said County of Solano
State of California

BENICIA CITY COUNCIL

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the City Council will hold a PUBLIC HEARING on Tuesday, June 7, 2016 at 7:00 p.m., in the City Council Chambers, 250 East L Street, to consider the following:

Adopt resolution of the Benicia City Council adopting the 2015 Urban Water Management Plan and directing staff to submit the Urban Water Management Plan to the California Department of Water Resources by the July 1, 2016 deadline.

REVIEW PROCESS: The meeting agenda and packet materials will be available after June 1, 2016 for public review on the City's website (www.ci.benicia.ca.us), at the Benicia Public Library, and at the Public Works Department, 250 East L Street, Benicia, Monday through Friday (except legal holidays) between the hours of 8:30 a.m. to noon, and 1:00 p.m. to 5:00 p.m. Persons wishing to comment can do so either in writing or in person. Written comments should be addressed to the City Clerk, 250 East L Street, Benicia, CA 94510.

Anyone who wishes to speak for or against the above may appear at the public hearing and will be heard.

If you challenge any action related to the proposed action above in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the City Council at, or prior to, the public hearing.

BY ORDER OF THE COUNCIL:

Lisa Wolfe, City Clerk

No. 1975
Published May 27, 2016

NO.....

IN THE

SUPERIOR COURT

of the

STATE OF CALIFORNIA

in and for the

COUNTY OF SOLANO

AFFIDAVIT OF PUBLICATION

of

_____

_____

Attorney for

_____

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Appendix B-3: Copies of Notification Letters

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THE CITY OF BENICIA CALIFORNIA
A SESQUICENTENNIAL CITY 1847 ★ 1997

CITY HALL • 250 EAST L STREET • BENICIA, CA 94510 • (707) 746-4200 • FAX (707) 747-8120

Public Works Department

March 18, 2016

Mr. Roland Sanford, General Manager
Solano County Water Agency
P.O. Box 349
Elmira, CA 95625

Subject: City of Benicia 2015 Urban Water Management Plan Update

Dear Mr. Sanford:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

You will also be notified as to the hearing date, time, and location (anticipated to be held on June 7, 2016), and have access to a copy of the updated UWMP for review. The public hearing will allow: (1) community input regarding the City's implementation plan for included water conservation provisions, (2) consideration of the economic impacts of complying with CWC statutes governing the UWMP and (3) the City to adopt a method, pursuant to subdivision (b) of Section 10608.26, for determining its urban water use target.

If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. Cary Keaten, General Manager
Solano Irrigation District
810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Keaten:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

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LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. Bill Emlen, Director
County of Solano - Department of Resource Management
675 Texas Street, Suite 5500
Fairfield, CA 94533

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Emlen:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
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KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. Joe Leach, Public Works Director/City Engineer
City of Dixon
600 East A Street
Dixon, CA 95620

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Leach:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. George Hicks, Public Works Director
City of Fairfield
1000 Webster Street
Fairfield, CA 94533

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Hicks:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. David Melilli , Public Works Director
City of Rio Vista
P.O. Box 745
Rio Vista, CA 94571

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Melilli:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
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MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

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KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. Tim McSorley, Public Works & Building Director/City Engineer
City of Suisun City
701 Civic Center Boulevard
Suisun City, CA 94585

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. McSorley:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. Steve Hartwig, Public Works Director
City of Vacaville
650 Merchant Street
Vacaville, CA 95688

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Hartwig:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

Recycled Paper

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Public Works Department

March 18, 2016

Mr. David Kleinschmidt, P.E., Public Works Director
City of Vallejo
555 Santa Clara Street
Vallejo, CA 94590

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Kleinschmidt:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Mr. Don Holdener, Manager
Maine Prairie Water District
P.O. Box 73
Dixon, CA 95620

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Holdener:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
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MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

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KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

Recycled Paper

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Public Works Department

March 18, 2016

Mr. Mike Hardesty, General Manager
Reclamation District 2068
7178 Yolano Road
Dixon, CA 95620-9621

Subject: City of Benicia Urban Water Management Plan Update

Dear Mr. Hardesty:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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Sincerely,

Graham Wadsworth

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
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LISA WOLFE, *City Clerk*

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Public Works Department

March 18, 2016

Ms. Sue Fisher Jones, Public Affairs Manager
Valero Benicia Refinery
3400 East 2nd Street
Benicia, CA 94510

Subject: City of Benicia Urban Water Management Plan Update

Dear Ms. Fisher Jones:

The City of Benicia is in the process of preparing the 2015 Urban Water Management Plan (UWMP) as required by the California Water Code (CWC). The UWMP must be adopted by the City Council by July 1, 2016. Pursuant to CWC §10621(b), the City must notify any city or county within which it delivers water at least 60 days prior to a public hearing on the updated UWMP. This letter provides that notification.

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If you have any questions regarding this notification or the City's UWMP update process, please contact Christian Di Renzo, Assistant Public Works Director, at (707) 746-4240.

Sincerely,

Graham Wadsworth, P.E.
Public Works Director

ELIZABETH PATTERSON, *Mayor*
Members of the City Council
MARK C. HUGHES, *Vice Mayor* . ALAN M. SCHWARTZMAN . TOM CAMPBELL . CHRISTINA STRAWBRIDGE

BRAD KILGER, *City Manager*
KENNETH C. PAULK, *City Treasurer*
LISA WOLFE, *City Clerk*

Recycled Paper

Appendix C-1: Water Supply Documents

- **C-1.1: Participating Agency Contract 2013**
- **C-1.2: DWR Settlement Agreement**
- **C-1.3: Solano Irrigation District Agreement**
- **C-1.4: Vallejo Agreement**
- **C-1.5: Sulphur Springs Creek Water Right License**
- **C-1.6: Vacaville Purchase Agreement**

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Appendix C-1.1: Participating Agency Contract 2013

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PARTICIPATING AGENCY CONTRACT BETWEEN
SOLANO COUNTY
WATER AGENCY
AND
THE CITY OF BENICIA

THIS PARTICIPATING AGENCY CONTRACT ("**Contract**") is made on _____, 2013, by and between SOLANO COUNTY WATER AGENCY, a governmental agency created and existing under and by virtue of chapter 573 of the 1989 Statutes of the State of California, as amended, hereinafter referred to as "**Agency**", and the CITY OF BENICIA, a municipal corporation of the State of California, hereinafter referred to as "**Participating Agency**".

WHEREAS, the State of California, acting by and through its Department of Water Resources ("**State**"), and Agency have entered into and subsequently amended a water supply contract ("as identified more specifically in Section 3(d) below, "**State Contract**") whereby the State will supply certain quantities of water to Agency from the State Water Resources Development System, and providing that Agency will make certain payments to the State and setting forth the terms and conditions of such supply, and such payment; and

WHEREAS, the lands and inhabitants of the Participating Agency are in need of additional water for beneficial uses and desire to obtain a supplemental supply of water to be made available to the Agency under the State Contract; and

WHEREAS, the Agency has entered into a Settlement Agreement and Release with the State and other parties which has resulted in an amendment to the State Contract ("**Settlement Agreement**")**;** and

WHEREAS, Participating Agency has received a copy of the Settlement Agreement, the terms and conditions of which are incorporated herein by this reference, and provisions to implement the Settlement Agreement are included in this Contract;

NOW, THEREFORE, the parties hereto mutually agree as follows:

1. **PREVIOUS CONTRACTS SUPERSEDED**

The Member Unit Contract of the parties dated October 22, 1985, Amendment A thereto dated February 3, 1987 and the First Amendment thereto dated February 5, 1991, are hereby superseded by this Contract.

2. **TERM OF THE CONTRACT**

This Contract shall become effective on the date first above written and shall remain in effect throughout the term of the State Contract and any extension thereof, provided, however, that whenever the State Contract is terminated, or suspended, in the manner and for a cause or causes specified in the State Contract, the Contract shall be similarly terminated or suspended.

3. **DEFINITIONS**

As used herein, unless otherwise distinctly expressed or manifestly incompatible with the intent hereof, the term(s):

(a) Definitions in Article 1 of the State Contract have the same meanings as therein set forth.

(b) "**Napa**" shall mean the Napa County Flood Control and Water Conservation District.

(c) "**Participating Agency**" or "**Participating Agencies**" shall mean one or all the governmental entities that enter into contracts with Agency for Project Water.

(d) "**Project Water**" is defined in Section A.1.(j) of the State Contract and includes Annual Entitlement, Advanced Table A, Interruptible Water, Carryover and Transfer Water.

(e) "**State Contract**" shall mean the contract for a water supply between the State of California, acting by and through its Department of Water Resources, and Agency, dated December 26, 1963, including all subsequent amendments thereto.

(f) "**Vallejo Permit Water**" means non-Project Water the City of Vallejo possesses water rights for and approved to be transported through the North Bay Aqueduct.

4. **APPLICABILITY OF THE STATE CONTRACT**

(a) All the rights and obligations of each of the parties hereto are and shall be subject to all the applicable terms, conditions and limitations in the State Contract and the Settlement Agreement, including all amendments thereto to date. Should the provisions of this Contract conflict with the provisions of the Settlement Agreement or the State Contract, the provisions of the latter agreement shall prevail. The Participating Agency hereby acknowledges receipt of a copy of the State Contract and Settlement Agreement and all amendments thereto to date and expressly agrees to the provisions of those agreements imposing obligations and limitations upon it. Notwithstanding the above, prior to executing any future amendments to the State Contract and/or Settlement Agreement, the Agency shall meet and confer with the Participating Agency

(b) The provisions of Articles 31, 32, 33, 34, 35, 40, 41, 42 and 44 of the State Contract, with the word "Agency" substituted for the word "State" whenever the latter appears and the words "Participating Agency" substituted for the word "Agency" whenever the latter appears, are hereby incorporated herein as though set forth in full at this point.

(c) The provisions of subdivision (p) of Article 45 of the State Contract are incorporated herein as though set forth in full at this point. The Participating Agency shall carry out all elements of Agency's water conservation program applicable to the Participating Agency and shall do all acts and things to be done by the Participating Agency as set forth in said subdivision (p).

5. **LIMITATIONS ON OBLIGATIONS OF AGENCY**

(a) Agency shall be under no obligation to provide water service, or to make Project Water available to the Participating Agency from the North Bay Aqueduct except during such times and to the extent and in the quality and manner that the State makes Project Water available to Agency under the State Contract. Agency shall not be liable to the Participating Agency in the event of delay, interruption, discontinuance or quality deterioration of Project Water to be made available to Agency under the State Contract, except to the extent that such delay, interruption, discontinuance, or quality deterioration is the result of the fault of Agency.

(b) The Agency does not assume any responsibility with respect to the quality of the water to be furnished pursuant to this Contract, and the Agency does not warrant the quality of such water. The Participating Agency acknowledges that such water is unfit for human consumption without treatment.

6. **SHORTAGES**

For the Participating Agency's Project Water identified in Table A ("**Annual Entitlement**"), if at any time and from any cause, the total quantity of Annual Entitlement made available by the State to the Agency under the State Contract is less than the total of all quantities of Annual Entitlement contracted for and requested by this Participating Agency and other Participating Agencies in any Year, the Agency may declare a shortage. During such a shortage, the Agency shall allocate the available Annual Entitlement among all Participating Agencies in proportion to the amount each Participating Agency's Annual Entitlement bears to the sum of all Participating Agencies' Annual Entitlement. The Agency shall similarly allocate available Project Water identified in Table C (**"Advanced Table A"** or **"ATA"**) in proportion to the amount each Participating Agency's share of ATA bears to the sum of all Participating Agencies' ATA, *Provided*, however, that the Agency may allocate Annual Entitlement and ATA on some other basis if such is required to meet minimum demands of Participating Agencies for domestic supply, fire protection, or sanitation during the Year. If, during a shortage, any Participating Agency fails to request or does not intend to use all of its Annual Entitlement or ATA, the Agency shall have the right to temporarily reallocate that Participating Agency's unrequested or unused Annual Entitlement or ATA to other Participating Agencies in proportion to the amount each Participating Agency's share bears to the sum of all Participating Agencies' Annual Entitlement or ATA.

7. **WATER SERVICE TO PARTICIPATING AGENCY**

(a) Subject to the terms of this Contract, the Agency shall make available for delivery to the Participating Agency the amounts of Project Water shown in Table A ("**Annual Entitlement**") and Table C ("**Advanced Table A**" or ("**ATA**"), attached hereto and incorporated herein.

(b) The Agency acknowledges that Participating Agency has agreements and rights to convey water supplies, in addition to Project Water, in the North Bay Aqueduct. The Participating Agency may acquire additional agreements and rights to convey other water supplies in the North Bay Aqueduct. In no event shall Agency be obligated to deliver any water supply through the North Bay Aqueduct to the Participating Agency in excess of the Participating Agency's proportionate share of

Agency's share of the available capacity of the North Bay Aqueduct as shown in Table B. Any unutilized capacity in the North Bay Aqueduct to which the Agency has rights to will be reallocated by the Agency to Participating Agencies, who have the ability to use North Bay Aqueduct capacity, in accordance with Table B. The Agency's share of the available capacity of the North Bay Aqueduct is determined by the State and/or by any future agreement between the Agency and Napa that may address capacity allocation between the Agency and Napa.

(c) The percentages in Table B were calculated by allocating North Bay Aqueduct capacity based on each Participating Agency's share of each of the following components: flow equivalent of maximum Annual Entitlement, 31.5 cubic feet per second for Vallejo Permit Water and 20 cubic feet per second for Excess Peaking Capacity referred to in subsection (c)(1) of Article 12 of the State Contract. If Dixon and/or Rio Vista exercise their right under Section 7(b) of their Participating Agency contract to start taking Project Water through the North Bay Aqueduct, the flow equivalent of their new Annual Entitlement, as well as the corresponding decrease in Annual Entitlement for Participating Agency, Fairfield and Vallejo, shall be included in a revised calculation for the percentages in Table B, which shall then be deemed modified without the need for amendment of this Contract.

8. **ADVANCED TABLE A**

The Settlement Agreement provides for delivery by the State to Agency of Advanced Table A (ATA). Consistent with the terms of the Settlement Agreement, Agency will annually notify the Participating Agency of the amount of ATA, if any, available to the Participating Agency consistent with Table C. The allocations in Table C were calculated by allocating ATA based on each Participating Agency's maximum Annual Entitlement. If Dixon and/or Rio Vista exercise their right under Section 7(b) of their Participating Agency contract to start taking deliveries of Annual Entitlement, their share of ATA, as well as the corresponding decrease in the shares of ATA for Participating Agency, Fairfield and Vallejo, shall be included in a revised calculation for the allocations in Table C, which shall then be deemed modified without the need for amendment of this Contract.

(a) Requests:

1. Participating Agency may submit a written request for delivery of ATA from Agency in conformance with Table C and the parameters of the Settlement Agreement within the deadline the Agency may determine pursuant to subdivision (d) of this Section 8. The request must be accompanied by a proposed monthly delivery schedule showing the intent to fully utilize all other available Project Water and anticipated ATA use.

2. Participating Agency can collaborate with other Participating Agencies to fully utilize available ATA. Collectively, all Participating Agencies' individual requests must be in conformance with the Agency's available ATA as determined by the Settlement Agreement.

3. If the Participating Agency's request for ATA is in conformance with the Settlement Agreement, Agency will make a corresponding request for ATA to the State.

(b) Participating Agency acknowledges that under the terms and conditions of the Settlement Agreement, the Agency may have an obligation to pay back ATA received. If this obligation derives from the Participating Agency's use of ATA, Agency will notify Participating Agency of any pay back obligation and Participating Agency agrees to provide Project Water to meet the pay back obligation in accordance with the Settlement Agreement. Participating Agency may also voluntarily pay back its ATA obligations earlier than prescribed in the Settlement Agreement.

(c) Agency shall maintain records of each Participating Agency's use of ATA and provide an annual report to the Participating Agency.

(d) From time to time, Agency may adopt rules and regulations to implement use and allocation of ATA among and between Participating Agencies.

9. **DELIVERIES TO PARTICIPATING AGENCY, PAYMENT FOR DELIVERY STRUCTURES AND MEASURING DEVICES AND MEASUREMENT OF WATER DELIVERIES**

(a) Project Water made available to the Participating Agency pursuant to this Contract shall be delivered to the Participating Agency at such location on the North Bay Aqueduct as is requested by the Participating Agency and approved by the State. The Participating Agency shall pay all of the costs of any new delivery structure for the delivery of Project Water to it and shall deposit with Agency, prior to the commencement of construction of the delivery structure, the amount of money estimated by the State to be sufficient to cover the costs thereof. The cost of the delivery structure will include the cost of a device for measurement of water deliveries. If the delivery structure is also used by another Participating Agency, the costs shall be allocated among the Participating Agencies on a proportionate use basis. The North Bay Aqueduct Alternate Intake Project is not a "delivery structure".

(b) The Participating Agency shall transmit to Agency schedules showing the amounts, times, and rates of delivery of Project Water desired by the Participating Agency, as and when required by Agency, to comply with Section 12 of the State Contract.

(c) All water furnished pursuant to this Contract is expected to be measured by the State at each Participating Agency delivery structure established pursuant to Section 9(a) hereof. All determinations relative to the measurement of water shall be made by the State and upon request of the Participating Agency the accuracy of the measurement will be investigated by the Agency. Any error appearing therein will be adjusted. The Participating Agency, with permission of the State if necessary, may inspect such measurement equipment for the purpose of determining the accuracy thereof. If the State does not provide a measurement device at the Participating Agency's delivery structure, the Participating Agency shall install, operate and maintain, to the satisfaction of the Agency, a measurement device. Agency may inspect such measurement equipment for the purpose of determining the accuracy thereof.

10. RESPONSIBILITY OF HANDLING WATER AND INDEMNIFICATION

The Participating Agency shall be responsible for the carriage, handling and control of water delivered hereunder after the water has passed the delivery structures referred to in subdivision (a) of Section 9. Neither Agency, the State, nor any of their respective officers, agents or employees shall be liable for any damage or claim of damage of any nature, including, without limitation, property damage, personal injury, or death arising out of or connected with the control, carriage, handling, use, disposal or distribution of such water beyond said delivery structures, and the Participating Agency shall indemnify and hold harmless the State and Agency and their respective officers, agents and employees from any such damages or claims of damage.

11. PLACE OF USE

Project Water cannot be used outside of the Agency's boundary. Participating Agency may sell, trade or exchange Project Water, on a temporary or permanent basis, with other Participating Agencies. Any such transaction of Project Water with other Participating Agencies shall be reported to Agency in writing at the time of the transaction.

12. PAYMENT FOR WATER

(a) The Participating Agency shall pay Agency the rate for Project Water established pursuant to Section 13 hereof for all Project Water furnished to and received by the Participating Agency during each Year throughout the term of this Contract, but for not less than the Annual Entitlement. The Participating Agency shall also pay Agency any applicable charge for State Water Project power pursuant to Section 14 hereof. The Participating Agency shall make said payments not later than the due date stated on Agency's invoices. The due date shall not be earlier than 30 days after receipt of Agency's invoice by the Participating Agency nor more than 30 days prior to the date Agency is obligated to disburse said payment pursuant to the State Contract. Agency intends to invoice Participating Agency two times a year, once in April and once in October. If full payment is not received by Agency within the timeframes specified in this Section, the Participating Agency shall remain obligated to pay the full amount due, plus pay Agency interest on the full amount due at the annual interest rate equivalent to the interest earned on investments on the State of California Treasurer's Office Local Agency Investment Fund, based on the most current reported interest rate, plus two percent (2%), for the time period the payment is not paid beyond the applicable due date.

(b) The obligations of the Participating Agency arising out of or pursuant or incidental to this Contract including, without limiting the generality of the foregoing, the obligations of the Participating Agency to pay to the Agency the sums becoming due the Agency for water furnished hereunder, shall constitute a general obligation of the Participating Agency and the Participating Agency shall use all the powers and resources available to it under the law, including but not limited to causing to be levied, imposed and collected all necessary taxes, assessments, tolls and charges, to collect the funds necessary for and to pay its obligations to the Agency under this Contract.

(c) Should the Participating Agency fail to make any payment to the Agency when the same shall become due for water to be furnished to the Participating Agency pursuant to this Contract, the Agency may thereafter withhold or suspend furnishing water pursuant to this Contract to the Participating Agency, or may impose such conditions upon the same as may be permissible under the terms of the State Contract for as long as Participating Agency remains delinquent in paying the amount due.

13. **PROJECT WATER RATE**

(a) The rate for Annual Entitlement shall be established by Agency for each Year. Except as provided in subsection (b) of this Section 13, the rate shall be $20.50 per acre-foot.

(b) The rate for Annual Entitlement may be increased over the amounts established pursuant to subsection (a) of this Section 13 to the extent necessary to produce an amount of money which, when added to the water rate payments by all the other Participating Agencies and the revenue from Agency's State Water Project tax, hereinafter referred to as "the Tax," and Agency's State Water Project reserve fund, shall be sufficient to enable the Agency to make all payments to the State as and when they are due and payable, to maintain all required reserves, and to fund other Agency costs directly related to the provision of water supply from the State Water Project. The Agency shall not increase the rate for Annual Entitlement to fund capital improvements to the North Bay Aqueduct, where the State gives the Agency a choice of participation in such improvements, without the consent of the Participating Agency.

(c) To the extent necessary to avoid an increase in the rate for Annual Entitlement in accordance with subsection (b) of this Section 13, Agency shall levy the Tax on both secured and unsecured property during each fiscal year through the term of the State Contract at a rate of not more than two cents per $100 of total assessed valuation in the Zone of Benefit established by Resolution 85-183 of the Solano County Flood Control and Water Conservation District, the predecessor of Agency.

(d) Nothing herein shall preclude Agency from using, or require Agency to use, taxation, assessment or other methods of finance to meet its obligations under the State Contract, or to pay other project-related costs on behalf of itself or any Participating Agency.

14. **STATE WATER PROJECT POWER**

(a) Participating Agency has an agreement with Agency for Conveyance of Settlement Water through the North Bay Aqueduct dated March 13, 2003; and may enter into similar agreements for water supply to be transported through the North Bay Aqueduct. These agreements may include a charge to be paid to Agency by Participating Agency for State Water Project power to pump the water supply through the North Bay Aqueduct. Participating Agency also has the ability to use Interruptible Water as specified in Section 17.

(b) Agency will assess, and the Participating Agency agrees to pay, a charge per acre foot for State Water Project power for any water supplies delivered through the North Bay Aqueduct over the Participating Agency's Annual Entitlement for the Year in which the water is delivered. If Carryover contributes to the amount of water over the amount of Annual Entitlement for the year in which the water

was delivered, the amount of water over the amount of Annual Entitlement to be charged shall be reduced by the amount of Carryover that is determined by the Agency to be exempt from State Water Project power charges, if any.

There are two scenarios where Carryover can be found to be exempt from State Water Project power charges based on the circumstances in the Year of Carryover generation. They are:

1. The entire amount of Carryover is exempt when, in the Year that Carryover was generated, the sum of the Annual Entitlement that is allocated by the Agency to the Participating Agency plus any other water supplies delivered to the Participating Agency through the North Bay Aqueduct that is not Annual Entitlement plus Carryover from a prior Year, is less than the Annual Entitlement for the Year.

2. A partial amount of Carryover is exempt when, in the Year that Carryover was generated, the sum of the Annual Entitlement that is allocated by the Agency to the Participating Agency plus any other water supplies delivered to the Participating Agency through the North Bay Aqueduct that is not Annual Entitlement plus Carryover from a prior Year, is greater than the Annual Entitlement. The exempt amount of Carryover is the difference between the Annual Entitlement and the sum of the Annual Entitlement that is delivered to the Participating Agency plus any other water supplies delivered to the Participating Agency that is not Annual Entitlement plus Carryover from a prior Year.

(c) The charge per acre foot to the Participating Agency for State Water Project power shall be calculated by taking the Variable Operations, Maintenance and Replacements components of the Transportation Charge and the Off Aqueduct Facility Charges as specified in the State Contract and as charged to Agency for all water transported through the North Bay Aqueduct for the Year and dividing that sum by the acre feet of all Agency water transported through the North Bay Aqueduct for the Year. The Participating Agency acknowledges that the State sometimes makes later adjustments to the Variable Operations, Maintenance and Replacement components of the Transportation Charge and the Off Aqueduct Facility Charges and that Agency will bill or credit the Participating Agency for past charges as they are assessed to Agency.

(d) From time to time the Agency may adopt rules and regulation to regulate the use and cost of State Water Project power.

15. **RELEASE**

The Participating Agency hereby releases, quitclaims, and rescinds any and all claims it may have against Agency, any of its Participating Agencies, and/or any other entity arising in any manner out of the selection of the route of the North Bay Aqueduct from the Delta to the Participating Agency's turnout.

16. **REDUCTION OF PARTICIPATING AGENCY'S ENTITLEMENT**

(a) Agency reserves the right to reduce the Participating Agency's Annual Entitlement and its corresponding payment obligation pursuant to Section 12 hereof for the purpose of making available a supply of Project Water for the Cities of Rio Vista and Dixon. The total amount by which the Participating Agency's Annual Entitlement shall be reduced is 37.5 percent of the total quantity of Annual Entitlement the Agency makes available to each of the Cities of Rio Vista and Dixon pursuant to their respective Participating Agency contracts. The amount by which the Participating Agency's Annual Entitlement is reduced may vary and shall in no event exceed an ultimate total annual reduction of 1125 acre-feet.

(b) Agency shall give the Participating Agency written notice of each reduction of its Annual Entitlements at least five (5) years prior to the effective date of the reduction, which date shall be the first day of January.

(c) Agency shall include in the Participating Agency Contracts of the Cities of Fairfield and Vallejo a section similar to this Section 16.

17. **INTERRUPTIBLE WATER**

(a) In addition to the Participating Agency's Annual Entitlement and Advanced Table A, from time to time, Agency may be entitled to receive Interruptible Water as defined and set forth in Article 21 of the State Contract.

(b) Agency will allocate any Interruptible Water made available to the Agency by the State by the following procedure:

1. Upon being advised of the availability of Interruptible Water, Agency will promptly advise all Participating Agencies who have the ability to use Project Water of the availability and Agency will obtain from each Participating Agency so advised the amount of Interruptible Water which each Participating Agency requests.

2. Agency will then allocate the Interruptible Water among the Participating Agencies, who have requested Interruptible Water, in proportion to their Annual Entitlement. If any Participating Agency declines Interruptible Water, or requests less than their proportionate share, then any unrequested Interruptible Water will be reallocated by the Agency to Participating Agencies, who have requested Interruptible Water, in proportion to their Annual Entitlements.

(c) Participating Agency may agree with another Participating Agency entitled to Project Water to sell or otherwise transfer its proportional right to Interruptible Water. If Participating Agency makes such an agreement it must notify Agency in writing.

(d) If pursuant to an annual agreement between the State and Agency, a certain percentage of the water available to the Agency pursuant to the State Contract must be used in a certain month, and if, at any time it appears that the taking of Interruptible Water by Participating Agency during such a month will result in Participating Agency not using its proportional share of Agency's mandatory percentage for that month, then Agency may immediately suspend the use of Interruptible Water by Participating Agency.

(e) Participating Agency shall pay Agency for State Water Project power costs for Interruptible Water taken by Participating Agency, as specified in Section 14.

(f) It is understood and agreed that the Cities of Dixon and Rio Vista will not receive Project Water as Participating Agencies until a later date, and it is further understood and agreed that the Cities of Dixon, Rio Vista, and Suisun City are presently not physically able to take Project Water. At such time as any or all of the Cities of Dixon, Rio Vista, and Suisun City are actually taking Project Water, they shall share in the Interruptible Water based upon their respective Annual Entitlement .

(g) It is understood and agreed by Participating Agency and Agency that the availability of Interruptible Water is not certain and that it may or may not be available at any given time or during any Year. Participating Agency expressly agrees that it will not rely upon Interruptible Water to augment its long term water supply or to allow future urban or other development within Participating Agency.

18. **CARRY-OVER ENTITLEMENT WATER ("CARRYOVER")**

(a) Agency may be entitled to deposit and storage of Carryover as set forth in Article 56 of the State Contract. The amount of Project Water Agency can deposit to storage each year is limited to quantities specified in Article 56(c)(1) of the State Contract.

(b) Agency will allocate to Participating Agencies capacity to deposit Carryover, made available by the State to the Agency, by the following procedures:

1. Agency will allocate the available capacity to deposit Carryover to Participating Agencies in proportion to Annual Entitlement.

2. Any unutilized capacity to deposit Carryover will be reallocated by the Agency to Participating Agencies, who have the current ability to accept and treat Project Water and desire additional carryover capacity, in proportion to Annual Entitlement.

(c) Carryover may be lost by a determination of the State pursuant to Article 56(c)(3) of the State Contract. The amount of Participating Agency Carryover lost will be a proportionate share of the total of all Participating Agency Carryover in storage prior to the loss.

(d) It is understood and agreed by Participating Agency and Agency that stored

Carryover may or may not be available at any given time or during any year. Participating Agency expressly agrees that it will not rely upon Carryover to augment its long term water supply or to allow future urban or other development within Participating Agency.

19. **REASONABLENESS OF DETERMINATION**

Where the terms of this Contract provide for action to be based on the opinion or determination of either party to this Contract said term shall not be construed as permitting such actions to be predicated upon arbitrary or unreasonable opinions or determinations.

20. **ASSIGNMENT PROHIBITED**

The provisions of this Contract shall apply to and bind the successors and assigns of the respective parties, but no assignment or transfer of this Contract, or any part thereof or interest therein, shall be valid until and unless approved by the Agency in writing.

21. **NOTICES**

All notices that are required, either expressly or by implication, to be given by any party to the other under this Contract shall be delivered or mailed, United States first-class postage prepaid, addressed as follows:

For the Agency:	SOLANO COUNTY WATER AGENCY 810 Vaca Valley Parkway, Suite 203 Vacaville, California 95688 Attention: General Manager
For the Participating Agency	CITY OF BENICIA 250 East L Street Benicia, California 94510 Attention: City Manager

Notice shall be deemed given (a) two calendar days following mailing via regular or certified mail, returned receipt requested, (b) one business day after deposit with any one day delivery service assuring "next day" deliver, (c) upon actual receipt of notice, or (d) upon transmission, if by facsimile, whichever is earlier. The parties shall promptly give written notice to each other of any change of address and mailing or shipment to the addresses stated herein shall be deemed sufficient unless written notification of a change of address has been received; provided, however, that this Section shall not preclude the effective service of any such notice or announcement by other means.

22. **ATTORNEY'S FEES**

If any legal action is initiated between Participating Agency and Agency in connection with this Contract, then the prevailing party shall be entitled to recover from the losing party all of its costs and expenses, including all costs and reasonable attorneys' fees.

23. **ENTIRE AGREEMENT**

This Contract constitutes the entire agreement between Participating Agency and the Agency and supersedes any preceding Contract, any oral agreement, statement or promise between them relating to the subject matter of this Contract. Any amendment, including oral modification, must be reduced to writing and signed by both parties to be effective.

IN WITNESS WHEREOF, the parties have executed this Contract by their respective officers therewith duly authorized as of the date first above written.

SOLANO COUNTY WATER AGENCY

Attest:

_____ By_____

David Okita, General Manager and Secretary James Spering, Chairman Board of Directors

CITY OF BENICIA, a Municipal Corporation of the State of California

Attest:

_____ By_____

Lisa Wolfe, City Clerk Elizabeth Patterson, Mayor

Approved to as form

_____

Heather McLaughlin, City Attorney

Table A

Annual Entitlements of
Water from North Bay Aqueduct
City of Benicia

17,200 acre feet

Table B

Proportionate Shares of
Agency's North Bay Aqueduct Capacity
(Percentage of Agency Capacity)

City	NBA Reach 1*	NBA Reach 1**	NBA Reach 2
Vallejo	39	33	57
Benicia	29	25	43
Fairfield	20	27	N/A
Suisun City	2	1	N/A
Vacaville	10	14	N/A

Note: If Dixon and Rio Vista should start taking Project Water through the North Bay Aqueduct, percentages will change as specified in Section 7(c).

* Applicable prior to installation of pump referenced in Article 26.2 (c) of the State Contract.
** Applicable after installation of pump referenced in Article 26.2 (c) of the State Contract.

Table C

Advanced Table A Allocations

City	Proportion (%)	Annual Limit (AF)	Cumulative Limit (AF)
Vallejo	13.3	2,000	8,000
Benicia	41.0	6,143	24,571
Fairfield	28.1	4,214	16,857
Suisun City	3.1	464	1,857
Vacaville	14.5	2,179	8,715
Total:	**100%**	**15,000**	**60,000**

Note: If Dixon and Rio Vista should start taking Project Water, allocations will change as specified in Section 8.

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

WATER SUPPLY CONTRACT
BETWEEN

THE STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

AND
SOLANO COUNTY WATER AGENCY

(FORMERLY SOLANO COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT)

Disclaimer: This document integrates Solano County Water Agency's State Water Project water supply contract with the many amendments to the contract entered into since 1963. It is intended only to provide a convenient reference source, and the Department of Water Resources is unable to provide assurances that this integrated version accurately represents the original documents. For legal purposes, or when precise accuracy is required, users should direct their attention to original source documents rather than this integrated version.

(as of November 12, 2003)

EXPLANATORY NOTES

< >	This symbol encloses material supplied to assist the reader but not contained in the basic or amended contract.
Provided	Italics have been added for consistency even though not used in every amendment.
Amendments	Amendments to the contract are indicated by footnotes.
Recitals	In addition to recitals contained in the basic contract, recitals from each contract amendment have also been included. For convenience, an index to recitals by amendment is included on page iii.

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2	Delta Water Rate for 1970. 12-31-69	14, 33, 39
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STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

CONTRACT
BETWEEN THE STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES AND SOLANO COUNTY WATER AGENCY FOR A WATER SUPPLY

THIS CONTRACT, made this 26th day of December, 1963, pursuant to the provisions of the California Water Resources Development Bond Act, the State Central Valley Project Act, and other applicable laws of the State of California, between the State of California, acting by and through its Department of Water Resources, herein referred to as the "State", and Solano County Flood Control and Water Conservation District <Solano County Water Agency>, a public agency in the State of California, duly organized, existing, and acting pursuant to the laws thereof with its principal place of business in Fairfield, California, herein referred to as the "Agency",

WITNESSETH, That:

<Following in Basic Contract>

WHEREAS, the State is authorized to construct and operate facilities for the storage and conveyance of water, certain of which facilities will make water available to the District; <similar provisions in Amendments No. 1> and

WHEREAS, funds will be provided under the California Water Resources Development Bond Act for the construction of said facilities; and

WHEREAS, the Agency is desirous of obtaining a supply of water from the State;

<Following added by Amendment No. 1>

WHEREAS, the State and the Agency have entered into a water supply contract, dated December 26, 1963, providing that the State shall supply certain quantities of water to the Agency, and providing that the Agency shall make certain payments to the State, and setting forth the terms and conditions of such supply and such payment; <similar provision also in Amendments No. 2, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19> and

WHEREAS, the State and the Agency are desirous of making certain changes and additions to such contract, while otherwise continuing the contract in full force and effect; <similar provision also in Amendments No. 6, 7, 9, 10, and 15>

<Following added by Amendment No. 2>

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WHEREAS, Article 22(b) of such water supply contract provides that for each year through the year 1969 the Delta Water Charge shall be the product of $3.50 and the Agency's annual entitlement for the respective year and that beginning in the year 1970, the Delta Water Charge shall be the sum of the capital cost component, minimum operation, maintenance, power and replacement component, and variable operation, maintenance, power and replacement component computed in accordance with Articles 22(c) and (d) of the water supply contract; and

WHEREAS, Articles 22(e) and (g) of such water supply contract provide that the Delta Water Charge as computed in accordance with Articles 22(c) and (d) shall include all projected costs of additional project and supplemental conservation facilities commencing in the years in which the State first incurs capital costs for such facilities after the facilities are authorized; <similar provisions in Amendment No. 11> and

WHEREAS, the parties desire that all water supply contracts be amended to postpone inclusion of the projected costs of any authorized additional project and supplemental conservation facilities in the computation of the Delta Water Charge until after the year 1970 and to fix the rate for computing the Delta Water Charge for the year 1970 at $6.65; and

WHEREAS, the payments to be made by the Agency to the State include interest calculated at the "project interest rate" defined in Article 1(r) of such water supply contract to mean the weighted average of the interest rates paid by the State on bonds issued under the Water Resources Development Bond Act (Bond Act) disregarding premiums received on the sale of such bonds; and

WHEREAS, the underlying assumption upon which the "project interest rate" was established was that all of the initial facilities of the State Water Resources Development System (Project) would be financed principally with proceeds of bonds issued under the Bond Act or from other sources on which the interest rate would not exceed that of the bonds issued under the Bond Act; and

WHEREAS, the State already has financed the Oroville-Thermalito power facilities through Central Valley Project Revenue Bonds and may finance other portions of the project facilities through additional revenue bond issues, bonds issued under other authority granted by the Legislature or the voters, bonds issued by other state agencies, advances from contractors, and other methods under which the financing costs relate to interest rates that may exceed the interest rate of the bonds issued under the Bond Act; and

WHEREAS, either the State or contractors making advances to the State may be subject to interest rates, or other financing costs that relate to interest rates, which will be greater than the "project interest rate" as presently defined in the contracts; and

WHEREAS, the parties desire that (1) the interest costs hereafter incurred by or on behalf of the State in financing the construction of project facilities by means other than the use of moneys provided under the Bond Act will be reflected in appropriate adjustments of

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the “project interest rate” (excepting the interest costs incurred for the Central Valley Project Revenue Bonds issued prior to the date of this amendment); (2) appropriate credit will be given to any contractor having made an advance of funds to the State corresponding to the bond service obligation payable by such contractor by reason of such advance or if bonds were not used to obtain funds for such advance, then to the net interest cost which would have resulted if the contractor had sold bonds for the purpose of funding the advance; and (3) if any sources of funds other than those provided under the Bond Act are employed to finance the construction of specific project facilities and the interest or other costs of such financing are greater than the cost would have been if bonds issued under the Bond Act had been used, appropriate adjustments to the charges to contractors will be made with respect to such facilities so that the charges to contractors taking water through reaches which include such facilities will be the same after such adjustments as such charges would have been if such facilities had been financed by the use of proceeds of bonds issued under the Bond Act, except insofar as the “project interest rate” has been adjusted pursuant to (1) in this recital:

<Following added by Amendment No. 5>

WHEREAS, the State and the Agency included in such contract a subarticle, hereinafter referred to as the agricultural and ground water replenishment provision, which entitles the Agency to obtain from the State a supply of surplus water for agricultural and ground water replenishment use when available; and

WHEREAS, Article 21 of such contract also provides for the sale by the State of a supply of surplus water when available; and

WHEREAS, the State and the Agency desire to amend the provisions of such contract related to the sale and purchase of surplus water;

<Following added by Amendment No. 7>

WHEREAS, each party recognizes the urgent need in California to conserve water by preventing its waste and furthering its efficient use;

WHEREAS, comprehensive programs of conserving project water by all the State’s water contractors may enhance the adequacy, quality and dependability of project water supplies and may lower costs, save energy and reduce inflow to sewage treatment facilities.

<Following added by Amendment No. 11>

WHEREAS, Article 22(b) of such water supply contract, as amended, provides that for beginning in the year 1987 the Delta Water Charge shall be the sum of the capital cost component, minimum operation, maintenance, power and replacement component, and variable operation, maintenance, power and replacement component computed in accordance with Articles 22(c) and (d) of the water supply contract; and

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WHEREAS, the parties desire that the Agency's water supply contract be amended to postpone inclusion of the projected costs of any authorized additional project and supplemental conservation facilities in the computation of the Delta Water Charge after the year 1986 until the happening of certain events.

<Following added by Amendment No. 12>

WHEREAS, the State and the Agency wish to provide financing for project facilities with water system revenue bonds and provide for repayment of water system revenue bonds;

WHEREAS, the State and the Agency wish to clarify the definition of the project interest rate without changing the interpretation of Article 1(r), except for the addition of item (7), and to specify that financing costs of water system facilities and East Branch Enlargement facilities shall not be included in calculating the project interest rate; and

WHEREAS, Article 28 of such water supply contract provides that the State shall redetermine the annual amounts of the Transportation Charge in order that the charges to the Agency may accurately reflect increases or decreases from year to year in projected costs, outstanding reimbursable indebtedness of the State, annual entitlements, estimated deliveries, project interest rate, and all other factors which are determinative of such charges;

WHEREAS, Article 28 also provides that each such redetermination shall include an adjustment of the components of the Transportation Charge to be paid by the Agency for succeeding years which shall account for differences, if any, between projections used by the State in determining the amounts of such components for all preceding years and actual costs incurred by the State during such years, but does not specify the computational details or the method of payment of such adjustments;

WHEREAS, the State is willing to amortize over the remaining repayment period of the contract, the "one-shot" adjustment applied to previous payments resulting from revisions in the project interest rate under conditions defined in this amendment; and

WHEREAS, the State and the Agency wish to correct the duplication in lettering of Article 45(p) added by Amendment 7 on August 22, 1984 and Article 45(p) added by Amendment 10 on November 15, 1985 by redesignating the latter Article 45(p) as Article 45(r) with no substantive change.

<Following added by Amendment No. 13>

WHEREAS, a more efficient use of entitlement water may be achieved by deferral of its use from October, November and December of one calendar year into the first three months of the next year.

WHEREAS, the State and the Agency desire to amend the provisions of such contract related to the delivery and scheduling of entitlement water to allow, under certain conditions,

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the carry-over of a portion of the Agency's entitlement deliveries from a respective year into the first three months of the next calendar year.

WHEREAS, the carry-over of entitlement by the Agency is not intended to adversely impact current or future project operations.

WHEREAS, the State Water Project contractors and the Department are aware that the carry-over of entitlement water from one year into the next may increase or decrease the costs to other SWP contractors in either year. The tracking of those costs may be too complex and expensive and does not warrant special accounting procedures to be established; however, any significant identifiable cost shall be charged to those contractors causing such cost, as determined by the Department;

WHEREAS, the carry-over of entitlement water is not to affect the payment provisions of the contract.

<Following added by Amendment No. 14>

WHEREAS, the State and the Agency included in such contract an article which entitles the Agency to obtain from the State deliveries of surplus water when available;

WHEREAS, the State and the Agency desire to amend the provisions of such contract related to the deliveries of surplus water; and

WHEREAS, beginning January 1, 1991 the Agency desires to be charged for the power used for pumping surplus water at the Melded Power Rate as provided herein for the remainder of the project repayment period.

WHEREAS, the parties to this Amendment, and those approving the Amendment, intend no impact upon their positions with respect to the interpretation of any existing contractual provisions.

<Following added by Amendment No. 15>

WHEREAS, Chapter 573 of the Statutes of 1989 repealed the Solano County Flood Control and Water Conservation District Act, enacted the Solano County Water Agency Act, and provided in Section 5 that the Solano County Water Agency is created as the successor to the Solano County Flood Control and Water Conservation District; and

WHEREAS, the State and the Agency wish to recognize in the contract that the Agency is the successor to the Solano County Flood Control and Water Conservation District, and

WHEREAS, the State and the Agency wish to provide in the contract for deliveries of unscheduled water under circumstances when the State has determined that unscheduled water can be made available, and

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<Following added by Amendment No. 16>

WHEREAS, on December 1, 1994, representatives of the contractors and the State executed a document entitled "Monterey Agreement – Statement of Principles – By the State Water Contractors and the State of California Department of Water Resources For Potential Amendment To the State Water Supply Contracts" (the "Monterey Agreement"); <similar provision also in Amendment No. 18> and

WHEREAS, the contractors and the State have negotiated an amendment to the water supply contracts to implement provisions of the Monterey Agreement (the "Monterey Amendment"); and

WHEREAS, the State and the Agency desire to implement such provisions by incorporating this Monterey Amendment into the water supply contract;

<Following added by Amendment No. 17>

B. The contract was amended to add the Monterey Amendment; the Monterey Amendment and the Environmental Impact Report for the Monterey Agreement were challenged in a lawsuit and addressed by the Court of Appeal in *Planning and Conservation League, et al. v. Department of Water Resources and Central Coast Water Agency <Authority>*, (2000) 83 Cal. App. 4th 892; and petitions for review of the Court of Appeal's decision are now pending before the Supreme Court.

C. The Agency has entered into an agreement with Kern County Water Agency, herein referred to as KCWA, for the permanent transfer of 5,756 acre-feet of State Water Project annual entitlement held by KCWA.

D. The State and Agency wish to set forth their agreement as to such matters as (i) the 5,756 acre-feet per year increase in the Agency's annual entitlement, (ii) the transfer of related transportation repayment obligations, and (iii) the revision of proportionate use of facilities factors set forth in the Water Supply Contract.

E. The State and KCWA are simultaneously, with the execution and delivery of this Amendment, entering into Amendment No. 33 to KCWA's Water Supply Contract between KCWA and the state in order to reflect (i) the transfer of Table A Entitlement described herein, (ii) the transfer of related transportation repayment obligations, and (iii) the revision of proportionate use of facilities factors.

F. An Environmental Impact Report was prepared in compliance with the California Environmental Quality Act and certified on August 10, 2000. No significant impacts on the environment will result from this transfer.

G. This transfer is in furtherance of the state policy in favor of water transfers (Water Code Section 475), will improve water supply reliability and will provide a supply

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adequate to meet planned population growth and development objectives specified in the Agency's member cities.

<Following added by Amendment No. 18>

C. The State, the Central Coast Water Authority ("CCWA") and those contractors intending to be subject to the Monterey Agreement subsequently negotiated an amendment to their contracts to implement provisions of the Monterey Agreement, and such amendment was named the "Monterey Amendment."

D. In October 1995, an environmental impact report ("EIR") for the Monterey Amendment was completed and certified by CCWA as the lead agency, and thereafter the Agency and the State executed the Monterey Amendment.

E. The EIR certified by the CCWA was challenged by several parties (the "Plaintiffs") in the Sacramento County Superior Court and thereafter in the Third District Court of Appeal, resulting in a decision in Planning and Conservation League, et al. v. Department of Water Resources, 83 Cal. App.4th 892 (2000), which case is hereinafter referred to as "PCL v. DWR."

F. In its decision, the Court of Appeal held that (i) the Department of Water Resources ("DWR"), not CCWA, had the statutory duty to serve as lead agency, (ii) the trial court erred by finding CCWA's EIR sufficient despite its failure to discuss implementation of Article 18, subdivision (b) of the State Water Project contracts, as a no-project alternative, (iii) said errors mandate preparation of a new EIR under the direction of DWR, and (iv) the trial court erroneously dismissed the challenge to DWR's transfer of title to certain lands to Kern County Water Agency (the "Validation Cause of Action") and execution of amended State Water Project contracts for failure to name and serve indispensable parties. The Court of Appeal remanded the case to the trial court, ordering it to take the following five actions: (1) vacate the trial court's grant of the motion for summary adjudication of the Validation Cause of Action; (2) issue a writ of mandate vacating the certification of the EIR; (3) determine the amount of attorney fees to be awarded Plaintiffs; (4) consider such orders it deems appropriate under Public Resources Code Section 21168.9(a) consistent with the views expressed in the Appellate Court's opinion; and (5) retain jurisdiction over the action until DWR, as lead agency, certifies an environmental impact report in accordance with CEQA standards and procedures, and the Superior Court determines that such environmental impact report meets the substantive requirements of CEQA.

G. The State, the contractors, and the Plaintiffs in PCL v. DWR reached an agreement to settle PCL v. DWR, as documented by that certain Settlement Agreement dated May 5, 2003 (the "Settlement Agreement"), and in such Settlement Agreement have agreed that the contracts should be amended, for clarification purposes, to delete terms such as "annual entitlement" and "maximum annual entitlement" so that the public, and particularly land use planning agencies, will better understand the contracts.

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H. Pursuant to the Settlement Agreement, the State and the Agency desire to so amend the Agency's contract, with the understanding and intent that the amendments herein with respect to subsections (k), (l), and (m) of Article 1, subsection (b) of Article 6, and subsection (a) of Article 16, and to Table A of the Agency's contract are solely for clarification purposes and that such amendments are not intended to and do not in any way change the rights, obligations or limitations on liability of the State or the Agency established by or set forth in the contract.

I. Pursuant to the Settlement Agreement, the State, the contractors and the Plaintiffs in PCL v. DWR also agreed that the contracts should be amended to include a new Article 58 addressing the determination of dependable annual supply of State Water Project water to be made available by existing Project facilities, and the State and Agency desire to so amend the Agency's contract.

<Following added by Amendment No. 19>

B. On December 8, 2000, the State and Agency entered Amendment No. 17 to the Water Supply Contract setting forth their agreement as to such matters as (i) the 5,756 acre-feet per year increase in the Agency's annual Table A amount, (ii) the transfer of related transportation repayment obligations, and (iii) the revisions of proportionate use of facilities factors set forth in the Water Supply Contract.

C. Pursuant to Section 3(b) of Amendment No. 17, the State and Agency agreed that the Agency would be liable for retroactive and prospective charges for North Bay Aqueduct capital costs attributable to the Table A amount increase.

D. Subsequent to entering Amendment No. 17, the Agency and the State have approved the Agency's request to pay only prospective charge for North Bay Aqueduct costs attributable to the annual Table A increase of 5,756 acre-feet. The effective date of this change would be the year following the execution date of the amendment.

E. Pursuant to Section 1 of Amendment No. 17, Article 53(j) was numbered incorrectly. To be consistent with the other water supply contracts, Article 53(j) should be renumbered to Article 45(s).

NOW THEREFORE, it is mutually agreed as follows:

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A. INTRODUCTORY PROVISIONS

[1]The Solano County Water Agency is hereby recognized as the successor to all the rights and obligations of the Solano County Flood Control and Water Conservation District under this contract. All references in this contract to the Solano County Flood Control and Water Conservation District and to the "Agency" shall be references to the Solano County Water Agency.

1. DEFINITIONS.

When used in this contract, the following terms shall have the meanings hereinafter set forth:

(a) "Bond Act" shall mean the California Water Resources Development Bond Act, comprising Chapter 8 (commencing at Section 12930) of Part 6 of Division 6 of the Water Code.

(b) "System" shall mean the State Water Resources Development System as defined in Section 12931 of the Water Code.

(c) "Delta" shall mean the Sacramento-San Joaquin Delta as defined in Section 12220 of the Water Code on November 8, 1960.

(d) [2]"Contractor" shall mean any entity that has executed, or is an assignee of, a contract of the type published in Department of Water Resources Bulletin No. 141 dated November 1965, with the State for a dependable supply of water made available by the System, except such water as is made available by the facilities specified in Section 12934(d)(6) of the Water Code.

(e) [3]"Project facilities" shall mean those facilities of the system which will, in whole or in part, serve the purposes of this contract by conserving water and making it available for use in and above the Delta and for export from the Delta and from such additional facilities as are defined in Article 1(h)(2) herein, and by conveying water to the District <Agency>. Said project facilities shall consist specifically of "project conservation facilities" and "project transportation facilities", as hereinafter defined.

(f) "Project conservation facilities" shall mean such project facilities as are presently included, or as may be added in the future, under (g) and (h) below.

(g) "Initial project conservation facilities" shall mean the following project facilities specified in Section 12934(d) of the Water Code:

---

[1] Amended: Amendment No. 15
[2] Amended: Amendment No. 16
[3] Amended: Amendment No. 9

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(1) All those facilities specified in subparagraph (1) thereof.

(2) Those facilities specified in subparagraph (3) thereof to the extent that they serve the purposes of water conservation in the Delta, water supply in the Delta, and transfer of water across the Delta.

(3) A reservoir near Los Banos in Merced County as specified in subparagraph (2) thereof.

(4) The reach of the San Joaquin Valley-Southern California Aqueduct extending from the Delta to a reservoir near Los Banos in Merced County, to the extent required for water conservation through conveyance of water diverted from the Delta to offstream storage in said reservoir as determined by the State.

(5) Those facilities specified in subparagraph (5) thereof which are incidental to the facilities included under (1), (2), (3), and (4) above.

(6) Those facilities specified in subparagraph (7) thereof which are necessary and appurtenant to the facilities included under (1), (2), (3), (4), and (5) above.

(h) [4]"Additional project conservation facilities" shall mean the following facilities and programs which will serve the purpose of preventing any reduction in the minimum project yield as hereinafter defined:

(1) Those project facilities specified in Section 12938 of the Water Code;

(2) Those facilities and programs described in (A), (B), (C), (D), and (E) below which, in the State's determination, are engineeringly feasible and capable of producing project water which is economically competitive with alternative new water supply sources, provided that, in the State's determination, the construction and operation of such facilities and programs will not interfere with the requested deliveries of annual entitlement to any contractor other than the sponsoring contractor, and will not result in any greater annual charges to any contractor other than the sponsoring contractor than would have occurred with the construction at the same time of alternative new water supply sources which are either reservoirs located north of the Delta or off-Aqueduct storage reservoirs located south or west of the Delta designed to supply water to the California Aqueduct. The following facilities and programs shall hereinafter be referred to as "Local Projects":

[4] Amended: Amendment No. 9

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(A) On-stream and off-stream surface storage reservoirs not provided for in Section 12938 of the Water Code, that will produce project water for the System for a period of time agreed to by the sponsoring contractor;

(B) Ground water storage facilities that will produce project water for the System for a period of time agreed to by the sponsoring contractor;

(C) Waste water reclamation facilities that will produce project water for the System for a period of time agreed to by the sponsoring contractor;

(D) Water and facilities for delivering water purchased by the State for the System for a period of time agreed to by the sponsoring contractor; provided that the economic test specified herein shall be applied to the cost of these facilities together with the cost of the purchased water; and

(E) Future water conservation programs and facilities that will reduce demands by the sponsoring contractor for project water from the System for a period of time agreed to by the sponsoring contractor and will thereby have the effect of increasing project water available in the Delta for distribution.

(3) Whether a Local Project described in (2) above shall be considered economically competitive shall be determined by the State by comparing, in an engineering and economic analysis, such Local Project with alternative new water supply sources which are either reservoirs located north of the Delta or off-Aqueduct storage reservoirs located south or west of the Delta designed to supply water to the California Aqueduct. The analysis for such alternative new water supply sources shall use the average cost per acre-foot of yield in the latest studies made for such sources by the State and shall compare those facilities with the proposed Local Project using commonly accepted engineering economics. In the case of a Local Project to be funded in part by the State as part of the System and in part from other sources, the economic analysis specified herein shall be applied only to the portion to be funded by the State as part of the System.

(4) The Local Projects in (2) above shall not be constructed or implemented unless or until:

(A) The sponsoring contractor signs a written agreement with the State which:

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(i) Contains the sponsoring contractor's approval of such facility or program.

(ii) Specifies the yield and the period of time during which the water from the Local Project shall constitute project water; and

(iii) Specifies the disposition of such Local Project or of the yield from such Local Project upon the expiration of such period of time; and

(B) All contractors within whose boundaries any portion of such Local Project is located, and who are not sponsoring contractors for such Local Project give their written approval of such Local Project.

(5) "Sponsoring contractor" as used in this Article 1(h) shall mean the contractor or contractors who either will receive the yield from facilities described in 2(A), (B), (C), or (D) above, or agree to reduce demands for project water from the System pursuant to 2(E) above.

(6) In the event of a shortage in water supply within the meaning of Article 18(a), the determination of whether to count, in whole or in part, the yield from facilities described in 2(A), (B), (C), or (D) above, or the reduced demand from future conservation programs described in 2(E) above in the allocation of deficiencies among contractors will be based on a project-by-project evaluation taking into consideration such factors as any limitation on the use of the water from such facilities and whether the sponsoring contractor has access to project water from the Delta as an alternate to such facilities.

(i) "Project transportation facilities" shall mean the following project facilities:

(1) Specified in Water Code Section 12935(d)(2) which are described in Table H of this contract;

(2) [5]Facilities for the generation and transmission of electrical energy of the following types:

(A) Hydroelectric generating and transmission facilities, whose operation is dependent on the transportation of project water, or on releases to channels downstream of project facilities defined under (1) above. Such facilities shall be called "project aqueduct power recovery plants."

[5] Amended: Amendment No. 9

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(B) All other generating and associated transmission facilities, except those dependent on water from project conservation facilities, for the generation of power. These facilities shall be called "off-aqueduct power facilities" and shall consist of the State's interest in the Reid-Gardner and any other generating and associated transmission facilities, constructed or financed in whole or in part by the State, which are economically competitive with alternative power supply sources as determined by the State.

(3) Specified in Water Code Section 12934(d)(7) which are necessary and appurtenant to the facilities included under (1) and (2) above.

(j) "Project water" shall mean water made available for delivery to the contractors by the project conservation facilities and by the transportation facilities included in the System.

(k) [6]"Minimum Project Yield" shall mean the dependable annual supply of project water to be made available assuming completion of the initial project conservation facilities and additional project conservation facilities. The project's capability of providing the minimum project yield shall be determined by the State on the basis of coordinated operations studies of initial project conservation facilities and additional project conservation facilities, which studies shall be based upon factors including but not limited to: (1) the estimated relative proportion of deliveries for agricultural use to deliveries for municipal use assuming Maximum Annual Table A Amounts for all contractors and the characteristic distributions of demands for these two uses throughout the year; and (2) agreements now in effect or as hereafter amended or supplemented between the State and the United States and others regarding the division of utilization of waters of the Delta or streams tributary thereto.

(l) [7]"Annual Table A Amount" shall mean the amount of project water set forth in Table A of this contract that the State, pursuant to the obligations of this contract and applicable law, makes available for delivery to the Agency at the delivery structures provided for the Agency. The term Annual Table A Amount shall not be interpreted to mean that in each year the State will be able to make that quantity of project water available to the Agency. The Annual Table A Amounts and the terms of this contract reflect an expectation that under certain conditions the Agency will receive its full Annual Table A Amount; but that under other conditions only a lesser amount, allocated in accordance with this contract, may be made available to the Agency. This recognition that full Annual Table A Amounts will not be deliverable under all conditions does not change the obligations of the State under this contract, including but not limited to, the obligations to make all reasonable efforts to complete the project facilities, to perfect and protect water rights, and to allocate among contractors the supply available in any year, as set forth in Articles 6(b), 6(c), 16(b)

[6] Amended: Amendments No. 1, 16, and 18

[7] Amended: Amendment No. 18

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and 18, in the manner and subject to the terms and conditions of those articles and this contract. Where the term "annual entitlement" appears elsewhere in this contract, it shall mean "Annual Table A Amount." The State agrees that in future amendments to this and other contractor's contracts, in lieu of the term "annual entitlement," the term "Annual Table A Amount" will be used and will have the same meaning as "annual entitlement" wherever that term is used.

(m) [8]"Maximum Annual Table A Amount"

"Maximum annual entitlement" shall mean the maximum annual amounts set forth in Table A of this contract, and where the term "maximum annual entitlement" appears elsewhere in this contract it shall mean "Maximum Annual Table A Amounts."

(n) "Supplemental conservation facilities" shall mean those facilities provided for in Section 12938 of the Water Code which will serve the purpose of supplying water in addition to the minimum project yield, and for meeting local needs.

(o) "Supplemental water" shall mean water made available by supplemental conservation facilities, in excess of the minimum project yield.

(p) "Year" shall mean the 12-month period from January 1 through December 31, both dates inclusive.

(q) "Year of initial project water delivery" shall mean the year when project water will first be available for delivery to a contractor pursuant to its contract with the State.

(r) [9]"Project interest rate" shall mean the weighted average interest rate on bonds, advances, or loans listed in this section to the extent the proceeds of any such bonds, advances, or loans are for construction of the State Water Facilities defined in Section 12934(d) of the Water Code, the additional project conservation facilities, and the supplemental conservation facilities (except off-aqueduct power facilities; water system facilities; advances for delivery structures, measuring devices and excess capacity; and East Branch Enlargement Facilities). The project interest rate shall be calculated as a decimal fraction to five places by dividing (i) the total interest cost required to be paid or credited by the State during the life of the indebtedness or advance by (ii) the total of the products of the various principal amounts and the respective terms in years of all such amounts. The bonds, advances, or loans used in calculating the project interest rate shall be:

[8] Amended: Amendment No. 18

[9] Amended: Amendments No. 2, 9, and 12

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(1) General obligation bonds issued by the State under the Bond Act, except that any premium received on the sale of these bonds shall not be included in the calculation of the project interest rate,

(2) Revenue bonds issued by the State under the Central Valley Project Act after May 1, 1969,

(3) Bonds issued by the State under any other authority granted by the Legislature or the voters,

(4) Bonds issued by any agency, district, political subdivision, public corporation, or nonprofit corporation of this State,

(5) Funds advanced by any contractor without the actual incurring of bonded debt therefor, for which the net interest cost and terms shall be those which would have resulted if the contractor had sold bonds for the purpose of funding the advance, as determined by the State,

(6) Funds borrowed from the General Fund or other funds in the Treasury of the State of California, for which the total interest cost shall be computed at the interest rate earned over the period of such borrowing by moneys in the Surplus Money Investment Fund of such Treasury invested in securities, and

(7) Any other financing capability available in the Treasury of the State of California at whatever interest rate and other financing costs are provided in the law authorizing such borrowing. However, the use of other financing from the State Treasury is intended to involve only short term borrowing at interest rates and other financing costs no greater than those charged to other State agencies during the same period until such time as the Department can sell bonds and reimburse the source of the short term borrowing from the proceeds of the bond sale.

(s) "Capital costs" shall mean all costs incurred subsequent to authorization of a facility for construction by the Legislature or by administrative action pursuant to Section 11290 of the Water Code and to the Bond Act, including those so incurred prior to the beginning of the project repayment period as herein defined and any accrued unpaid interest charges thereon at the rates specified herein, which are properly chargeable to the construction of and the furnishing of equipment for the facilities of the System, including the costs of surveys, engineering studies, exploratory work, designs, preparation of construction plans and specifications, acquisition of lands, easements and rights-of-way, relocation work, and essential administrative work in connection therewith, all as shown upon the official records of the Department of Water Resources.

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(t) [10]"Project repayment period" shall mean that period of years commencing on January 1, 1961, and extending until December 31, 2035, p*rovided*, that if construction of any project facilities is financed by a bond issue with maturity dates later than December 31, 2035, whether the bonds are issued pursuant to the Bond Act or other authority, repayment of the costs of such facilities shall be extended to end on the date of the latest maturities of the bonds with which construction of such facilities is financed.

(u) "Municipal use" shall mean all those uses of water common to the municipal water supply of a city, town, or other similar population group, including uses for domestic purposes, uses for the purposes of commerce, trade or industry, and any other use incidental thereto for any beneficial purpose.

(v) "Manufacturing use" shall mean any use of water primarily in the production of finished goods for market.

(w) "Agricultural use" shall mean any use of water primarily in the production of plant crops or livestock for market, including any use incidental thereto for domestic or stock-watering purposes.

(x) "Subject to approval by the State" shall mean subject to the determination and judgment of the State as to acceptability.

(y) "Area of origin statutes" shall mean Section 10505 and 11460 through 11463 of the Water Code as now existing or hereafter amended.

[11](z) Reserved for future use.

(aa) Reserved for future use.

(bb) Reserved for future use.

[12] (cc) "Water system revenue bonds" shall mean revenue bonds or revenue bond anticipation notes issued by the State under the Central Valley Project Act after January 1, 1987 for water system facilities identified in Article 1(hh).

(dd) Reserved for future use.

(ee) Reserved for future use.

(ff) Reserved for future use.

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[10] Amended: Amendment No. 6
[11] Amended: Amendment No. 12
[12] Amended: Amendment No. 12

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[13](gg) "East Branch Enlargement Facilities" shall mean all of the following:

(1) The facilities remaining to be constructed as part of the East Branch Enlargement construction;

(2) The work done pursuant to the letter agreement between the State and The Metropolitan Water District of Southern California dated November 29, 1966, which consisted of constructing the California Aqueduct between Cottonwood (now known as Alamo) Powerplant and Cedar Springs (now known as Silverwood) Reservoir so that, by future additions to the canal lining, siphons, and additional pumping units at Pearblossom Pumping Plant, the capacity could be increased by a then-estimated approximately 700 cubic feet per second;

(3) That portion of the enlargement of the Pearblossom Pumping Plant Forebay and Cofferdam construction which would not have been constructed but for the proposed East Branch Enlargement and which was done pursuant to the letter agreement between the State and The Metropolitan Water District of Southern California, dated January 19, 1984;

(4) That portion of the canal lining work between Alamo Powerplant and Pearblossom Pumping Plant done pursuant to the letter agreements between the State and The Metropolitan Water District of Southern California, dated July 2, 1984, and May 15, 1985, which increased the East Branch Aqueduct capacity beyond that set forth in Table B-2 as shown in State Bulletin 132-70;

(5) That portion of Reach 24 (Silverwood Lake) to be determined by reallocation of Reach 24 to reflect the additional use to be made of that reach as a result of the East Branch Enlargement operation; and

(6) That portion of Reach 25 (San Bernardino Tunnel) to be determined by an allocation of total delivery capacity of Reach 25 between the basic East Branch facilities and the East Branch Enlargement as a result of East Branch Enlargement operation.

[14](hh) "Water System Facilities" shall mean the following facilities to the extent that they are financed with water system revenue bonds or to the extent that other financing of such facilities is reimbursed with proceeds from water system revenue bonds:

(1) The North Bay Aqueduct,

[13] Amended: Amendment No. 12

[14] Amended: Amendments No. 12 and 16

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(2) The Coastal Branch Aqueduct,

(3) Delta Facilities, including Suisun Marsh facilities, to serve the purposes of water conservation in the Delta, water supply in the Delta, transfer of water across the Delta, and mitigation of the environmental effects of project facilities, and to the extent presently authorized as project purposes, recreation and fish and wildlife enhancement,

(4) Local projects as defined in Article 1(h)(2) designed to develop no more than 25,000 acre-feet of project yield from each project,

(5) Land acquisition prior to December 31, 1995, for the Kern Fan Element of the Kern Water Bank,

(6) Additional pumps at the Banks Delta Pumping Plant,

(7) The transmission line from Midway to Wheeler Ridge Pumping Plant,

(8) Repairs, additions, and betterments to conservation or transportation facilities existing as of January 1, 1987, and to all other facilities described in this subarticle (hh) except for item (5),

(9) A project facilities corporation yard, and

(10) A project facilities operation center.

[15](ii) "Carry-over Entitlement Water" shall mean water from a contractor's annual entitlement for a respective year which is made available for delivery by the State in the next year pursuant to Article 12(e).

[16](jj) "Interruptible water" shall mean project water available as determined by the State that is not needed for fulfilling contractors' annual entitlement deliveries as set forth in their water delivery schedules furnished pursuant to Article 12 or for meeting project operational requirements, including storage goals for the current or following years.

[17](kk) "Nonproject water" shall mean water made available for delivery to contractors that is not project water as defined in Article 1(j).

[15] Amended: Amendment No. 13
[16] Amended: Amendment No. 16
[17] Amended: Amendment No. 16

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[18](ll) "Monterey Amendments" shall mean this amendment and substantially similar amendments to other contractors' water supply contracts that include, among other provisions, the addition of Articles 51 through 56.

2. [19]TERM OF CONTRACT.

This contract shall become effective on the date first above written and shall remain in effect for the longest of the following:

1. The project repayment period

2. 75 years

3. The period ending with the latest maturity date of any bond issue used to finance the construction costs of project facilities.

3. VALIDATION.

Within one (1) year after the effective date of this contract, the Agency shall submit this contract to a court of competent jurisdiction for determination of its validity by a proceeding in mandamus or other appropriate proceeding or action, which proceeding or action shall be diligently prosecuted to final decree or judgment. In the event that this contract is determined to be invalid by such final decree or judgment, the State shall make all reasonable efforts to obtain validating legislation at the next session of the Legislature empowered to consider such legislation, and within six (6) months after the close of such session, if such legislation shall have been enacted, the Agency shall submit this contract to a court of competent jurisdiction for redetermination of its validity by appropriate proceeding or action, which proceeding or action shall be diligently prosecuted to final decree or judgment.

4. [20]OPTION FOR CONTINUED SERVICE.

By written notice to the State at least six (6) months prior to the expiration of the term of this contract, the Agency may elect to receive continued service after expiration of said term under the following conditions unless otherwise agreed to:

(1) Service of water in annual amounts up to and including the Agency's maximum annual entitlement hereunder.

(2) Service of water at no greater cost to the Agency than would have been the case had this contract continued in effect.

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[18] Amended: Amendment No. 16
[19] Amended: Amendment No. 6
[20] Amended: Amendment No. 16

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(3) Service of water under the same physical conditions of service, including time, place, amount and rate of delivery, as are provided for hereunder.

(4) Retention of the same chemical quality objective provision as is set forth herein.

(5) Retention of the same options to utilize the project transportation facilities as are provided for in Articles 18(c) and 55, to the extent such options are then applicable.

Other terms and conditions of the continued service shall be reasonable and equitable and shall be mutually agreed upon. In the event that said terms and conditions provide for continued service for a limited number of years only, the Agency shall have the same option to receive continued service here provided for upon the expiration of that and each succeeding period of continued service.

5. PLEDGE OF REVENUES.

This contract is entered into for the direct benefit of the holders and owners of all general obligation bonds issued under the Bond Act, and the income and revenues derived from this contract are pledged to the purposes and in the priority set forth in that act.

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B. WATER SERVICE PROVISIONS

6. ANNUAL ENTITLEMENTS.

(a) Year of Initial Water Delivery

The year of initial water delivery to the Agency is presently estimated to be 1980. To the extent practicable, the State shall notify the Agency of any change in this estimate.

(b) [21]Agency's Annual Table A Amounts

Commencing with the year of initial water delivery to the Agency, the State each year shall make available for delivery to the Agency the amounts of project water designated in Table A of this contract, which amounts shall be subject to change as provided for in Article 7(a) and are referred to in this contract as the Agency's Annual Table A Amounts.

(c) Obligation of State to Complete Facilities

Subject to the availability of funds, the State shall make all reasonable efforts consistent with sound fiscal policies, reasonable construction schedules, and proper operating procedures to complete the project facilities necessary for delivery of project water to the Agency in such manner and at such times that said delivery can commence in or before the year specified in subdivision (a) of this article, and continue in the amounts designated in Table A of this contract.

(d) [22]Deliveries Prior to Completion of North Bay Aqueduct

Prior to the date water is delivered to the Agency through the North Bay Aqueduct (hereinafter referred to as the date of initial aqueduct delivery), all water shall be delivered to the Agency at the diversion works of the City of Vallejo on Cache Slough. If initial aqueduct delivery occurs after January 1988, the Total Annual Amount for 1988 shall be 2,100 acre-feet prorated from January 1, 1988 to the date of initial aqueduct delivery and the amount shown in Table A Amended for said year prorated from the date of initial delivery to the end of the year. The Agency may increase the Total Annual Amount for any year prior to the year of initial aqueduct delivery provided, first, that the increased amount shall not exceed 10,800 acre-feet, second, that the Agency gives the State written notice of the increase on or before September 1 of the year before the increase is effective, and third, that if the increase is more than 500 acre-feet the excess shall not be effective for the first year following such notice if it would cause or increase a shortage in the entitlement deliveries to other contractors.

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[21] Amended: Amendment No. 18

[22] Amended: Amendments No. 6 and 11

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[23]TABLE A
SOLANO COUNTY WATER AGENCY

Year		Total Annual Amount In Acre-feet
1	(1980)	500
2	(1981)	650
3	(1982)	800
4	(1983)	950
5	(1984)	1,100
6	(1985)	1,250
7	(1986)	1,400
8	(1987)	1,500
9	(1988)	15,660
10	(1989)	18,420
11	(1990)	21,250
12	(1991)	22,300
13	(1992)	24,170
14	(1993)	26,130
15	(1994)	28,080
16	(1995)	34,250
17	(1996)	37,800
18	(1997)	38,250
19	(1998)	38,710
20	(1999)	39,170
21	(2000)	39,620
22	(2001)	45,836
23	(2002)	46,296
24	(2003)	46,756
25	(2004)	47,206
26	(2005)	47,256
27	(2006)	47,306
28	(2007)	47,356
29	(2008)	47,406
30	(2009)	47,456
31	(2010)	47,506
32	(2011)	47,556
33	(2012)	47,606
34	(2013)	47,656
35	(2014)	47,706
36	(2015)	47,756
And each succeeding year thereafter, for the term of this contract as a maximum Annual entitlement:		47,756

In any year, the amounts designated in this Table A shall not be interpreted to mean that the State is able to deliver those amounts in all years. Article 58 describes the State's process for providing current information for project delivery capability.

[23] Amended: Amendments No. 1, 6, 7, 11, 17, and 18

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7. CHANGES IN ANNUAL ENTITLEMENTS; MAXIMUM ANNUAL ENTITLEMENT.

(a) [24]Changes in Annual Entitlements.

The Agency may, at any time or times during the term of this contract, by timely written notice furnished to the State, request that project water be made available to it thereafter in annual amounts greater or less than the annual entitlements designated in Table A of this contract. Subject to approval by the State of any such request, the State's construction schedule shall be adjusted to the extent necessary to satisfy the request, and the requested increases or decreases in said annual entitlements shall be incorporated in said Table A by amendment thereof. Requests for changes in annual entitlements for more than one year shall be approved by the State: *Provided*, That no change shall be approved if in the judgment of the State it would impair the financial feasibility of project facilities.

(b) Maximum Annual Entitlement of Agency

The maximum amount of project water to be made available to the Agency in any one year under this contract shall be that specified in Table A of this contract and in said table designated as the Agency's "Maximum Annual Entitlement." In no event shall such maximum amount of project water to be made available to the Agency be increased over this amount, except as is otherwise provided in this contract.

8. OPTION TO INCREASE MAXIMUM ANNUAL ENTITLEMENT.

In the event that the maximum annual entitlements under all contracts executed by the State on or before December 31, 1963, do not aggregate the amount of the minimum project yield as herein defined, the State shall immediately notify the Agency and all other contractors, and the Agency may elect to become entitled to the uncontracted for portion of the minimum project yield in or up to an amount which bears the same ratio to such uncontracted for portion as the Agency's maximum annual entitlement bears to the total of the maximum annual entitlements of all contractors as of that date: *Provided*, That such option may be exercised only to the extent that the water involved can be put to beneficial use within a reasonable period of time. Such option shall become effective on the date that the Agency receives said notice from the State and shall remain in effect through September 30, 1964. If the full amount of such uncontracted for portion of the minimum project yield is not preempted by the Agency under this option and by other contractors through the exercise of similar options on or before September 30, 1964, the Agency may request that it become entitled to any amount of such water not so preempted. Such request shall be subject to approval by the State and shall be considered in the light of all similar requests from other contractors. The State shall approve such request only to the extent that the water involved can be put to beneficial use within a reasonable

[24] Amended: Amendment No. 16

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period of time. Upon the exercise of such option or upon the approval of such request the Agency's maximum annual entitlement in Table A of this contract shall be increased by the amount of the additional entitlement thereby obtained by amendment of that table, and the Agency shall become obligated and hereby agrees to pay to the State a proportionate share of the costs attributable to such increase in accordance with cost allocation principles and procedures set forth in this contract. The service of and payment for said increased entitlement shall in all respects be subject to the terms and conditions of this contract.

9. DELIVERY POINTS.

Project water made available to the Agency pursuant to Article 6 shall be delivered to the Agency by the State at the delivery structures established in accordance with Article 10.

10. DELIVERY STRUCTURES.

(a) Determination of Size and Location of Delivery Structures

Project water made available to the Agency pursuant to this contract shall be delivered to the Agency at such locations and times and through delivery structures of such capacities as are requested by the Agency and approved by the State.

(b) Agency Requests as to Initial Delivery Structures

Pursuant to subdivision (a) of this article, the District shall furnish to the State on or before February 1, 1964, its written requests as to:

(1) The location of delivery structures for delivery of project water to it.

(2) The time at which project water is first to be delivered through each such delivery structure.

(3) The maximum instantaneous flow capacity in cubic feet per second to be provided in each such delivery structure.

(4) The maximum amount of water in acre-feet to be delivered in any one month through each such delivery structure.

(5) The total combined maximum instantaneous flow capacity in cubic feet per second to be provided by all such delivery structures.

(6) The total maximum amount of water in acre-feet to be delivered in any one month through all such delivery structures.

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(c) Requests by Agency for Additional Delivery Structures

From time to time the District may request delivery structures in addition to those requested pursuant to subdivision (b) of this article.

(d) Agency to Advance Funds for Delivery Structure

The Agency shall pay all of the costs of delivery structures for the delivery of water to it, and shall deposit with the State, prior to the commencement of construction of any such delivery structure, an amount of money estimated by the State to be sufficient to cover the costs thereof.

11. MEASUREMENT OF WATER DELIVERED.

(a) Measurement by State

The State shall measure all project water delivered to the Agency and shall keep and maintain accurate and complete records thereof. For this purpose, the State shall install, operate, and maintain at all delivery structures for delivery of project water to the Agency such measuring devices and equipment as are satisfactory and acceptable to both parties. Said devices and equipment shall be examined, tested, and serviced regularly to insure their accuracy. At any time or times, the Agency or any other contractor may inspect such measuring devices and equipment, and the measurements and records taken therefrom.

(b) Agency to Advance Funds for Measuring Devices

The Agency shall pay all of the costs of acquiring and installing the measuring devices and equipment provided for in subdivision (a) of this article, and shall deposit with the State, prior to such acquisition and installation, an amount of money estimated by the State to be sufficient to cover such costs.

12. [25]PRIORITIES, AMOUNTS, TIMES AND RATES OF DELIVERIES. <Only Article Title Amended.>

(a) Procedure for Determining Water Delivery Schedule

The amounts, times, and rates of delivery of project water to the Agency during any year shall be in accordance with a water delivery schedule for that year, such schedule to be determined in the following manner:

(1) On or before October 1 of each year, the Agency shall submit in writing to the State a preliminary water delivery schedule, subject to the provisions of this article and Articles 6(b), 7(b), 10, and 17, indicating the

[25] Amended: Amendment No. 16

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amounts of water desired by the Agency during each month of the succeeding five (5) years.

(2) [26]Upon receipt of a preliminary schedule the State shall review it and, after consultation with the Agency, shall make such modifications in it as are necessary to insure the delivery of the annual quantity allocated to the Agency in accordance with Article 18 and to insure that the amounts, times, and rates of delivery to the Agency will be consistent with the State's overall delivery ability, considering the then current delivery schedules of all contractors. On or before December 1 of each year, the State shall determine and furnish to the Agency the water delivery schedule for the next succeeding year which shall show the amounts of water to be delivered to the Agency during each month of that year.

(3) A water delivery schedule may be amended by the State upon the Agency's written request. Proposed amendments shall be submitted by the Agency within a reasonable time before the desired change is to become effective, and shall be subject to review and modification by the State in like manner as the schedule itself.

(b) Limit on Peak Deliveries of Water

In no event shall the State contract to deliver to any contractor from the project transportation facilities downstream from Pumping Plant VI (Tehachapi Pumping Plant) in any one month of any year a total amount of project water greater than eleven percent (11%) of such contractor's annual entitlement for that year; or to deliver to any contractor from the project transportation facilities upstream from said Pumping Plant VI in any one month of any year a total amount of project water greater than the sum of eighteen percent (18%) of that portion of such contractor's annual entitlement for that year to be put to agricultural use, as determined by the State, and eleven percent (11%) of that portion of such contractor's annual entitlement for that year to be put to municipal use, as determined by the State: *Provided*, That if the State delivers project water to any contractor through delivery structures both downstream and upstream from said Pumping Plant VI, the foregoing limitations shall be based on an appropriate apportionment of such contractor's annual entitlement for the respective year to the respective portions of such contractor's service area to which delivery is made from the project transportation facilities downstream from said Pumping Plant VI and from the project transportation facilities upstream therefrom: *Provided further*, That the percentages set forth hereinabove may be revised for a particular contractor by amendment of this subdivision after submission to the State of that contractor's requests with respect to maximum monthly deliveries, such revision being subject to approval by the State and subject to advancement to the State by the contractor of funds sufficient to cover any additional costs of the project transportation

[26] Amended: Amendment No. 16

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facilities occasioned thereby, the amount of such funds to be determined pursuant to Article 24(d).

(c) [27]Water Deliveries to the Agency

(1) To the extent delivery capability in the North Bay Aqueduct is available, the State will, on receipt of a request from the Agency, increase the delivery of project water above the limits imposed by Article 45(k) by up to 1,207 acre-feet in any month. Delivery capability shall be deemed to be available only to the extent that such deliveries do not prevent delivery of approved requests of Napa County Flood Control and Water Conservation District for quantities of project water up to but not exceeding 46 cubic feet per second.

(2) [28]In no event shall the State be obligated to deliver water to the Agency through all delivery structures at a total combined instantaneous rate of flow exceeding one hundred forty-one (141) cubic-feet-per-second, except as this rate of flow may be revised by amendment of this article after submission to the State of the Agency's requests with respect to maximum flow capacities to be provided in said delivery structures, pursuant to Article 10.

[29](d) Deleted

[30](e) Delivery of Carry-over Entitlement Water

Upon request of the Agency, the State shall make Carry-over Entitlement Water available for delivery to the Agency during the first three months of the next year, to the extent that such deliveries do not adversely affect current or future project operations, as determined by the State. The State's determination shall include, but not be limited to the operational constraints of project facilities, filling of project conservation storage, flood control releases and water quality restrictions.

Carry-over of entitlement water shall be limited to entitlement water that was included in the Agency's approved delivery schedule for October, November and December, but was not delivered due to:

(1) scheduled or unscheduled outages of facilities within the Agency's service area; or

(2) a delay in the planned application of a contractor's annual entitlement water for pre-irrigation; or

[27] Amended: Amendments No. 1 and 10
[28] Amended: Amendment No. 17
[29] Amended: Amendment No. 16
[30] Amended: Amendment No. 13

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(3) a delay in the planned spreading of the Agency's annual entitlement water for ground water storage.

After determining that the carry-over of entitlement water would not adversely affect project operations, the State shall notify the Agency of the amount of entitlement water to be carried over to the following January through March period. The notification shall include the proposed terms and conditions consistent with this Article 12(e) that would govern the delivery of the Carry-over Entitlement Water.

The Agency agrees to pay all significant identifiable costs associated with its Carry-over Entitlement Water, as determined by the State.

All scheduling and delivery of Carry-over Entitlement Water shall be carried out pursuant to the provisions of this contract.

The Agency agrees to forego the delivery of any Carry-over Entitlement Water that is lost because of project operations or is not delivered by March 31 of the next year.

Any Carry-over Entitlement Water foregone by the Agency will become a part of the current year's total project supply.

[31](f) Priorities

Each year water deliveries to the contractors shall be in accordance with the following priorities to the extent there are conflicts:

First, project water to meet scheduled deliveries of contractors' annual entitlements for that year.

Second, interruptible water to the extent contractors' annual entitlements for that year are not met by the first priority.

Third, project water to fulfill delivery requirements pursuant to Article 14(b).

Fourth, project water previously stored pursuant to Articles 12(e) and 56.

Fifth, nonproject water to fulfill contractors' annual entitlements for that year not met by the first two priorities.

Sixth, additional interruptible water delivered to contractors in excess of their annual entitlements for that year.

[31] Amended: Amendment No. 16

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Seventh, additional nonproject water delivered to contractors in excess of their annual entitlements for that year.

13. RESPONSIBILITIES FOR DELIVERY AND DISTRIBUTION OF WATER.

(a) State Not Liable for Operation Beyond Delivery Structures

Neither the State nor any of its officers, agents, or employees shall be liable for the control, carriage, handling, use, disposal, or distribution of project water supplied to the Agency after such water has passed the delivery structures established in accordance with Article 10; nor for claim of damage of any nature whatsoever, including but not limited to property damage, personal injury or death, arising out of or connected with the control, carriage, handling, use, disposal or distribution of such water beyond said delivery structures; and the Agency shall indemnify and hold harmless the State and its officers, agents, and employees from any such damages or claims of damages.

(b) Agency Not Liable for Operation Upstream From Delivery Structures

Neither the Agency nor any of its officers, agents, or employees shall be liable for the control, carriage, handling, use, disposal, or distribution of project water before such water has passed the delivery structures established in accordance with Article 10; nor for claim of damage of any nature whatsoever, including but not limited to property damage, personal injury or death, arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such water before it has passed said delivery structures.

14. [32]CURTAILMENT OF DELIVERY.

(a) State May Curtail Deliveries

The State may temporarily discontinue or reduce the delivery of project water to the Agency hereunder for the purposes of necessary investigation, inspection, maintenance, repair, or replacement of any of the project facilities necessary for the delivery of project water to the Agency, as well as due to outages in, or reduction in capability of, such facilities beyond the State's control or unuseability of project water due to an emergency affecting project facilities. The State shall notify the Agency as far in advance as possible of any such discontinuance or reduction, except in cases of emergency, in which case notice need not be given.

(b) Agency May Receive Later Delivery of Water Not Delivered

[32] Amended: Amendment No. 16

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In the event of any discontinuance or reduction of delivery of project water pursuant to subdivision (a) of this article, the Agency may elect to receive the amount of annual entitlement which otherwise would have been delivered to it during such period under the water delivery schedule for that year at other times during the year or the succeeding year to the extent that such water is then available and such election is consistent with the State's overall delivery ability, considering the then current delivery schedules of annual entitlement to all contractors.

15. AREA SERVED BY AGENCY.

(a) State Approval of Sale of Water by Agency Outside Boundaries

Project water delivery to the Agency pursuant to this contract shall not be sold or otherwise disposed of by the Agency for use outside the Agency without the prior written consent of the State.

(b) State Approval of Change in Boundaries or Organization of Agency

While this contract is in effect no change shall be made in the Agency either by inclusion or exclusion of lands, by partial or total consolidation or merger with another district, by proceedings to dissolve, or otherwise, except with the prior written consent of the State or except by act of the Legislature.

(c) Map of Agency

The Agency shall provide the State with a map satisfactory to the State indicating the major existing distribution facilities and the boundaries of the Agency at the time the contract is signed and supplementary maps whenever a boundary change is made.

16. CONTINUITY AND DEPENDABILITY OF WATER SUPPLY.

(a) [33]Limit on Total of all Maximum Annual Table A Amounts

The Agency's Maximum Annual Table A Amount hereunder, together with the maximum Table A amounts of all other contractors, shall aggregate no more than 4,185,000 acre-feet of project water.

(b) State to Perfect Water Rights

The State shall make all reasonable efforts to perfect and protect water rights necessary for the System and for the satisfaction of water supply commitments under this contract.

[33] Amended: Amendments No. 1, 16, and 18

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(c) State to Report on Ability to Meet Future Water Demands

Commencing within two (2) years from the year of initial project water delivery to the Agency, the State shall submit to the Agency at not more than five-year intervals a report on the State's ability to meet future demands for project water and for supplemental water, and on the State's plans for constructing additional project conservation facilities and supplemental conservation facilities. Such reports shall include all estimates, projections, and other data which the State deems relevant thereto.

(d) Construction of Additional and Supplemental Conservation Facilities

Bond funds required to be expended for the construction of additional facilities of the System under the provisions of Section 12938 of the Water Code shall be expended only for construction of additional project conservation facilities as defined herein, and related, appurtenant facilities necessary and desirable to meet local needs: *Provided*, That if at any time after 1985 the State finds that a part or all of such bond funds are not then required for the above purpose, and will not be so required within the next succeeding ten (10) years, such bond funds may be used, to the extent permitted in the Bond Act, to construct supplemental conservation facilities as defined herein.

(e) Furnishing of Supplemental Water

In planning and designing supplemental conservation facilities the State shall give consideration to the requirements and demands for supplemental water of the Agency and others who have contracted for project water. Entitlements to supplemental water shall be obtained, and repayment therefor shall be arranged, in contracts separate from contracts for project water.

17. CONSTRUCTION OF PROJECT FACILITIES.

(a) Determination of Aqueduct Capacities

Subject to the rights of the Agency under subdivision (b) of this article and the other provisions of this contract, the State shall provide in each aqueduct reach of the project transportation facilities such maximum monthly delivery capability for the transport and delivery of project water to the Agency as, in the judgment of the State, will best serve the interests of the Agency and all other contractors entitled to delivery of project water from or through said facilities: *Provided*, That within three (3) months after the effective date of this contract the Agency shall furnish to the State a written request specifying such maximum monthly delivery capabilities, and the State shall give full consideration to such request in planning and designing said facilities.

(b) Criteria for Determining Capacity of Transportation Facilities

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Subject to Article 45, the State shall design and construct the project transportation facilities so as to provide in each reach thereof, including reservoirs, the capacity necessary to enable delivery of project water in each year to the Agency and to other contractors in the maximum monthly amounts and at the locations, times, and maximum rates specified or provided for in their respective contracts for such year, and shall include in each such reach such capacity as is economically justified in the judgment of the State to compensate for scheduled outages for purposes of necessary investigation, inspection, maintenance, repair or replacement of project facilities, and for losses of water due to evaporation, leakage, seepage, or other causes: *Provided*, That regulatory storage reservoirs included in the project transportation facilities may be utilized in conjunction with conveyance capacity provided in said facilities for delivery to the Agency of the foregoing monthly amounts.

(c) Inspection of Project Plans and Specifications

The Agency shall have a reasonable opportunity to inspect and study the State's plans and specifications for all project facilities and may make comments and recommendations thereon to the State. Such privilege shall also extend to any plans and specifications in connection with the use by the State, in conjunction with the project facilities, of facilities owned by an entity other than the State. The State shall not enter into any such agreement which would impair the State's ability to perform fully its obligations under this contract.

(d) Restriction on Bond Sales

No bonds shall be sold nor funds expended under the authority of the Bond Act for the construction of any aqueduct or appurtenance thereto included in the System unless and until contracts are executed which will insure the recovery by the State of at least seventy-five percent (75%) of those capital costs of the particular aqueduct and any appurtenances thereto which shall be reimbursable by the contractors as determined by the State; nor shall any bonds be sold or funds expended under the authority of the Bond Act for the construction of any project conservation facility or supplemental conservation facility, unless and until contracts are executed which, together with estimated revenues from the sale or other disposal of electrical energy generated in connection with operation of project conservation facilities and supplemental conservation facilities, will insure the recovery by the State of at least seventy-five percent (75%) of those capital costs of the particular facility which shall be reimbursable by the contractors as determined by the State: *Provided*, That the foregoing limitations shall not apply with respect to: (1) surveys, engineering studies, exploratory work, designs, preparation of construction plans and specifications, acquisition of lands, easements and rights of way, relocation work, and essential administrative work in connection therewith; (2) construction for which appropriations had been made prior to approval of the Bond Act by the voters of the State of California; and (3) construction of facilities pursuant to an agreement between the State and the United States.

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(e) Failure to Complete Facilities

In the event that the State fails or is unable to complete construction of any portion or portions of the project transportation facilities necessary to deliver water to the Agency as provided in this contract, and gives the Agency written notice thereof or by reason of such failure or inability construction of said facilities has ceased for a period of two and one-half (2-1/2) years, the Agency, if it be not then in default and without exclusion of such other rights as it may have under this contract, may exercise the following options:

(1) The Agency may provide funds to the State in such amounts and at such times as may be necessary to enable the State to complete construction of such incompleted portion or portions of the project transportation facilities to the extent necessary for the transport and delivery of water to the Agency as provided for in this contract: *Provided*, That the State shall be and remain the owner of such project transportation facilities or portions thereof constructed in whole or in part with funds provided by the Agency, and shall be and remain obligated to operate, maintain, repair and replace such facilities to the full extent contemplated in this contract: *Provided further*, That the amount of any funds so provided by the Agency shall be credited by the State against the Agency's payment obligation under the capital cost component of the Transportation Charge, but the Agency shall be and remain obligated to pay its share of any capital costs of the above-described facilities not paid for with such funds, together with its proportionate share of the operation, maintenance, power and replacement costs of such facilities.

(2) The Agency may at its own expense, and on a joint venture basis if such an arrangement is made with other contractors having similar options, connect to the project transportation facilities constructed by the State for the purpose of receiving project water to which it is entitled under this contract. In such event and notwithstanding any other provisions of this contract, the structures for delivery of project water to the Agency pursuant hereto shall thereafter be deemed to be located at such point of connection. Specific arrangements for acquiring, constructing, operating, maintaining, and replacing the Agency's facilities at the point of connection thereof with the State's facilities shall be in accordance with terms and conditions mutually agreed upon by the parties: *Provided*, That the State shall be and remain the owner of all facilities constructed by it to said point of connection, and the Agency shall be and remain obligated to pay its proportionate share of the costs thereof.

[34](f) Adjustments Due to Supplemental Financing Costs

[34] Amended: Amendment No. 2

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(1) If a contractor, with approval of the State, advances funds to the State to assist the State in financing construction of project facilities (not including delivery structures, measuring devices and excess capacity), such advance shall be amortized by means of annual credits to the contractor having made such advance of funds to the State, with such credits being equal to the actual bond service obligations payable by such contractor by reason of such advance or, if no bonded debt was incurred, then such credits shall be sufficient to cover the repayment of principal and interest costs which would have resulted if the contractor had sold bonds for the purpose of funding the advance as determined by the State.

(2) If, after May 1, 1969, any source of funds other than those provided by the Bond Act is employed to finance construction of specific project facilities, any additional costs incurred because of such financing will not be charged to the contractors, except for adjustments to the "project interest rate".

18. [35]SHORTAGE IN WATER SUPPLY.

(a) Shortages; Delivery Priorities

In any year in which there may occur a shortage due to drought or any other cause whatsoever, in the supply of project water available for delivery to the contractors, with the result that such supply is less than the total of the annual entitlements of all contractors for that year, the State shall allocate the available supply in proportion to each contractor's annual entitlement as set forth in its Table A for that year and shall reduce the allocation of project water to each contractor using such water for agricultural purposes and to each contractor using such water for other purposes by the same percentage of their respective annual entitlements for that year: *Provided*, that the State may allocate on some other basis if such is required to meet minimum demands of contractors for domestic supply, fire protection, or sanitation during the year. If a contractor is allocated more water than it requested, the excess water shall be reallocated among the other contractors in proportion to their annual entitlements as provided for above. The foregoing provisions of this subdivision shall be inoperative to the extent necessary to comply with subdivision (c) of this article and to the extent that a contractor's annual entitlement for the respective year reflects established rights under the area of origin statutes precluding a reduction in deliveries to such contractor.

(b) Deleted

(c) Permanent Shortage; Contracts for Areas-of-Origin

[35] Amended: Amendment No. 16

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In the event that the State, because of the establishment by a party of a prior right to water under the provisions of Sections 11460 through 11463 of the Water Code, enters into a contract with such party for a dependable supply of project water, which contract will cause a permanent shortage in the supply of project water to be made available to the Agency hereunder:

(1) The State shall: (i) equitably redistribute the costs of all transportation facilities included in the System among all contractors for project water, taking into account the diminution of the supply to the Agency and other prior contractors in accordance with the terms of their contracts, and (ii) revise the Agency's annual entitlements and maximum annual entitlement, by amendment of Table A of this contract to correspond to the reduced supply of project water to be made available to the Agency: *Provided*, That such redistribution of costs of transportation facilities shall not be made until there has been reasonable opportunity for the Agency to exercise the option provided for in (2) below, and for other prior contractors to exercise similar options.

(2) The Agency, at its option, shall have the right to use any of the project transportation facilities which by reason of such permanent shortage in the supply of project water to be made available to the Agency are not required for delivery of project water to the Agency, to transport water procured by it from any other source: *Provided*, That such use shall be within the limits of the capacities provided in the project transportation facilities for service to the Agency under this contract: *Provided further*, That, except to the extent such limitation in Section 1293l of the Water Code be changed, the Agency shall not use the project transportation facilities under this option to transport water the right to which was secured by the Agency through eminent domain unless such use be approved by the Legislature by concurrent resolution with a majority of the members elected to each house voting in favor thereof. This option shall terminate upon a redistribution of costs of transportation facilities by the State pursuant to (1) above. In the event that this option is exercised, the State shall take such fact into account in making such redistribution of costs, and shall offset such use as is made of the project transportation facilities pursuant thereto against any reduction in the Agency's payment obligation hereunder resulting from such redistribution of costs.

(d) Reinstatement of Entitlements

If after any revision of annual entitlements and maximum annual entitlements pursuant to subdivision (c) of this article, circumstances arise which, in the judgment of the State, justify a revision upward of the same, the State shall, with the consent of the affected contractor, reinstate proportionately the previously reduced entitlements of such contractor to the extent deemed justified, and shall equitably redistribute the costs of the project transportation facilities if inequities would otherwise occur as a result of such reinstatement of entitlements.

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(e) Advance Notice of Delivery Reductions

The State shall give the Agency written notice as far in advance as possible of any reduction in deliveries to it which is to be made under subdivision (a) of this article and, to the extent possible, shall give the Agency written notice five (5) years in advance of any reduction in its annual entitlements and maximum annual entitlement under subdivision (c) of this article. Reports submitted to the Agency pursuant to Article 16(c) may constitute such notices.

(f) No Liability for Shortages

Neither the State nor any of its officers, agents, or employees shall be liable for any damage, direct or indirect, arising from shortages in the amount of water to be made available for delivery to the Agency under this contract caused by drought, operation of area of origin statutes, or any other cause beyond its control.

19. WATER QUALITY.

(a) Table of Water Quality Objectives

It shall be the objective of the State and the State shall take all reasonable measures to make available, at all delivery structures for delivery of project water to the Agency, project water of such quality that the following constituents do not exceed the concentrations stated as follows:

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<WATER QUALITY OBJECTIVES FOR SOLANO COUNTY WATER AGENCY>

Constituent	Unit	Monthly Average	Average for any 10-year Period	Maximum
Total Dissolved Solids	ppm.	440	220	--
Total Hardness	ppm	180	110	--
Chlorides	ppm.	110	55	--
Sulfates	ppm.	110	20	--
Boron	ppm.	0.6	--	--
Sodium Percentage	%	50	40	--
Fluoride	ppm.	--	--	1.5
Lead	ppm.	--	--	0.1
Selenium	ppm.	--	--	0.05
Hexavalent Chromium	ppm.	--	--	0.05
Arsenic	ppm.	--	--	0.05
Iron and Manganese together	ppm.	--	--	0.3
Magnesium	ppm.	--	--	125.0
Copper	ppm.	--	--	3.0
Zinc	ppm.	--	--	15.0
Phenol	ppm.	--	--	0.001

(b) Records of Water Quality

The State shall regularly take samples of water at each delivery structure for delivery of project water to the Agency, and shall make chemical and physical analyses and tests of such samples. The State shall keep accurate and complete records of all such analyses and tests, which records shall be available for inspection by the District at any time or times.

(c) No Liability for Failure to Meet Quality Objectives

If through no negligence of the State or its officers, agents, or employees, the State is unable to attain the quality objectives set forth in subdivision (a) of this article, neither the State nor any of its officers, agents, or employees shall be liable in any manner whatsoever for such deviation from said quality objectives.

20. SUSPENSION OF SERVICE UPON DEFAULT.

In the event of any default by the Agency in the payment of any money required to be paid to the State hereunder, the State may, upon not less than six months' notice to the Agency, suspend deliveries of water under this contract for so long as such default continues: *Provided*, That during such period the Agency shall remain obligated to make all payments required under this contract. Action taken pursuant to this article shall not deprive the State of

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or limit any remedy provided by this contract or by law for the recovery of money due or which may become due under this contract.

21. [36]INTERRUPTIBLE WATER SERVICE.

(a) Allocation of Interruptible Water

Each year from water sources available to the project, the State shall make available and allocate interruptible water to contractors in accordance with the procedure in Article 18(a). Allocations of interruptible water in any one year may not be carried over for delivery in a subsequent year, nor shall the delivery of interruptible water in any year impact a contractor's approved deliveries of annual entitlement or the contractor's allocation of water for the next year. Deliveries of interruptible water in excess of a contractor's annual entitlement may be made if the deliveries do not adversely affect the State's delivery of annual entitlement to other contractors or adversely affect project operations. Any amounts of water owed to the Agency as of the date of this amendment pursuant to former Article 12 (d), any contract provisions or letter agreements relating to wet weather water, and any Article 14 (b) balances accumulated prior to 1995, are canceled. The State shall hereafter use its best efforts, in a manner that causes no adverse impacts upon other contractors or the project, to avoid adverse economic impacts due to a contractor's inability to take water during wet weather.

(b) Rates

For any interruptible water delivered pursuant to this article, contractors shall pay the State the same (including adjustments) for power resources (including on-aqueduct, off-aqueduct, and any other power) incurred in the transportation of such water as if such interruptible water were entitlement water, as well as all incremental operation, maintenance, and replacement costs, and any other incremental costs, as determined by the State. The State shall not include any administrative or contract preparation charge. Incremental costs shall mean those nonpower costs which would not be incurred if interruptible water were not scheduled for or delivered to the contractor. Only those contractors not participating in the repayment of the capital costs of a reach shall be required to pay any use of facilities charge for the delivery of interruptible water through that reach.

(c) Contracts

To obtain a supply of interruptible water, a contractor shall execute a further contract with the State which shall be in conformity with this article and shall include at least provisions concerning the scheduling of deliveries of interruptible water and times and methods of payment.

[36] Amended: Amendments No. 5, 14, 15, and 16

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C. PAYMENT PROVISIONS

22. DELTA WATER CHARGE.

(a) Payment of Reimbursable Costs of Project Conservation Facilities

The payments to be made by each contractor for project water shall include an annual charge designated as the Delta Water Charge. This charge, together with the total revenues derived during the project repayment period from the sale or other disposal of electrical energy generated in connection with operation of project conservation facilities, shall return to the State during the project repayment period all costs of the project conservation facilities, including capital, operation, maintenance, power, and replacement costs, which are allocated to the purpose of water conservation in, above, and below the Delta pursuant to subdivision (e) of this article during the project repayment period. Wherever reference is made, in connection with the computation or determination of the Delta Water Charge, to the costs of any facility or facilities included in the System, such reference shall be only to those costs of such facility or facilities which are reimbursable by the contractors as determined by the State.

(b) [37]For each contractor receiving project water in any year through December 31, 1969, the Delta Water Charge shall be the product of $3.50 and the contractor's annual entitlement to project water for the respective year. For each contractor receiving project water in the year 1970, the Delta Water Charge shall be the product of $6.65 and the contractor's annual entitlement to project water for that year. The $6.65 rate for the year 1970 shall consist of a capital cost component of $5.04 and a minimum operation, maintenance, power and replacement component of $1.61. After December 31, 1970, the Delta Water Charge shall consist and be the sum of the following components as these are computed in accordance with subdivisions (c) and (d) of this article: a capital cost component; a minimum operation, maintenance, power and replacement component; and a variable operation, maintenance, power and replacement component.

(c) Computation of the Components of the Delta Water Rate

The capital cost, the minimum operation, maintenance, power, and replacement, and the variable operation, maintenance, power, and replacement components of the Delta Water Charge, together with that portion of the revenues derived during the project repayment period from the sale or other disposal of electrical energy generated in connection with operation of project conservation facilities which is allocated by the State to repayment of the respective category of costs, shall return to the State during the project repayment period, respectively, the following categories of the costs allocated to the purpose of water conservation in,

[37] Amended: Amendment No. 2

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above, and below the Delta pursuant to subdivision (e) of this article: (1) capital costs; (2) operation, maintenance, power, and replacement costs incurred irrespective of the amount of project water delivered to the contractors; and (3) operation, maintenance, power, and replacement costs incurred in an amount which is dependent upon and varies with the amount of project water delivered to the contractors: *Provided*, That each of the above categories of costs shall be inclusive of the appropriate costs properly chargeable to the generation and transmission of electrical energy in connection with operation of project conservation facilities. Each component of the Delta Water Charge shall be computed on the basis of a rate which, when charged during the project repayment period for each acre-foot of the sum of the yearly totals of annual entitlements of all contractors, will be sufficient, together with that portion of the revenues derived during the project repayment period from the sale or other disposal of electrical energy generated in connection with operation of project conservation facilities which is allocated by the State to repayment of the respective category of costs, to return to the State during the project repayment period all costs included in the respective category of costs covered by that component. Each such rate shall be computed in accordance with the following formula:

$$\frac{(c_1 - r_1)(1+i)^{-1} + (c_2 - r_2)(1+i)^{-2} + \ldots + (c_n - r_n)(1+i)^{-n}}{e_1(1+i)^{-1} + e_2(1+i)^{-2} + \ldots + e_n(1+i)^{-n}}$$

Where:

i = The project interest rate.

c = The total costs included in the respective category of costs for the respective year of the project repayment period.

r = That portion of the revenues derived from the sale or other disposal of electrical energy allocated by the State to repayment of the costs included in the respective category for the respective year of the project repayment period.

1, 2, and n appearing below c and r = The respective year of the project repayment period for which costs are included in the respective category, n being the last year of the project repayment period.

e = With respect to the capital cost and minimum operation, maintenance, power, and replacement components, the total of annual entitlements to project water of all contractors for the respective year of the project repayment period.

e = With respect to the variable operation, maintenance, power, and replacement component, the total of the amounts of project water delivered to all contractors for the respective year of the expired portion of the project repayment period, together with the total of annual entitlements to project water of all contractors for the respective year of

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the unexpired portion of the project repayment period.

1, 2, and *n* appearing below *e* = The respective year of the project repayment period in which the annual entitlements or project water deliveries occur, *n* being the last year of the project repayment period.

n used as an exponent = The number of years in the project repayment period.

(d) Application of Component Rates

The capital cost and minimum operation, maintenance, power, and replacement components of the Delta Water Charge shall be the product of the appropriate rate computed under subdivision (c) of this article, and the contractor's annual entitlement to project water for the respective year. The variable operation, maintenance, power, and replacement component of the charge shall be the product of the appropriate rate computed under subdivision (c) of this article and the number of acre-feet of project water delivered to the contractor during the respective year: *Provided*, That when project water has been requested by a contractor and delivery thereof has been commenced by the State, and, through no fault of the State, such water is wasted as a result of failure or refusal by the contractor to accept delivery thereof, said variable component during such period shall be the product of said rate per acre-foot and the sum of the number of acre-feet of project water delivered to the contractor and the number of acre feet wasted.

(e) Allocations to Project Purposes

[38]Prior to the time that additional project conservation facilities or supplemental conservation facilities are constructed, the Delta Water Charge shall be determined on the basis of an allocation to project purposes, by the separable cost-remaining benefits method, of all actual and projected costs of all those initial project conservation facilities located in and above the Delta, and upon an allocation to the purposes of water conservation and water transportation, by the proportionate use of facilities method, of all actual and projected costs of the following project facilities located below the Delta: The aqueduct intake facilities at the Delta, Pumping Plant I (Harvey O. Banks Pumping Plant), the aqueduct from the Delta to San Luis Forebay (O'Neill Forebay), San Luis Forebay (O'Neill Forebay), and San Luis Reservoir:

[38] Amended: Amendment No. 11

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Provided, That all of the actual and projected costs properly chargeable to the generation and transmission of electrical energy in connection with operation of project conservation facilities shall be allocated to the purpose of water conservation in, above, and below the Delta: *Provided further*, That allocations to purposes the cost of which are to be paid by the United States shall be as determined by the United States.

Commencing in the year in which the State first awards a major construction contract for construction of a major feature of additional project conservation facilities, or first commences payments under a contract with a federal agency in the event a major feature of additional project conservation facilities is constructed by such federal agency under an agreement requiring the State to pay all or part of the costs of such construction, the Delta Water Charge shall be determined on the basis of the foregoing allocations and upon an allocation to project purposes, by the separable costs-remaining benefits method and subject to the foregoing provisos, of all projected costs of such feature of the additional project conservation facilities: *Provided*, That if the agreement with such federal agency allows repayment of costs of a portion of a facility to be deferred, the associated costs of such portion shall be excluded from the Delta Water Charge computations until repayment of such deferred costs or interest thereon is commenced by the State: *Provided further*, That all costs of additional project conservation facilities incurred prior to the award of a major construction contract, shall be included in the Delta Water Charge computations in the year in which they are incurred.

(f) Yearly Recomputation of Rates After 1970

The rates to be used in determining the components of the Delta Water Charge pursuant to subdivision (d) of this article and to become effective on January 1, 1970, shall be computed by the State in accordance with subdivision (c) of this article prior to that date. Such computation shall include an adjustment which shall account for the difference, if any, between revenues received by the State under the Delta Water Charge prior to January 1, 1970, and revenues which would have been received under the charge prior to that date had it been computed and charged in accordance with subdivision (c) and (d) of this article. Upon such computation, a document establishing such rates shall be prepared by the State and attached to this contract as an amendment of this article. The State shall recompute such rates each year thereafter, and each such recomputation shall take account of and reflect increases or decreases from year to year in projected costs, outstanding reimbursable indebtedness of the State incurred to construct the project conservation facilities described in subdivision (e) of this article, annual entitlements, deliveries of project water, project interest rate, revenues from the sale or other disposal of electrical energy, and all other factors which are determinative of such rates. In addition, each such recomputation shall include an adjustment of the rates for succeeding years which shall account for the differences, if any, between projections of costs used by the State in determining said rates for all preceding years, and actual costs incurred by the State during such years. Upon each such recomputation, an appropriately revised

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copy of the document establishing such rates shall be prepared by the State and attached to this contract as an amendment of this article.

(g) Supplemental Conservation Facilities

[39]Upon the construction of supplemental conservation facilities, the Delta Water Charge shall be paid by the contractors for supplemental water, as well as by contractors for project water, and, together with revenues derived from the sale or other disposal of electrical energy generated in connection with operation of project conservation facilities and supplemental conservation facilities, shall return to the State, in addition to those costs of the project conservation facilities allocated to the purpose of water conservation in, above, and below the Delta pursuant to subdivision (e) of this article, all costs of such supplemental conservation facilities, including capital, operation, maintenance, power, and replacement costs which are allocated to the purpose of water conservation, in, above, and below the Delta pursuant hereto. Commencing in the year in which the State first awards a major construction contract for construction of a major feature of any supplemental conservation facilities, or first commences payments under a contract with a federal agency in the event a major feature of supplemental conservation facilities is constructed by such federal agency under an agreement requiring the State to pay all or part of the costs of such construction, the Delta Water Charge shall be determined on the basis of the allocations made pursuant to subdivision (e) of this article, and upon an allocation to project purposes, by the separable costs-remaining benefits method and subject to provisos corresponding to those contained in said subdivision (e), of all projected costs of such feature of the supplemental conservation facilities. Commencing in the same year, the computation of the rates to be used in determining the components of the Delta Water Charge shall include the annual entitlements to water under all contracts for supplemental water. If the repayment period of any bonds sold to construct supplemental conservation facilities or the repayment period under any agreement with a federal agency for repayment of the costs of supplemental conservation facilities constructed by such federal agency extends beyond the repayment period of the contract, the Delta Water Charge shall be determined and redetermined on the basis of such extended repayment period as the State determines to be appropriate: *Provided*, That if the agreement with such federal agency allows repayment of costs of a portion of a facility to be deferred, the associated costs of such portion shall be excluded from the Delta Water Charge computations until repayment of such deferred costs of interest thereon is commenced by the State.

[40](h) If the State hereafter enters into or amends any contract whereby any other contractor receives a credit, refund, allowance, or other benefit by reason of having paid in any year the Delta Water Charge for more project water than the contractor actually received during such year the State will immediately on request of the Agency further amend this contract to give the same benefit to the Agency.

[39] Amended: Amendment No. 11

[40] Amended: Amendment No. 6

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[41](i) The determination of the rate for water under the Delta Water Charge shall be made by including the appropriate costs and quantities of water, calculated in accordance with subdivisions (c), (d) and (e) above, for all additional project conservation facilities as defined in Article 1(h) hereinabove. In the event a Local Project as defined in Article 1(h)(2) will, pursuant to written agreement between the State and the sponsoring contractor, be considered and treated as an additional project conservation facility for less than the estimated life of the facility, the rate under the Delta Water Charge will be determined on the basis of that portion of the appropriate cost and water supply associated with such facility as the period of time during which such facility shall be considered as an additional project conservation facility bears to the estimated life of such facility. No costs for the construction or implementation of any Local Project are to be included in the Delta Water Charge unless and until the written agreement required by Article 1(h) has been entered into.

[42](j) In calculating the rate for project water to be paid by each contractor for the Delta Water Charge under subdivisions (c), (d) and (e) above, the component for operation, maintenance, power and replacement costs shall include, but not be limited to, all costs to the State incurred in purchasing water, which is competitive with alternative sources as determined by the State, for delivery as project water.

[43](k) Notwithstanding provisions of Article 22 (a) through (j), the capital cost component and the minimum OMP&R component of the Delta Water Charge shall include an annual charge to recover the Agency's share of the conservation portion of the water system revenue bond financing costs. Charges to the Agency for these costs shall be calculated in accordance with provisions in Article 50 of this contract. Charges for the conservation portion of the water system revenue bond financing costs shall not be affected by any reductions in payments pursuant to Article 51.

23. TRANSPORTATION CHARGE.

The payments to be made by each contractor entitled to delivery of project water from the project transportation facilities shall include an annual charge under the designation Transportation Charge. This charge shall return to the State during the project repayment period those costs of all project transportation facilities necessary to deliver project water to the contractor, including capital, operation, maintenance, power, and replacement costs, which are allocated to the contractor during the project repayment period in accordance with the cost allocation principles and procedures hereinafter set forth. Wherever reference is made, in connection with the computation, determination, or payment of the Transportation Charge, to the costs of any facility or facilities included in the System, such reference shall be only to those costs of such facility or facilities which are reimbursable by the contractors as

[41] Amended: Amendment No. 9
[42] Amended: Amendment No. 9
[43] Amended: Amendments No. 12 and 16

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determined by the State. The Transportation Charge shall consist of a capital cost component; a minimum operation, maintenance, power, and replacement component; and a variable operation, maintenance, power, and replacement component, as these components are defined in and determined under Articles 24, 25, and 26, respectively. For the purpose of allocations of costs pursuant to said articles, the project transportation facilities shall be segregated into such aqueduct reaches as are determined by the State to be necessary for such allocations of costs. Subject to such modifications as are determined by the State to be required by reason of any request furnished by the Agency to the State pursuant to Article 17 (a) of this contract, or by reason of contracts entered into by the State with other contractors, the aqueduct reaches of the project transportation facilities are established as set forth in Table I of this contract: *Provided*, That those costs of the aqueduct reaches from the Delta through the outlet of San Luis Reservoir which are allocated to the purpose of water conservation in, above, and below the Delta for the purpose of determining the Delta Water Charge, as hereinbefore set forth, shall not be included in the Transportation Charge.

[44]Table I
Aqueduct Reach
Solano County Water Agency

Aqueduct Reach	Major Features of Reach
Barker Slough thru Fairfield/Vacaville Turnout	Intake Channel Fish Protective Facilities Barker Slough Pumping Plant Aqueduct
Fairfield/Vacaville Turnout to Cordelia Forebay	Aqueduct
Cordelia Forebay thru Benicia and Vallejo Turnouts	Cordelia Forebay (Solano portion) Cordelia Pumping Plant (Solano portion) Aqueduct

24. TRANSPORTATION CHARGE – CAPITAL COST COMPONENT.

(a) Method of Computation

The capital cost component of the Transportation Charge shall be sufficient to return to the State those capital costs of the project transportation facilities necessary to deliver water to the contractor which are allocated to the contractor pursuant to subdivision (b) of this article. The amount of this component shall be determined in two steps as follows: (1) an allocation of capital costs to the contractor, and (2) a computation of annual payment of such allocated capital costs and interest thereon,

[44] Amended: Amendment No. 10

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computed at the project interest rate and compounded annually, to be made by the contractor.

(b) [45]In the first step, the total amount of capital costs of each aqueduct reach to be returned to the State shall be allocated among all contractors entitled to delivery of project water from or through the reach by the proportionate use of facilities method of cost allocation and in accordance with (1) and (2) below. The measure of the proportionate use of each contractor of each reach shall be the average of the following two ratios: (i) the ratio of the contractor's maximum annual entitlement to be delivered from or through the reach to the total of the maximum annual entitlements of all contractors to be delivered from or through the reach from the year in which charges are to be paid through the end of the project repayment period and (ii) the ratio of the capacity provided in the reach for the transport and delivery of project water to the contractor to the total capacity provided in the reach for the transport and delivery of project water to all contractors served from or through the reach from the year in which charges are to be paid through the end of the project repayment period. Allocations of capital costs to the Agency pursuant hereto shall be on the basis of relevant values which will be set forth in [46]Table B-1 of this contract by the State as soon as designs and cost estimates are prepared by it subsequent to receipt of requests from the Agency as to the maximum monthly delivery capability to be provided in each aqueduct reach of the project transportation facilities for the transport and delivery of project water to the Agency, pursuant to Article 17(a): *Provided*, That these values shall be subject to redetermination by the State in accordance with Article 28: *Provided further*, That the principles and procedures set forth in this subdivision shall be controlling as to allocations of capital costs to the Agency. Proportionate use of facilities factors for prior years shall not be adjusted by the State in response to changes or transfers of entitlement among contractors unless otherwise agreed by the State and the parties to the transfer and unless there is no impact on past charges or credits of other contractors.

[45] Amended: Amendment No. 16

[46] Amended: Amendment No. 10

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[47]TABLE B-1

<Table B-1 is on the next page>

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[47] Amended: Amendments No. 10

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Table B-1

PROPORTION OF CAPITAL COSTS OF PROJECT TRANSPORTATION FACILITIES
ALLOCATED TO
SOLANO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

	Total for Project Transportation Facilities			Agency Participation				
Aqueduct Reach	Total of Maximum Annual Entitlements of All Contractors Thousands of Acre-Feet Per Year(1	Total of Maximum Capacities in Cubic Feet per Second(1	Total Capital Cost, Thousands of Dollars(2	Maximum Annual Entitlement, Thousands of Acre-Feet per Year(1	Ratio of Maximum Annual Entitlement to Total of Maximum Annual Entitlements	Maximum Capacity in Cubic Feet per Second	Ratio of Maximum Capacity to Total Capacity	Average of Ratios
Barker Slough thru Fairfield/Vacaville Turnout	84.337(3	153.77144(4		59.316(3	0.70332120	108.15096(4	0.70332280	0.70332200
Fairfield/Vacaville Turnout to Cordelia Forebay	65.126(3	118.74426(4		40.108(3	0.61585235	73.12925(4	0.61585503	0.61585369
Cordelia Forebay thru Benicia and Vallejo Turnouts	40.090(3	73.09643(4		40.090(3	1.00000000	73.09643(4	1.00000000	1.00000000

1) As increased by an allowance for losses as provided in Article 24(b)(2).
2) Capital costs are being developed.
3) Includes 17,287 acre-feet per year of City of Vallejo permit water.
4) Includes 31.52 cfs of City of Vallejo permit water.

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[48]TABLE B-2

<Table B-2 is on the next page.>

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[48] Amended: Amendments No. 10

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Table B-2

PROPORTION OF MINIMUM OPERATION, MAINTENANCE, POWER, AND REPLACEMENT COSTS
OF PROJECT TRANSPORTATION FACILITIES ALLOCATED TO
SOLANO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

	Total for Project Transportation Facilities			Agency Participation				
Aqueduct Reach	Total of Maximum Annual Entitlements of All Contractors Thousands of Acre-Feet Per Year(1	Total of Maximum Capacities in Cubic-Feet per Second(1	Minimum Annual Operating Cost, Thousands of Dollars(2	Maximum Annual Entitlement, Thousands of Acre-Feet per Year(1	Ratio of Maximum Annual Entitlement to Total of Maximum Annual Entitlements	Maximum Capacity in Cubic-Feet per Second	Ratio of Maximum Capacity to Total Capacity	Average of Ratios
Barker Slough thru Fairfield/Vacaville Turnout	84.337(3	173.77144(4(5		59.316(3	0.70332120	128.15096(4(5	0.73746848	0.72039484
Fairfield/Vacaville Turnout to Cordelia Forebay	65.126(3	118.74426(4		40.108(3	0.61585235	73.12925(4	0.61585503	0.61585369
Cordelia Forebay thru Benicia and Vallejo Turnouts	40.090(3	73.09643(4		40.090(3	1.00000000	73.09643(4	1.00000000	1.00000000

1) As increased by an allowance for losses as provided in Article 24(b)(2).
2) Minimum annual operating costs are being developed.
3) Includes 17,287 acre-feet per year of City of Vallejo permit water.
4) Includes 31.52 cfs of City of Vallejo permit water.
5) Includes 20 cfs of excess capacity added under provisions of Article 12(b).

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(1) The total amount of capital costs allocated to a contractor shall be the sum of the products obtained when there is multiplied, for each aqueduct reach necessary to deliver water to the contractor, the total amount of the capital costs of the reach to be returned to the State under the Transportation Charge by the average of the two foregoing ratios for such reach as said average is set forth in the appropriate table included in its contract.

(2) In the event that excess capacity is provided in any aqueduct reach for the purpose of making project water available in the future to an agency or agencies with which the State has not executed contracts at the time of any allocation of costs pursuant to this subdivision, the prospective maximum annual entitlement or entitlements to be supplied by such excess capacity, as determined by the State, shall be deemed to be contracted for by said agency or agencies for the purpose of such allocation of costs, to the end that the capital costs of providing such excess capacity are not charged to any contractor entitled by virtue of an executed contract to the delivery of project water from or through that aqueduct reach at the time of such allocation. Where additional capacity is provided in any aqueduct reach to compensate for loss of water due to evaporation, leakage, seepage, or other causes, or to compensate for scheduled outages for purposes of necessary investigation, inspection, maintenance, repair or replacement of the facilities of the project facilities, then, for the purpose of any allocation of costs pursuant to this subdivision: (i) the maximum annual entitlement to be delivered from or through the reach of each contractor entitled to delivery of project water from or through the reach shall be increased by an amount which bears the same proportion to the maximum annual delivery capability provided by such additional capacity that the contractor's maximum annual entitlement to be delivered from or through the reach bears to the total of the maximum annual entitlements to be delivered from or through the reach under all contracts; and (ii) the capacity provided in the reach for each contractor entitled to delivery of project water from or through the reach shall be increased in the same proportion that the contractor's maximum annual entitlement to be delivered from or through the reach is increased pursuant to (i) above.

(3) The projected amounts of capital costs to be allocated annually to the Agency under the capital cost component of the Transportation Charge shall be determined by the State in accordance with the cost allocation principles and procedures set forth in this subdivision, which principles and procedures shall be controlling as to allocations of capital costs to the Agency. Such amounts will be set forth in Table C of this contract by the State as soon as designs and cost estimates are prepared by it subsequent to receipt of requests from the Agency as to the maximum monthly delivery capability to be provided in each aqueduct reach for transport and delivery of project water to

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TABLE C
PROJECTED ALLOCATIONS OF CAPITAL COST OF PROJECT TRANSPORTATION FACILITIES
SOLANO COUNTY WATER AGENCY

Year	Projected Allocation in Thousands of Dollars
1*	
2	
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21	

* Year in which State commences construction of project transportation facilities, 1965.

<Table C is published as Table B-14 in Bulletin 132.>

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the Agency, pursuant to Article 17(a): *Provided*, That these amounts shall be subject to redetermination by the State in accordance with Article 28.

(c) Annual Payments of Allocated Capital Costs

In the second step, the Agency's annual payment of its allocated capital costs and interest thereon, computed at the project interest rate and compounded annually, shall be determined in accordance with a payment schedule established by the State and determined in accordance with the principles set forth in (1), (2), and (3) below, which principles shall be controlling as to the Agency's payment of its allocated capital costs. The Agency's payment schedule will be set forth in Table D of this contract by the State as soon as designs and cost estimates are prepared by it subsequent to receipt of requests from the Agency as to the maximum monthly delivery capability to be provided in each aqueduct reach for transport and delivery of project water to the Agency, pursuant to Article 17(a): *Provided*, That the amounts set forth in Table D shall be subject to redetermination by the State, pursuant to Article 28.

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Table D
TRANSPORTATION CHARGE—CAPITAL COST COMPONENT
SOLANO COUNTY WATER AGENCY
(in thousands of dollars)

Year	Annual Payment of Principal	Annual Interest Payment	Total Annual Payment by District <Agency>
1*			
2**			
3			
4			
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Table D (continued)
TRANSPORTATION CHARGE—CAPITAL COST COMPONENT
SOLANO COUNTY WATER AGENCY
(in thousands of dollars)

Year	Annual Payment of Principal	Annual Interest Payment	Total Annual Payment by District <Agency>
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
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67			
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69			
70			
71			
72			
73			
74			
Total			

* Year in which State commences construction of project transportation facilities, 1965.
** Year of first payment.

<DWR provides Table D with Solano County Water Agency's annual statement of charges. Table D is published in (unadjusted) summary form as Table B-15 in Bulletin 132.>

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(1) The Agency's annual payment shall be the sum of the amounts due from the Agency on the Agency's allocated capital costs for the then current year and for each previous year where each such amount will pay, in not more than fifty (50) equal annual installments of principal and interest, the Agency's allocated capital costs for the respective year and interest thereon, computed at the project interest rate and compounded annually.

(2) The Agency may make payments at a more rapid rate if approved by the State.

(3) Such annual payments shall cease when all allocated capital costs and interest thereon, computed at the project interest rate and compounded annually, are repaid.

(d) Payment in Advance for Excess Peaking Capacity

In the event that any contractor, pursuant to Article 12(b), requests delivery capacity in any aqueduct reach which will permit maximum monthly deliveries to such contractor in excess of the percentage amounts specified in said Article 12(b) for the uses designated therein, such contractor shall furnish to the State, in advance of the construction of such aqueduct reach, funds sufficient to cover the costs of providing such excess capacity, which funds shall be in an amount which bears the same proportion to the total capital costs of such reach, including the costs of providing such excess capacity, as such excess capacity bears to the total capacity of such reach, including such excess capacity. For the purpose of any allocation of costs pursuant to subdivision (b) of this article, the total capital costs of such aqueduct reach shall be allocated among all contractors entitled to delivery of project water from or through the reach in the following manner:

(1) The costs which would have been incurred for such reach had no such excess capacity been provided shall be estimated by the State and allocated among all such contractors in the manner provided in said subdivision (b); and

(2) The amount of the difference between said estimated costs and the projected actual costs of such reach shall be allocated to the contractor or contractors for which such excess capacity is provided.

Where such excess capacity is provided for more than one contractor, the costs allocated to them under (2) above shall be further allocated between or among them in amounts which bear the same proportion to the total of said allocated costs as the amount of such excess capacity provided for the respective contractor bears to the total of such excess capacity provided in such reach. In the event that the funds advanced by a contractor pursuant to this subdivision are more or less than the costs so allocated to such contractor under (2) above, the account of such contractor shall be credited or debited accordingly.

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(e) Costs Incurred Prior to Date of Contract

The Agency's allocated capital costs for the year preceding the year of initial payment of the capital component of the Transportation Charge, pursuant to subdivision (c) of this article, shall consist of the sum of the Agency's allocated capital costs for each year through such year preceding the year of initial payment, and interest thereon, computed at the project interest rate and compounded annually.

[49](f) The capital costs of project aqueduct power recovery plants shall be charged and allocated in accordance with this Article 24. The capital costs of off-aqueduct power facilities shall be charged and allocated in accordance with Article 25(d).

[50](g) Notwithstanding provisions of Article 24 (a) through (d), the capital cost component of the Transportation Charge shall include an annual charge to recover the Agency's share of the transportation portion of the water system revenue bond financing costs. Charges to the Agency for these costs shall be calculated in accordance with the provisions of Article 50 of this contract. Charges for the transportation portion of the water system revenue bond financing costs shall not be affected by any reductions in payments pursuant to Article 51.

25. TRANSPORTATION CHARGE – MINIMUM OPERATION, MAINTENANCE, POWER, AND REPLACEMENT COMPONENT.

(a) Method of Computation

The minimum operation, maintenance, power, and replacement component of the Transportation Charge shall return to the State those costs of the project transportation facilities necessary to deliver water to the contractor which constitute operation, maintenance, power, and replacement costs incurred irrespective of the amount of project water delivered to the contractor and which are allocated to the contractor pursuant to (b) below: *Provided*, That to the extent permitted by law, the State may establish reserve funds to meet anticipated minimum replacement costs; and deposits in such reserve funds by the State: (1) shall be made in such amounts that such reserve funds will be adequate to meet such anticipated costs as they are incurred, and (2) shall be deemed to be a part of the minimum replacement costs for the year in which such deposits are made.

(b) Allocation of Costs

The total projected minimum operation, maintenance, power, and replacement costs of each aqueduct reach of the project transportation facilities for the respective

[49] Amended: Amendment No. 9

[50] Amended: Amendments No. 12 and 16

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year shall be allocated among all contractors entitled to delivery of project water from said facilities by the proportionate use of facilities method of cost allocation, in the same manner and upon the same bases as are set forth for the allocation of capital costs in Article 24: *Provided*, That such minimum operation, maintenance, power, and replacement costs as are incurred generally for the project transportation facilities first shall be allocated to each aqueduct reach in an amount which bears the same proportion to the total amount of such general costs that the amount of the costs incurred directly for the reach bears to the total of all direct costs for all aqueduct reaches.

(c) Payment Table

The amount to be paid each year by the Agency under the minimum operation, maintenance, power, and replacement component of the Transportation Charge shall be determined in accordance with subdivision (b) of this article on the basis of the relevant values to be set forth for the respective aqueduct reaches in [51]Table B-2 of this contract: *Provided*, That these values shall be subject to redetermination by the State in accordance with Article 28. Such amounts and any interest thereon shall be set forth by the State in Table E of this contract as soon as designs and cost estimates have been prepared by it subsequent to receipt of requests from the Agency as to the maximum monthly delivery capability to be provided in each aqueduct reach for transport and delivery of project water to the Agency, pursuant to Article 17(a): *Provided*, That the amounts set forth in Table E shall be subject to redetermination by the State in accordance with Article 28.

[51] Amended: Amendment No. 10

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TABLE E
TRANSPORTATION CHARGE—MINIMUM OPERATION MAINTENANCE, POWER, AND REPLACEMENT COMPONENT
SOLANO COUNTY WATER AGENCY

Year	Total Annual Payment By District <Agency>* (In thousands of dollars)
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and each succeeding year thereafter, for the term of this contract.	

* Payment shall start with respect to each aqueduct reach in the year following the year in which the State completes construction of the respective reach.

** Year in which the State commences construction of the project transportation facilities, 1965.

<Table E is published as Table B-16A in Bulletin 132.>

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[52](d) Notwithstanding the provisions of subdivisions (a) and (b) of this article, or of Article 1(s), the costs of off-aqueduct power facilities shall be determined and allocated as follows:

(1) The off-aqueduct power costs shall include all annual costs the State incurs for any off-aqueduct power facility, which shall include, but not be limited to, power purchases, any annual principal and interest payments on funds borrowed by or advanced to the State, annual principal and interest on bonds issued by the State or other agency, or under revenue bond financing contracts, any requirements for coverage, deposits to reserves, and associated operation and maintenance costs of such facility, less any credits, interest earnings, or other monies received by the State in connection with such facility. In the event the State finances all or any part of an off-aqueduct power facility directly from funds other than bonds or borrowed funds, in lieu of such annual principal and interest payments, the repayment of capital costs as to that part financed by such other funds shall be determined on the basis of the schedule that would have been required under Article 24.

(2) The annual costs of off-aqueduct power facilities as computed in (1) above shall initially be allocated among contractors in amounts which bear the same proportions to the total amount of such power costs that the total estimated electrical energy (kilowatt hours) required to pump through project transportation facilities the desired delivery amounts of annual entitlements for that year, as submitted pursuant to Article 12(a)(1) and as may be modified by the State pursuant to Article 12(a)(2), bears to the total estimated electrical energy (kilowatt hours) required to pump all such amounts for all contractors through project transportation facilities for that year, all as determined by the State.

(3) [53]An interim adjustment in the allocation of the power costs calculated in accordance with (2) above, may be made in May of each year based on April revisions in approved schedules of deliveries of project and nonproject water for contractors for such year. A further adjustment shall be made in the following year based on actual deliveries of project and nonproject water for contractors provided, however, in the event no deliveries are made through a pumping plant, the adjustments shall not be made for that year at that plant.

(4) To the extent the monies received or to be received by the State from all contractors for off-aqueduct power costs in any year are determined by the State to be less than the amount required to pay the off-aqueduct power costs in such year, the State may allocate and charge that amount of off-aqueduct power costs to the District <Agency> and other contractors in the

[52] Amended: Amendment No. 9

[53] Amended: Amendments No. 9 and 16

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same manner as costs under the capital cost component of the Transportation Charge are allocated and charged. After that amount has been so allocated, charged and collected, the State shall provide a reallocation of the amounts allocated pursuant to this paragraph (4), such reallocation to be based on the allocations made pursuant to (2) and (3) above for that year, or in the event no such allocation was made for that year, on the last previous allocation made pursuant to (2) and (3) above. Any such reallocation shall include appropriate interest at the project interest rate.

[54](e) The total minimum operation, maintenance, power and replacement component due that year from each contractor shall be the sum of the allocations made under the proportionate use of facilities method provided in subdivision (b) of this article and the allocations made pursuant to subdivision (d) of this article for each contractor.

26. TRANSPORTATION CHARGE – VARIABLE OPERATION, MAINTENANCE, POWER, AND REPLACEMENT COMPONENT.

(a) Method of Computation

The variable operation, maintenance, power, and replacement component of the Transportation Charge shall return to the State those costs of the project transportation facilities necessary to deliver water to the contractor which constitute operation, maintenance, power and replacement costs incurred in an amount which is dependent upon and varies with the amount of project water delivered to the contractor and which are allocated to the contractor pursuant to (1) and (2) below: *Provided*, That to the extent permitted by law, the State may establish reserve funds to meet anticipated variable replacement costs; and deposits in such reserve funds by the State: (1) shall be made in such amounts that such reserve funds will be adequate to meet such anticipated costs as they are incurred, and (2) shall be deemed to be a part of the variable replacement costs for the year in which such deposits are made. The amount of this component shall be determined as follows:

(1) There shall be computed for each aqueduct reach of the project transportation facilities a charge per acre-foot of water which will return to the State the total projected variable operation, maintenance, power, and replacement costs of the reach for the respective year. This computation shall be made by dividing said total by the number of acre-feet of project water estimated to be delivered from or through the reach to all contractors during the year.

(2) The amount of the variable component shall be the sum of the products obtained when the charges per acre-foot of water, determined under (1) above, for each aqueduct reach necessary to deliver water to the contractor are multiplied by the number of acre-feet of project water delivered to the

[54] Amended: Amendment No. 9

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contractor from or through that reach during the year: *Provided*, That when project water has been requested by a contractor and delivery thereof has been commenced by the State, and, through no fault of the State, such water is wasted as a result of failure or refusal by the contractor to accept delivery thereof, the amount of said variable component to be paid by such contractor during such period shall be the product of the above sum and the sum of the number of acre-feet of project water delivered to the contractor and the number of acre-feet wasted.

(b) Revenue from Aqueduct Power Recovery Plants

There shall be credited against the amount of the variable component to be paid by each contractor, as determined pursuant to subdivision (a) of this article, a portion of the projected net value of any power recovered during the respective year at project aqueduct power recovery plants located upstream on the particular aqueduct from the delivery structures for delivery of project water to the contractor. Such portion shall be in an amount which bears the same proportion to said projected net value that the number of acre-feet of project water delivered to the contractor through said plants during the year bears to the number of acre-feet of project water delivered to all contractors through said plants during the year.

(c) Payment Table

The amount to be paid each year by the Agency under the variable operation, maintenance, power, and replacement component of the Transportation Charge shall be determined in accordance with subdivision (a) of this article for the respective aqueduct reaches in [55]Tables B-1 and B-2 of this contract. Such amounts and any interest thereon shall be set forth by the State in Table F of this contract as soon as designs and cost estimates are prepared by it subsequent to receipt of requests from the Agency as to the maximum monthly delivery capability to be provided in each aqueduct reach for transport and delivery of project water to the Agency, pursuant to Article 17(a): *Provided*, That the amounts set forth in Table F shall be subject to redetermination by the State in accordance with Article 28.

[55] Amended: Amendment No. 10

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TABLE F
TRANSPORTATION CHARGE—ESTIMATED VARIABLE OPERATION, MAINTENANCE, POWER, AND REPLACEMENT COMPONENT
SOLANO COUNTY WATER AGENCY

Year	Total Annual Payment by District <Agency>* (In thousands of dollars)
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and each succeeding year thereafter, for the term of this contract.	

* Payments start with year of initial water delivery.

** Year in which State commences construction of project transportation facilities, 1965.

<Table F is published as Table B-18 in Bulletin 132.>

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[56]26.1 TRANSPORTATION OF CITY OF VALLEJO PERMIT WATER

(a) Definition

As used in this contract, "Vallejo permit water" shall mean non-project water, subject to a water right claimed by the City of Vallejo, that is transported by the State through the North Bay Aqueduct from Barker Slough to delivery structures for delivery to the City of Vallejo.

(b) Vallejo Permit Water

The State shall transport in the North Bay Aqueduct Vallejo permit water for the Agency when it is available under an independent water right claimed by the City of Vallejo. Such water shall be delivered at a flow rate not to exceed 31.52 cubic feet per second and the annual quantity shall not exceed 17,287 acre-feet. Responsibilities for the delivery and distribution of Vallejo permit water shall be the same as are described in Article 13 for project water.

(c) Water Right

The Agency shall obtain from the City of Vallejo and transmit to the State information as to when Vallejo permit water is available and permission from Vallejo for the State to divert Vallejo permit water and transport it through the North Bay Aqueduct.

(d) Schedules

Schedules for the delivery of Vallejo permit water shall be submitted separately along with the schedules for project water required under Article 12(a).

(e) Variable Operation, Maintenance, and Replacement Charge

The Agency shall pay a variable operation, maintenance, and replacement charge determined by the State for pumping Vallejo permit water through North Bay Aqueduct pumping plants.

(f) Power for Pumping Vallejo Permit Water

Project power shall not be used for pumping Vallejo permit water. Power for this purpose shall be provided by the Agency or the City of Vallejo without cost to the State.

(g) Advance Payments for Vallejo Permit Water

[56] Amended: Amendment No. 10

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The Agency shall make advance payments to the State under the capital cost component of the Transportation Charge for the costs estimated by the State to be necessary for enlarging the North Bay Aqueduct to have sufficient capacity to transport Vallejo permit water in addition to all the planned deliveries of project water. The amounts and times of such advance payments shall be as follows:

$1,111,900 by January 1, 1986

$ 990,800 by July 1, 1986

$ 938,000 by January 1, 1987

$ 885,500 by July 1, 1987

Amounts so advanced shall be credited to the capital cost component of the Transportation Charge allocated to the Agency.

[57]26.2 EXCESS PEAKING CAPACITY

(a) Enlargement of Capacity and Additional Pump Bay

In order to provide the 1,207 acre-feet per month of excess peaking capacity referred to in subsection (c)(1) of Article 12, the State shall make the necessary enlargement of the North Bay Aqueduct and construct an additional bay for a large-size pump.

(b) Payments for Excess Peaking Capacity

Notwithstanding the payment provisions of Article 24(d), the Agency shall pay to the State the incremental capital costs of excess peaking capacity requested by the Agency over and above the capacity added for Vallejo permit water. If a combined delivery structure serving the cities of Fairfield and Vacaville is located within 150 feet of Vanden Road, the amounts and times of such payments shall be as follows:

$ 36,600 by January 1, 1986

$ 92,300 by July 1, 1986

$ 102,000 by January 1, 1987

$ 97,000 by July 1, 1987

If the delivery structure(s) for the cities of Fairfield and Vacaville is (are) located elsewhere, the State shall redetermine the amounts of the foregoing payments.

[57] Amended: Amendment No. 10

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(c) Additional Pump

The State shall, on the request of the Agency, procure and install a large-size plump in the additional bay referred to in subdivision (a) of this article. The Agency shall pay all the costs thereof on a schedule to be determined at the time the Agency makes its request.

27. TRANSPORTATION CHARGE – PAYMENT SCHEDULE.

The amounts to be paid by the Agency for each year of the project repayment period under the capital cost and minimum operation, maintenance, power, and replacement components of the Transportation Charge, and under the variable operation, maintenance, power, and replacement component of said charge on the basis of then estimated deliveries, shall be set forth by the State in Table G of this contract as soon as designs and cost estimates have been prepared by it subsequent to receipt of requests from the Agency as to the maximum monthly delivery capability to be provided in each aqueduct reach for transport and delivery of project water to the Agency, pursuant to Article 17(a). Table G of this contract shall constitute a summation of Tables D, E, and F of this contract: *Provided*, That each of the amounts set forth in Table G shall be subject to redetermination by the State in accordance with Article 28: *Provided further*, That the principles and procedures set forth in Articles 24, 25, and 26 shall be controlling as to such amounts. Such amounts shall be paid by the Agency in accordance with the provisions of Article 29.

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TABLE G
PAYMENT SCHEDULE
SOLANO COUNTY WATER AGENCY
(In thousands of dollars)

		Transportation Charge		
Year	**Capital Cost Component**	**Minimum Component**	**Variable Component**	**Total**
1*				
2**				
3				
4				
5				
6				
7				
8				
9				
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11				
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TABLE G (continued)
PAYMENT SCHEDULE
SOLANO COUNTY WATER AGENCY
(In thousands of dollars)

Year	Capital Cost Component	Transportation Charge Minimum Component	Transportation Charge Variable Component	Total
47				
48				
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* Year in which State commences construction of project transportation facilities, 1965.
** Year of first payment.

<Table G is published in summary form as Table B-19 in Bulletin 132.>

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28. [58]TRANSPORTATION CHARGE - REDETERMINATION.

(a) Determinative Factors Subject to Retroactive Change

The State shall redetermine the values and amounts set forth in [59]Tables B-1, B-2, C, D, E, F, and G of this contract in the year following the year in which the State commences construction of the project transportation facilities and each year thereafter in order that the Transportation Charge to the Agency and the components thereof may accurately reflect the increases or decreases from year to year in projected costs, outstanding reimbursable indebtedness of the State incurred to construct the project transportation facilities described in Table I <and Table H> of this contract, annual entitlements, estimated deliveries, project interest rate, and all other factors which are determinative of such charges. In addition, each such redetermination shall include an adjustment of the components of the Transportation Charge to be paid by the Agency for succeeding years which shall account for the differences, if any, between those factors used by the State in determining the amounts of such components for all preceding years and the factors as then currently known by the State. Such adjustment shall be computed by the State and paid by the Agency or credited to the Agency's account in the manner described in (b) and (c) below.

Table H
Project Transportation Facilities
Solano County Water Agency

A North Bay Aqueduct extending to a turnout in the vicinity of the Cordelia Pumping Plant.

(b) Adjustment: Transportation Charge-Capital Cost Component

Adjustments for prior underpayments or overpayments of the capital cost component of the Transportation Charge to the Agency, together with accrued interest charges or credits thereon computed at the then current project interest rate on the amount of the underpayment or overpayment and compounded annually for the number of years from the year the underpayment or overpayment occurred to and including the year following the redetermination, shall be paid in the year following the redetermination: *Provided*, That the Agency may elect to exercise the option whereby when the redetermined Transportation Charge for the following year, with adjustments, including adjustments of the operation, maintenance, power, and replacement components provided for in subdivision (c) of this article, is more or less than the last estimate of the Charge provided pursuant to Article 27 for the corresponding year, without adjustments, an amount equal to the total of such

[58] Amended: Amendment No. 12
[59] Amended: Amendments No. 10

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difference shall be deducted from or added to the adjusted capital cost component for that year and paid or credited in accordance with the following schedule:

Percent that Transportation Charge differs from last estimate (+ or -)	Period, in years, for amortizing the difference in indicated charge
for 10% or less	no amortization
more than 10%, but not more than 20%	2
more than 20%, but not more than 30%	3
more than 30%, but not more than 40%	4
more than 40%.	5

Such payments or credits shall be in equal semi-annual amounts of principal and interest on or before the 1st day of January and the 1st day of July, with interest computed at the project interest rate and compounded annually, during varying amortization periods as set forth in the preceding schedule: *Provided*, that for the purpose of determining the above differences in the Transportation Charge, the variable operation, maintenance, power, and replacement component shall be computed on the basis of the same estimated project water deliveries as was assumed in computing pursuant to Article 26(c).

(c) Adjustment: Transportation Charge-Minimum and Variable Components

One-twelfth of the adjustments for prior underpayments or overpayments of the Agency's minimum and variable operation, power, and replacement components for each year shall be added or credited to the corresponding components to be paid in the corresponding month of the year following the redetermination, together with accrued interest charges or credits thereon computed at the then current project interest rate on the amount of the underpayment or overpayment and compounded annually for the number of years from the year the underpayment or overpayment occurred to and including the year following the redetermination.

(d) Exercise of Option

The option provided for in subdivision (b) above shall be exercised in writing on or before the January 1 due date of the first payment of the capital cost component of the Transportation Charge for the year in which the option is to become effective.

Such option, once having been exercised, shall be applicable for all of the remaining years of the project repayment period.

(e) Notwithstanding the provisions of Article 28(b), adjustments for prior overpayments and underpayments shall be repaid beginning in the year following the redetermination by application of a unit rate per acre-foot which, when paid for the projected portion of the Agency's annual entitlement will return to the State, during the project repayment period, together with interest thereon computed at the project

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interest rate and compounded annually, the full amount of the adjustments resulting from financing after January 1, 1987, from all bonds, advances, or loans listed in Article 1(r) except for Article 1(r) (3) and except for bonds issued by the State under the Central Valley Project Act after January 1, 1987 for facilities not listed among the water system facilities in Article 1(hh). Notwithstanding the immediately preceding exception, such amortization shall also apply to any adjustments in this component charge resulting from a change in the project interest rate due to any refunding after January 1, 1986 of bonds issued under the Central Valley Project Act. However, amortization of adjustments resulting from items 1(r)(4) through (7) shall be limited to a period which would allow the Department to repay the debt service on a current basis until such time as bonds are issued to reimburse the source of such funding. In no event shall this amortization period be greater than the project repayment period.

(f) Adjustment: Water System Revenue Bond Financing Costs

The use of water system revenue bonds for financing facilities listed in Article 1(hh) would result in adjustments for prior underpayments or overpayments of the capital cost component of the Transportation Charge to the Agency under the provisions of this article; however, in place of making such adjustments, charges to the Agency will be governed by Article 50.

29. TIME AND METHOD OF PAYMENT.

(a) Initial Payment – Delta Water Charge

Payments by the Agency under the Delta Water Charge shall commence in the year of initial project water delivery to the Agency.

(b) Initial Payment – Transportation Charge: Capital Component

Payments by the Agency under the capital cost component of the Transportation Charge shall commence in the year following the year in which the State commences construction of the project transportation facilities. If such construction has already commenced when this contract is executed, such payments shall begin in the year following the year of execution.

(c) Initial Payment – Transportation Charge: Minimum Component

Payments by the Agency under the minimum operation, maintenance, power, and replacement component of the Transportation Charge shall commence for each aqueduct reach in the year following the year in which construction of that reach is completed.

(d) Initial Payment – Transportation Charge: Variable Component

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Payments by the Agency under the variable operation, maintenance, power, and replacement component of the Transportation Charge shall commence in the year of initial water delivery to the Agency.

(e) Statement of Charges

The State shall, on or before July 1 of each year, commencing with the year preceding the year in which payment of the respective charge is to commence pursuant to this article, furnish the Agency with a written statement of: (1) the charges to the Agency for the next succeeding year under the capital cost and minimum operation, maintenance, power, and replacement components of the Delta Water Charge and Transportation Charge; (2) the unit charges to the Agency for the next succeeding year under the variable operation, maintenance, power, and replacement components of said Delta Water Charge and Transportation Charge; and (3) the total charges to the Agency for the preceding year under the variable operation, maintenance, power, and replacement components of said Delta Water Charge and Transportation Charge: *Provided*, That through December 31, 1969, the Delta Water Charge shall be based upon a unit rate of $3.50 per acre-foot and shall be paid by the contractors on the basis of their respective annual entitlements to project water, as provided in Article 22(b): *Provided further*, That the first such statement shall be provided by the State as soon after the execution of this contract as is feasible. All such statements shall be accompanied by the latest revised copies of the document amendatory to Article 22 and of [60]Tables B-1, B-2, C, D, E, F, and G of this contract, together with such other data and computations used by the State in determining the amounts of the above charges as the State deems appropriate. The State shall, on or before the fifteenth day of each month of each year, commencing with the year of initial water delivery to the Agency, furnish the Agency with a statement of the charges to the Agency for the preceding month under the variable operation, maintenance, power, and replacement components of the Delta Water Charge and Transportation Charge. Such charges shall be determined by the State in accordance with the relevant provisions of Articles 22 and 26 of this contract, upon the basis of metered deliveries of project water to the Agency, except as otherwise provided in those articles.

(f) Times of Payment – Capital Components

The Agency shall pay to the State, on or before January 1 of each year, commencing with the year in which payment of the respective charge is to commence pursuant to this article, one-half (1/2) of the charge to the Agency for the year under the capital cost component of the Delta Water Charge and one-half (1/2) of the charge to the Agency for the year under the capital cost component of the Transportation Charge, as such charges are stated pursuant to subdivision (e) of this article; and shall pay the remaining one-half (1/2) of each of said charges on or before July 1 of that year.

[60] Amended: Amendment No. 10

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(g) Times of Payment – Minimum Components

The Agency shall pay to the State, on or before the first day of each month of each year, commencing with the year of initial water delivery to the Agency, one-twelfth (1/12) of the sum of the charges to the Agency for the year under the minimum operation, maintenance, power, and replacement components of the Delta Water Charge and Transportation Charge, respectively, as such charges are stated pursuant to subdivision (e) of this article.

(h) Times of Payment – Variable Components

The Agency shall pay to the State on or before the fifteenth day of each month of each year, commencing with the year of initial water delivery to the Agency, the charges to the Agency under the variable operation, maintenance, power, and replacement components of the Delta Water Charge and Transportation Charge, respectively, for which a statement was received by the Agency during the preceding month pursuant to subdivision (e) of this article, as such charges as stated in such statement.

(i) Contest of Accuracy of Charges

In the event that the Agency contests the accuracy of any statement submitted to it pursuant to subdivision (e) of this article, it shall give the State notice thereof at least ten (10) days prior to the day upon which payment of the stated amounts is due. To the extent that the State finds the Agency's contentions regarding the statement to be correct, it shall revise the statement accordingly, and the Agency shall make payment of the revised amounts on or before the due date. To the extent that the State does not find the Agency's contentions to be correct, or where time is not available for a review of such contentions prior to the due date, the Agency shall make payment of the stated amounts on or before the due date, but may make the contested part of such payment under protest and seek to recover the amount thereof from the State.

30. SURCHARGE FOR PROJECT WATER USED ON EXCESS LAND.

(a) Definitions: "Surcharge"; "Excess Land"

As used herein the term "surcharge" shall mean an amount equivalent to the power credit per acre-foot of water, as such credit is determined under and established by subdivision (b) of this article, to be charged to water users other than the United States or the State of California, as hereinafter provided and to the extent permitted by law, for each acre-foot of project water put to agricultural or manufacturing use on excess land. As used herein the term "excess land" shall mean that part of any land held in single beneficial ownership within a contractor's boundaries, or, where project water is delivered to water users by a retail agency as hereinafter defined, that part of any such land within the service area of such retail agency, which is in excess of 160

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acres; or in the case of joint ownership by husband and wife that part of any such land which is in excess of 320 acres.

(b) Definition: "Power Credit"

As used herein, the term "power credit" shall mean the net value accruing to the State from revenues derived from the sale or other disposal of electrical energy generated in connection with operation of initial project conservation facilities after deducting from said revenues the amount necessary to repay the investment properly chargeable to energy generation and for operation, maintenance, and replacement of the electrical generation facilities. The power credit per acre-foot of water shall be computed in accordance with the following formula:

$$\frac{c_1 (1 + i)^{-1} + c_2 (1 + i)^{-2} + \ldots + c_n (1+ i)^{-n}}{e_1 (1+ i)^{-1} + e_2 (1 + i)^{-2} + \ldots + e_n (1 + i)^{-n}}$$

Where:

i = The project interest rate.

c = The projected annual power credit accrued during the respective year of the project repayment period.

1, 2, and n appearing below c = The respective year of the project repayment period during which the power credit is accured, n being the last year of the project repayment period.

e = The total of annual entitlements to project water of all contractors for the respective year of the project repayment period.

1, 2, and n appearing below e = The respective year of the project repayment period in which the annual entitlements occur, n being the last year of the project repayment period.

n used as an exponent = The number of years in the project repayment period.

The power credit per acre-foot of water is hereby established as $2 until all of the facilities for generation of electrical energy in connection with operation of initial project conservation facilities are installed and in operation. The State shall

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redetermine the power credit per acre-foot of water each year thereafter in order that it may accurately reflect increases or decreases from year to year in the power credit as defined herein. Each such redetermination shall be in accordance with the method of computation set forth in this subdivision, and upon each such redetermination, a document showing the revised amount of the power credit per acre-foot of water shall be attached to this contract as an amendment of this subdivision.

(c) Definition: "Retail Agency"

As used herein the term "retail agency" shall mean any agency which delivers directly to the users thereof, project water made available by, through, or under a contractor.

(d) Payment of Surcharge

Each contractor, to the extent that it delivers project water directly to the users thereof, shall require on behalf of the State that each such user on or before June 1 of each year, commencing with the year following the year of initial water delivery: (1) certify in writing to the contractor on forms prescribed and furnished by the State the description of the excess land owned by such user upon which project water is put to agricultural or manufacturing use, and the amount of project water put to agricultural or manufacturing use on such land during the preceding year; and (2) pay to the contractor for the account of the State a surcharge for the amount of water so certified. Each contractor, to the extent that it delivers project water to a retail agency or to another agency by, through, or under which such water is delivered to a retail agency, shall require on behalf of the State that each water user served by such retail agency be required to, or on before May 1 of each year, commencing with the year following the year of initial water delivery: (1) certify in writing to the retail agency on forms prescribed and furnished by the State the description of the excess land owned by such user upon which project water is put to agricultural or manufacturing use and the amount of project water put to agricultural or manufacturing use on such land during the preceding year; and (2) pay to the retail agency for the account of the State a surcharge for the amount of project water so certified. Each contractor and retail agency shall be entitled to rely upon the certifications furnished them by water users pursuant to this subdivision, unless notified by the State as to the inaccuracy of any such certification. Payments made to the contractor pursuant to this subdivision, together with the certifications supporting such payments, shall be forwarded to the State on or before July 1 of the year in which they are received. Payments made to a retail agency pursuant to this subdivision, together with the certifications supporting such payments, shall on behalf of the State be required to be forwarded to the contractor, which shall in turn forward them to the State on or before July 1 of the year in which they are received; except that where project water has been delivered to the retail agency by, through, or under an agency or agencies other than the contractor, such payments and certifications shall on behalf of the State be required to be forwarded by the retail agency to the agency from which it received project water and

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by that agency, et seq., to the contractor, which shall forward them to the State on or before July 1 of the year in which they are received.

(e) Commingling of Project and Nonproject Water

In the event that a contractor, retail agency, or water user commingles project water with water from another source in a common distribution system, the contractor shall, in complying with the provisions of this article, adhere to the following rules, and, where project water is delivered by it to a retail agency or to another agency by, through or under which project water is delivered to a retail agency, as contemplated in subdivision (d) of this article, shall require on behalf of the State that such retail agency adhere or be required to adhere to the same rules.

(1) If the amount of nonproject water applied in any year within the area served with project water by the contractor or retail agency is equal to or greater than the amount of water put to agricultural or manufacturing use on all excess land within that area during such year, it shall be presumed that the water put to agricultural or manufacturing use on such excess land is nonproject water, and there shall be no surcharge to water users in that area.

(2) If the amount of nonproject water applied in any year within the area served with project water by the contractor or retail agency is less than the amount of water put to agricultural or manufacturing use on all excess land within that area during such year, it shall be presumed, for the purpose of determining the payments to be made under the surcharge by water users in that area, that the amount of project water put to agricultural or manufacturing use on excess land of a particular ownership within that area during such year bears the same proportion to the total amount of water so used on that excess land during such year as the total amount of project water applied within that area during such year bears to the total amount of water applied within that area during such year.

(3) Project water which reaches the underground prior to delivery to or pumping by water users shall not be subject to a surcharge under this article.

(f) Failue of Retail Agency to Perform Obligations

Subject to subdivision (g) of this article, a contractor shall not be liable for the failure of any retail agency or other agency to perform the obligations imposed upon it in accordance with subdivision (d) of this article.

(g) State May Enforce Surcharge

In the event that any retail agency or other agency by, through or under which project water is delivered to a retail agency, fails to perform the obligations imposed

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upon it in accordance with subdivision (d) of this article, the State may take such action in a court of competent jurisdiction, in the name of the contractor and/or agency or agencies by, through or under which project water is delivered to such retail agency, as it deems necessary to compel the performance of such obligations, and in such action the State shall be subrogated to the rights of such contractor and/or such other agency or agencies against such retail agency or other agency. In the event that any certification furnished by a water user in accordance with subdivision (d) of this article is found by the State to inaccurately represent facts of water user or land ownership, with the result that such user is avoiding payment under the surcharge provided for herein, the State may take such action in a court of competent jurisdiction, in the name of the contractor and/or the retail agency and/or any other agency or agencies by, through, or under which project water is delivered to such water user, as it deems necessary to collect full payment under the surcharge from such water user and to compel the performance of all obligations imposed upon such water user in accordance with said subdivision (d), and in such action the State shall be subrogated to the rights of such contractor and/or such retail agency and/or such other agency or agencies against such water user. Where project water is delivered by a contractor to a retail agency or to another agency by, through, or under which project water is delivered to a retail agency, as contemplated in subdivision (d) of this article, the contractor shall require on behalf of the State that such retail agency or other agency and all agencies by, through, or under which project water is delivered to a retail agency permit or be required to permit the State to bring the foregoing actions in their respective names and be subrogated to their respective rights as set forth above.

(h) State to Defend and Indemnify Against Claims

Should the application of any of the provisions of this article in the manner provided for herein result in claims of any nature against a contractor, retail agency, or other agency by, through, or under which project water is delivered to a retail agency, the State shall defend the contractor, retail agency, or other agency against such claims, and shall indemnify them for any liability with respect thereto arising from activities required by the State under this article.

(i) Separability

This article shall be separable from all other provisions in this contract, and in the event that any or all of the provisions of this article are in any manner or to any extent held to be invalid by final judgment or decree of a court of competent jurisdiction, such holding and such invalidity shall in no way affect the validity of, or make invalid, any other provision of this contract.

31. ADJUSTMENT FOR OVERPAYMENT OR UNDERPAYMENT.

If in any year, by reason of errors in computation or other causes, there is an overpayment or underpayment to the State by the Agency of the charges provided for herein,

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which overpayment or underpayment is not accounted for and corrected in the annual redetermination of said charges, the amount of such overpayment or underpayment shall be credited or debited, as the case may be, to the Agency's account for the next succeeding year and the State shall notify the Agency thereof in writing.

32. DELINQUENCY IN PAYMENT.

(a) Agency to Provide for Punctual Payment

The governing body of the Agency shall provide for the punctual payment to the State of payments which become due under this contract.

[61](b) Interest on Overdue Payments

Upon every amount of money required to be paid by the District <Agency> to the State pursuant to this contract which remains unpaid after it becomes due and payable, interest shall accrue at an annual rate equal to that earned by the Pooled Money Investment Fund, as provided in Government Code Sections 16480, et seq. calculated monthly on the amount of such delinquent payment from and after the due date until it is paid, and the District <Agency> hereby agrees to pay such interest: *provided*, that no interest shall be charged to or be paid by the District <Agency> unless such delinquency continues for more than thirty (30) days.

33. OBLIGATION OF DISTRICT TO MAKE PAYMENTS.

(a) Refusal of Water Does Not Affect Obligation

The Agency's failure or refusal to accept delivery of project water to which it is entitled under Article 6(b) shall in no way relieve the Agency of its obligation to make payments to the State as provided for in this contract. The State, however, shall make reasonable efforts to dispose of any water made available to but not required by the Agency and any net revenues from such disposal shall be credited to Article 21.

(b) Character of Obligation

The Agency as a whole is obligated to pay to the State the payments becoming due under this contract, notwithstanding any individual default by its constituents or others in the payment to the Agency of assessments, tolls, or other charges levied by the Agency.

34. OBLIGATION OF DISTRICT TO LEVY TAXES AND ASSESSMENTS.

(a) When Obligated

[61] Amended: Amendment No. 9

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If in any year the Agency fails or is unable to raise sufficient funds by other means, the governing body of the Agency shall levy upon all property in the Agency not exempt from taxation, a tax or assessment sufficient to provide for all payments under this contract then due or to become due within that year.

(b) Enforcement by Officers of Agency

Taxes or assessments levied by the governing body of the Agency pursuant to subdivision (a) of this article shal1 be enforced and collected by all officers of the Agency charged with the duty of enforcing and collecting taxes or assessments levied by the Agency.

(c) Deposit in Separate Fund

All money collected for taxes or assessments under this article shall be kept in a separate fund by the treasurer or other officer of the Agency charged with the safe-keeping and disbursement of funds of the Agency, and, upon the written demand of the State, the treasurer or other officer shall pay over to the State all such money in his possession or control then due the State under this contract, which money shall be applied by the State to the satisfaction of the amount due under this contract.

(d) Enforcement of Levy

In the event of failure, neglect, or refusal of any officer of the Agency to levy any tax or assessment necessary to provide payment by the Agency under this contract, to enforce or to collect the tax or assessment, or to pay over to the State any money then due the State collected on the tax or assessment, the State may take such action in a court of competent jurisdiction as it deems necessary to compel the performance in their proper sequence of all such duties. Action taken pursuant hereto shall not deprive the State of or limit any remedy provided by this contract or by law for the recovery of money due or which may become due under this contract.

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D. GENERAL PROVISIONS

35. REMEDIES NOT EXCLUSIVE.

The use by either party of any remedy specified herein for the enforcement of this contract is not exclusive and shall not deprive the party using such remedy of, or limit the application of, any other remedy provided by law.

36. AMENDMENTS.

This contract may be amended at any time by mutual agreement of the parties, except insofar as any proposed amendments are in any way contrary to applicable law. The State shall promptly furnish the Agency with copies of all contracts now or hereafter executed by the State for a dependable supply of project water, and of any amendments thereof.

37. AGENCY NOT ESTOPPED TO CHALLENGE STATE LAWS.

Nothing herein contained shall be construed as estopping or otherwise preventing the Agency or any person, firm, association, corporation, or public body or agency claiming by, through, or under the Agency from contesting by litigation or other lawful means the validity, constitutionality, construction or application of any law of this State, including laws referred to in the Bond Act, or as preventing or prejudicing the amendment or repeal of any such law, and each contract executed by the State for a dependable supply of project water shall contain a similar reservation with respect to State laws.

38. OPINIONS AND DETERMINATIONS.

Where the terms of this contract provide for action to be based upon the opinion, judgment, approval, review, or determination of either party hereto, such terms are not intended to be and shall never be construed as permitting such opinion, judgment, approval, review, or determination to be arbitrary, capricious, or unreasonable.

39. CONTRACTING OFFICER OF THE STATE.

The contracting officer of the State shall be the Director of Water Resources of the State of California and his successors, or their duly authorized representatives. The contracting officer shall be responsible for all discretionary acts, opinions, judgments, approvals, reviews, and determinations required of the State under the terms of this contract.

40. SUCCESSORS AND ASSIGNS OBLIGATED.

This contract and all of its provisions shall apply to and bind the successors and assigns of the parties hereto.

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41. ASSIGNMENT.

No assignment or transfer of this contract or any part hereof, rights hereunder, or interest herein by the Agency shall be valid unless and until it is approved by the State and made subject to such reasonable terms and conditions as the State may impose.

42. WAIVER OF RIGHTS.

Any waiver at any time by either party hereto of its rights with respect to a default or any other matter arising in connection with this contract, shall not be deemed to be a waiver with respect to other default or matter.

43. NOTICES.

All notices that are required either expressly or by implication to be given by one party to the other under this contract shall be signed for the State by its contracting officer, and for the Agency by such officer as it may, from time to time, authorize in writing to so act. All such notices shall be deemed to have been given if delivered personally or if enclosed in a properly addressed envelope and deposited in a United State Post Office for delivery by registered or certified mail. Unless and until formally notified otherwise, all notices shall be addressed to the parties at their addresses as shown on the signature page of this contract.

<Director of Water Resources

P.O. Box 942836

Sacramento, California 94236-0001>

and the State shall address all notices to the Agency as follows:

<Solano County Water Agency

508 Elmira Road

Vacaville, California 95687>

44. MAINTENANCE AND INSPECTION OF BOOKS, RECORDS, AND REPORTS.

During regular office hours, each of the parties hereto and their duly authorized representatives shall have the right to inspect and make copies of any books, records, or reports of the other party pertaining to this contract or matters related hereto. Each of the parties hereto shall maintain and make available for such inspection accurate records of all of its costs, disbursements and receipts with respect to its activities under this contract and the Bond Act.

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E. SPECIAL PROVISIONS AND TABLES

45. SPECIAL PROVISIONS.

(a) [62] (Deleted)

(b) [63]Surcharge Credit

Notwithstanding other provisions of this contract, the State may allow a credit to each contractor not to exceed the surcharge paid by such contractor.

For the purpose of this contract, the surcharge credit shall be determined and applied in the following manner:

(1) The State shall, in each year after the year of initial water delivery, allow a credit to the Agency in the amount of the surcharge forwarded by the Agency to the State in the preceding year.

(2) The Agency shall not establish water rates, or tax or assessment rates, so as to cause the surcharge credit to be passed on to water users in a manner which will bring about a greater reduction in the cost per acre-foot of project water put to use on excess land than such cost of project water put to use on other than excess land.

This subdivision 45(b) shall be separable from all other provisions in this contract, and in the event that any or all of the provisions of this subdivision are in any manner or to any extent held to be invalid by final judgment or decree of a court of competent jurisdiction, such holding and such invalidity shall in no way affect the validity of, or make invalid, any other provision of this contract.

(c) The Agency shall have the right to transport through the North Bay Aqueduct such quantities, as the Agency shall from time to time determine, of water other than project water: *Provided*, That the transportation of such water shall not, without the prior consent of the State and all other contractors taking water through the North Bay Aqueduct, materially deteriorate the quality of water received by such other contractors through the North Bay Aqueduct: *Provided further*, That the materiality of any deterioration of the quality of water delivered through the North Bay Aqueduct shall be determined by the State: *Provided further*, That the Agency's right under this subdivision is subject to the State's determination that such transportation of water will not interfere with the delivery of project water to other contractors: *Provided further*, That the variable component of the Transportation Charge paid by the Agency to the State shall include the operation, maintenance,

[62] Amended: Amendments No. 1 and 5

[63] Amended: Amendment No. 1

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power and replacement costs proportionately allocated to the transportation of such water other than project water.

(d) Notwithstanding the provisions of Article 10(d), any delivery structures requested by the Agency, other than delivery structures on the North Bay Aqueduct, may be located in any manner or place within the Delta and may be designed, constructed, operated, and maintained by the Agency, subject to prior written approval by the State of plans and specifications for any such structure: *Provided*, That diversion works of the City of Vallejo on Cache Slough existing on the date this contract is executed shall be deemed to be delivery structures constructed by the Agency pursuant to the provisions of this subdivision, and may be used to take delivery of project water: *Provided further*, That no water other than project water shall be diverted or delivered through delivery structures or works constructed hereafter pursuant to the provisions of this subdivision: *Provided further*, That the provisions of Article 10(d) shall apply to all delivery structures constructed by the State.

(e) Notwithstanding the provisions of Article 11, measuring devices and equipment to be installed in any delivery structure constructed by the Agency pursuant to subdivision (d) of this article shall be acquired and installed by the Agency, and maintained and operated by the State: *Provided*, That such measuring devices and equipment shall be satisfactory and acceptable to the State, and shall be installed under the supervision of the State: *Provided further*, That if the diversion works of the City of Vallejo on Cache Slough are used pursuant to subdivision (d) of this article to take delivery of project water, the measuring devices and equipment therein shall be maintained and operated by the State, and shall be replaced with devices and equipment satisfactory and acceptable to the State if in the judgment of the State the existing measuring devices and equipment are not satisfactory and acceptable: *Provided further*, That all of said devices and equipment shall be examined, tested and serviced regularly by the State to insure their accuracy, and that at any time or times the Agency or any other contractor may inspect such devices and equipment and the measurements and records taken therefrom: *Provided further*, That the provisions of Article 11 shall apply to measuring devices and equipment installed in delivery structures constructed by the State.

(f) The provisions of Article 19 of this contract shall not apply to any water diverted or delivered through delivery structures located at points within the Delta other than the North Bay Aqueduct.

(g) Notwithstanding the provisions of Article 13(a), neither the State nor any of its officers, agents, or employees shall be liable for the control, carriage, handling, use, disposal, or distribution of project water supplied to the Agency after such water has reached the delivery structures established in accordance with subdivision (d) of this article, nor for claims of damage of any nature whatsoever arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such water after such water has reached such delivery structures; and

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the Agency shall indemnify and hold harmless the State and its officers, agents, and employees from any such damages or claims of damage.

(h) Notwithstanding the provisions of Article 13(b), neither the Agency nor any of its officers, agents, or employees shall be liable for the control, carriage, handling, use, disposal, or distribution of project water before such water has reached the delivery structures established in accordance with subdivision (d) of this article; nor for claims of damage of any nature whatsoever arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such water before it has reached said delivery structures.

(i) Notwithstanding other provisions of this contract, nothing herein contained shall be construed as a waiver by the Agency of any rights it may have under the area of origin statutes, or under Part 4.5 of Division 6 of the Water Code, or as estopping or otherwise preventing the Agency or any person, firm, association, corporation, or public body or agency claiming by, through, or under the Agency from asserting by litigation or other lawful means the validity, constitutionality, construction, or application of any law of this State, including laws referred to in the Bond Act, or as preventing or prejudicing the right of any such entity to oppose the amendment or repeal of any such law.

(j) The State shall make no other contract to supply project water for use within the Agency's boundaries without the consent of the Agency.

(k) [64]Except as provided in Articles 12(c) and 26.2, project water shall not be delivered to the Agency in any one month of any year in a total amount greater than eleven percent (11%) of that portion of the Agency's annual entitlement for that year to be put to municipal use, as determined by the State, and eighteen percent (18%) of that portion of the Agency's annual entitlement for that year to be put to agricultural use, as determined by the State.

(l) Notwithstanding the provisions of Article 17, the State shall, at the request of the Agency, increase the capacity of the North Bay Aqueduct, or any reach thereof, over that determined by the State to be necessary pursuant to Article 17(b): *Provided*, That the Agency notifies the State prior to the final design of the portion of the North Bay Aqueduct affected thereby of the location and extent of such increased capacity and makes arrangements satisfactory to the State whereby the Agency shall pay the capital cost in advance of construction, computed on the basis of proportionate use attributed to such increased capacity: *Provided further*, That the minimum operation, maintenance, power, and replacement component of the Transportation Charge to be paid by the Agency shall be determined by the State to reflect such increased capacity: *Provided further*, That the Agency shall request delivery capability to be provided by the State in each aqueduct reach of the project transportation facilities sufficient, in the judgment of the State, to deliver not less than

[64] Amended: Amendment No. 10

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37,000 acre-feet of water annually at a flow rate which will deliver eleven percent (11%) of such quantity of water monthly to the Agency's turnout in the vicinity of the Cordelia Pumping Plant.

(m) Notwithstanding other provisions of this contract, allocation of capital cost of project transportation facilities pursuant to Article 24(b), and of minimum operation, maintenance<,> power and replacement costs for project transportation facilities pursuant to Article 25(b), shall be based on delivery of not less than 37,000 acre-feet of project water annually at a flow rate which will deliver eleven percent (11%) of such quantity of water monthly to the Agency's turnout in the vicinity of the Cordelia Pumping Plant.

(n) Notwithstanding other provisions of this contract, the year of initial water delivery to the Agency for the purpose of establishing the year in which payments by the Agency under the variable operation, maintenance, power, and replacement component of the Transportation Charge shall commence pursuant to Article 29(d) shall be the year in which delivery of water through any portion of the North Bay Aqueduct commences regardless of the source of such water.

(o) The State shall not commence construction of any portion of the North Bay Aqueduct east of Cordelia until 1975 or such earlier date as may hereafter be agreed upon by the State, the Agency, and all other contractors taking water from the North Bay Aqueduct. Nothing herein shall be deemed to restrict the right of the State to acquire lands, easements and rights-of-way for any portion of the North Bay Aqueduct at such time or times as it may deem appropriate and desirable: *Provided*, That for the purpose of establishing the year in which the State commences construction of the project transportation facilities for the purposes of Article 29(b), such construction shall be deemed to commence in the year in which the State first acquires lands, easements or rights-of-way for any portion of the North Bay Aqueduct east of Cordelia.

[65](p) Water Conservation

(1) The Agency shall formulate and implement a comprehensive program for the conservation of water designed to meet the goals set forth in subdivision (4) of this Article 45(p), hereinafter referred to as "the program". The program shall include measures for public education, distribution of water conservation kits, measures to reduce water use and loss, measures to prevent waste and assure the efficient use of water, and provisions for auditing quantities of water conserved. Each and all the elements of the program shall be reasonable, cost effective, financially feasible, environmentally acceptable and legally implementable.

[65] Amended: Amendment No. 7

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(2) Formulation of the program shall be the cooperative effort of the Agency and the Cities of Benicia, Fairfield, Suisun City and Vacaville, hereinafter collectively referred to as "the Cities". The Agency shall be the lead agency in the formulation of the program. The program may contain elements applicable to all the Cities and elements applicable to only a particular city to reflect differing conditions in each. The portions of the program applicable to a City shall be subject to the approval of that City. The program shall be adopted and implemented in accordance with the Urban Water Management Planning Act (Water Code Section 10610, et seq.) and shall constitute the urban water management plan for the Cities.

(3) The program shall become effective in each of the Cities not later than the year of initial water delivery to the City. Thereafter, each City shall be responsible for the implementation of all elements of the program with the City's water service area.

(4) The goals of the program shall be the conservation of the following quantities of water which are based on the population projections shown in parentheses in thousands:

	1990 Goal in acre feet per year	**2000 Goal in acre feet per year**	**2010 Goal in acre feet per year**
Benicia	370 (26.9)	660 (30.5)	850 (35.5)
Fairfield	990 (62.4)	1,740 (71.8)	2,170 (79.9)
Suisun City	340 (13.5)	690 (16.1)	880 (18.9)
Vacaville	750 (65.1)	1,400 (79.7)	2,070 (94.0)

If actual practice or new information shows any goal to be unrealistic, or if the above population projections are not realized, the goal shall be appropriately amended by agreement of the parties.

(5) Each City shall keep records sufficient to show what is being done to implement the program and the quantities of water that are thereby conserved. Each City shall submit a report of its implementation of the program to the Agency annually for the first five years after the program becomes effective and thereafter every five years. The Agency shall consolidate the reports and forward copies to the State.

(6) The State shall not reduce the quantities of project water delivered to the Agency by reason of any failure of the Agency or any of the Cities to achieve any water conservation goal established by this agreement.

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(7) Upon determination by the State that the Agency and the Cities have formulated an adequate program and are taking reasonable measures consistent with sound fiscal policies and proper operating procedures to implement it, the State shall, in mitigation of significant adverse environmental impacts caused by the North Bay Aqueduct, provide financial assistance in the form of grants and allowances to the Agency to cover expenses incurred by the Agency and the Cities in connection with the program as follows:

(a) To the extent it has authority to do so the State shall make grants from available funds other than those appropriated by the California Water Resources Development Bond Act, to the Agency for the Cities for conservation measures, such as leak detection and distribution of residential water conservation kits. In making such grants the State shall accord to the Agency and to Napa County Flood Control and Water Conservation District a priority over other qualified applicants for such funds to the extent of its authority to do so.

(b) To the extent that the cost of the program exceeds the amount of grants under subdivision 7(a) of this Article 45p (sic) the State shall on application of the Agency make payments of funds available for construction of the System to the Agency for program expenditures the State has approved in advance, such as the costs of initial development or purchase of movies and slide shows, intial (sic) leak detection and leak repairs, design of a corrosion control program, design of a meter maintenance schedule, purchase and distribution of residential water conservation kits, purchase of meters for loan to large quantity water users, and other programs or equipment approved by the State, and engaging consultants for any of the foregoing. Funds shall be provided within 60 days after receipt of statements of costs submitted by the Agency not more frequently than monthly. The amount thus provided during each year together with interest thereon at the project interest rate shall be repaid in not more than twenty equal annual installments. The Agency may allocate available funds provided to it by the State to Cities that make application therefore on the same terms of repayment.

(8) The procedures for adoption and implementation of the program shall be done in accordance with the Urban Water Management Planning Act (Water Code Section 10610, et seq.) and to the extent possible the program shall be the same as the urban water management plan required for the cities under that Act.

(9) The State shall make all reasonable efforts consistent with sound fiscal policies, reasonable construction schedules and proper operating procedures to deliver project water through the North Bay Aqueduct by

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March 31, 1987, or by September 30, 1986, if final design studies show that variable speed pumps are not necessary.

[66](q) The Agency shall pay the State any costs in addition to those identified in Article 26.1 that result from transportation of Vallejo permit water which, if not paid by the Agency, would otherwise increase the cost of project water over what such cost would have been without the transportation of Vallejo permit water. If the State determines that such costs are being incurred, the State shall immediately notify the Agency, furnishing an explanation of the nature and amount of such costs and the details of their calculation.

[67](r) [68]Notwithstanding the provisions of Articles 24 and 25, the proportionate use factors for the calculation of the capital cost component and the minimum operation, maintenance, power, and replacement cost component of the Transportation Charge for the Agency shall be determined by the State by including 31.52 cubic feet per second and 17,287 acre-feet per year for delivery of Vallejo permit water pursuant to Article 26.1. In calculating the Agency's proportionate use factors, the State shall take into account that the Agency had previously contracted for transportation capacity over and above that needed for its entitlement deliveries, and that the Agency now desires to dedicate any such extra capacity to the transportation of Vallejo permit water.

(s) [69]In accordance with Article 53(a) the Agency is increasing its Table A annual entitlements by 5,756 acre-feet beginning in year 2001 and each succeeding year thereafter for the term of the contract. The Agency is also assuming repayment obligations for the additional delivery capacity attributable to the 5,756 acre-feet on the North Bay Aqueduct. As a result Table A as designated in Article 6(b) is amended as follows:

[66] Amended: Amendment No. 10
[67] Amended: Amendments No. 10 and 12
[68] Amended: Amendment No. 10
[69] Amended: Amendments No. 17 and 19

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Year	Old	New
2001	40,080	45,836
2002	40,540	46,296
2003	41,000	46,756
2004	41,450	47,206
2005	41,500	47,256
2006	41,550	47,306
2007	41,600	47,356
2008	41,650	47,406
2009	41,700	47,456
2010	41,750	47,506
2011	41,800	47,556
2012	41,850	47,606
2013	41,900	47,656
2014	41,950	47,706
2015	42,000	47,756
And each succeeding year, thereafter for the term of this contract as a maximum annual entitlement:		47,756

<Table A as amended by Amendment No. 17 is shown in Appendix A).>

[70]The following apply to this permanent transfer:

(a) The Agency's delivery capability for transportation of entitlement water to the Agency's service area shall increase by 5,756 acre-feet annually. Consistent with Article 53(g) deliveries of the 5,756 acre-feet of entitlement shall not adversely impact deliveries of project water to other contractors.

(b) Effective January 1, 2001, State the allocate to, and the Agency shall be liable for all prospective charges under the minimum operation, maintenance, power and replacement component of the Transportation Charge, all prospective Water System Revenue Bond Surcharges plus all retroactive and prospective charges under the capital cost component of the Transportation Charge attributable to the increase in the Agency's delivery capability in the North Bay Aqueduct for transportation of entitlement to its service area.

(c) Effective January 1, 2001, KCWA is relieved of and the Agency is liable to the State for all prospective Delta Water Charges, Transportation Charges, and the Water System Revenue Bond Surcharge attributable to the 5,756 acre-feet of annual entitlement and related delivery capacity purchased from KCWA.

(d) Increases to the Agency's Delta Water and Transportation Charges and Water System Revenue Bond Surcharge resulting from the increase in the Agency's

[70] Amended: Amendment No. 17

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annual entitlements and maximum annual entitlement shall be identified by the State and included in its annual Statement of Charges to the Agency.

(e) Recognizing Reach 31A of the Coastal Branch of the California Aqueduct will not be used for delivery of any of the 5,756 acre-feet of annual entitlement purchased from the Agency, KCWA shall retain the right to use the transportation capacity in Reach 31A associated with the applicable portion of the 5,756 acre-feet being transferred. For delivery of water to the Agency in Reach 31A, KCWA shall remain responsible for any applicable portion of the variable operation, maintenance, power, and replacement component of the Transportation Charge and any applicable portion of the Off-Aqueduct Power Facilities Charge of the minimum operation, maintenance, power and replacement component of the Transportation Charge.

(f) All future adjustments in charges and credits of past costs associated with the 5,756 acre-feet of annual entitlement (or applicable portion thereof) and the related transportation capacity in Reaches 1 through 11B and Reach 31A of the California Aqueduct shall be attributable to the Agency as if the Agency's annual entitlement and the related transportation capacity had been increased by the 5,756 acre-feet of annual entitlement purchased from the KCWA in years prior to January 1, 2001.

(g) For cost allocation and repayment purposes, Exhibit A attached hereto shows entitlement and capacity amounts for each aqueduct reach in which the Agency participates. These redetermined values shall be used to derive the proportionate use of facilities factors as set forth in Table B as designated in Article 24(b). The capacity amounts shown in Exhibit A are estimated values. Actual values will be used by the State in implementing the terms of this Amendment and in redetermination of Table B of this Water Supply Contract under Article 28.

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SOLANO COUNTY WATER DISTRICT
ANNUAL ENTITLEMENT AND CAPACITY VALUES FOR EACH REACH (a
FOR COST ALLOCATION AND REPAYMENT ONLY

The values related to this transfer are estimated to be as follows:

Repayment Reach (b	Before Transfer		Entitlement Transferred from KCWA (c	Capacity Transferred from KCWA (c	Additional Capacity Required	After Transfer	
	Annual Entitlement (AF)	Capacity (cfs)	(AF)	(cfs)	(cfs)	Total Annual Entitlement [1]+[3] (AF)	Total Capacity [2]+[4]+[5] (cfs)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
California Aqueduct							
Reach 1	0	0	5,756	13	0	5,756	13
Reach 2A	0	0	5,756	13	0	5,756	13
Reach 2B	0	0	5,756	13	0	5,756	13
Reach 3	0	0	5,756	13	0	5,756	13
Reach 4	0	0	5,756	13	0	5,756	13
Reach 5	0	0	5,756	13	0	5,756	13
Reach 6	0	0	5,756	13	0	5,756	13
Reach 7	0	0	5,756	13	0	5,756	13
Reach 8C	0	0	5,756	13	0	5,756	13
Reach 8D	0	0	5,756	13	0	5,756	13
Reach 9	0	0	4,049	8	0	4,049	8
Reach 10A	0	0	4,049	8	0	4,049	8
Reach 11B	0	0	3,237	6	0	3,237	6
Reach 31A	0	0	1,707	d) 5	0	1,707	5
North Bay Aqueduct							
Reach 1	59,287	e) 128	5,756	0	0	65,043	e) 128
Reach 2	40,087	73	0	0	0	40,087	73
Reach 3A	40,087	73	0	0	0	40,087	73

a) Does not include capacity for outages and losses.
b) These numbers apply to the reaches as set forth in Bulletin 132, Figure B-4, "Repayment Reaches and Descriptions."
c) From the Delta to Belridge Water Storage District's service area (3,237 AF in Reach 11B) and to Berrenda Mesa Water District's service area (812 AF in Reaches 9 and 10A, and 1,707 AF in Reach 31A).
d) See explanation in Article 3 (c) of this Amendment.
e) Includes 20 cfs of "Excess Peaking Capacity".

[71]The parties further agree to the following changes to the conditions applicable to the permanent transfer of Table A amounts as set forth in paragraph 3 of Amendment No. 17 to the Agency's Water Supply Contract:

[72]Effective January 1, 2004, the State shall allocate to, and the Agency shall be liable for prospective charges only under the capital cost component of the Transportation Charge attributable to the Agency's delivery capability in the North Bay Aqueduct for transportation of the 5,756 acre-feet Table A amount increase made effective in Amendment No. 17 to the Agency's long term Water Supply Contract. "Table A amount" shall mean the amount of

[71] Amended: Amendment No. 19
[72] Amended: Amendment No. 19

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project water set forth in Table A of the Agency's Water Supply Contract, which the State makes available for delivery to the Agency at the delivery structures provided for the Agency.

[73]Effective January 1, 2004, delivery priority for allocated water attributable to the 5,756 acre-feet increase in the Table A amounts pursuant to Amendment No. 17 shall be below other Table A amounts delivered through the North Bay Aqueduct that are charged both retroactively and prospectively.

[74]The Agency agrees to indemnify, defend, and hold harmless the State and any of its officers, agents, or employees from any liability, expenses, defense costs, attorney fees, claims, actions, liens and lawsuits of any kind arising from or related to this Amendment and associated agreements.

[75]Except as amended herein, the provisions of the Water Supply Contract, including but not limited to Articles 12(b) and 12(c), and all amendments thereto, will remain in full force and effect.

46. [76]Reserved for Future Use.

47. Reserved for Future Use.

48. Reserved for Future Use.

49. Reserved for Future Use.

50. [77]WATER SYSTEM REVENUE BOND FINANCING COSTS.

(a) Charges to the Agency for water system revenue bond financing costs shall be governed by provisions of this article. Charges to all contractors for water system revenue bond financing costs shall return to the State an amount equal to the annual financing costs the State incurs in that year for water system revenue bonds (including water system revenue bond anticipation notes). Annual financing costs shall include, but not be limited to, any annual principal and interest on water system revenue bonds plus any additional requirements for bond debt service coverage, deposits to reserves, and annual premiums for insurance or other security obtained pursuant to subdivision (f) of this article. The State shall provide credits to the contractors for excess reserve funds, excess debt service coverage, interest, and other earnings of the State in connection with repayment of such revenue bond financing costs, when and as permitted by the bond resolution. When such credits are determined by the State to be available, such credits shall be promptly provided to the contractors and shall be in proportion to the payments under this article from each

[73] Amended: Amendment No. 19
[74] Amended: Amendment No. 19
[75] Amended: Amendment No. 19
[76] Amended: Amendment No. 12
[77] Amended: Amendment No. 12

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contractor. Reserves, bond debt service coverage, interest, and other earnings may be used in the last year to retire the bonds.

(b) Annual charges to recover water system revenue bond financing costs shall consist of two elements.

(1) The first element shall be an annual charge to the Agency for repayment of capital costs of water system facilities as determined under Articles 22 and 24 of this contract with interest at the project interest rate. For conservation facilities, the charge shall be a part of the capital cost component of the Delta Water Charge in accordance with Article 22. For transportation facilities, the charge shall be a part of the capital cost component of the Transportation Charge in accordance with Article 24.

(2) The second element shall be the Agency's share of a Water System Revenue Bond Surcharge to be paid in lieu of a project interest rate adjustment. The total annual amount to be paid by all contractors under this element shall be the difference between the total annual charges under the first element and the annual financing costs of the water system revenue bonds. The amount to be paid by each contractor shall be calculated annually as if the project interest rate were increased to the extent necessary to produce revenues from all contractors sufficient to pay such difference for that year. In making that calculation, adjustments in the Agency's Transportation capital cost component charges for prior overpayments and underpayments shall be determined as if amortized over the remaining years of the project repayment period.

(c) The Water System Revenue Bond Surcharge will be identified by component and charge in the Agency's invoice.

(d) Timing of Payments. Payments shall be made in accordance with Article 29(f) of this contract.

(e) Reduction in Charges. The Water System Revenue Bond Surcharge under Article 50(b) (2) shall cease for each series of water system revenue bonds when that series is fully repaid. However, the annual charge determined pursuant to Article 50(b) (1) shall continue to be collected for the time periods otherwise required under Articles 22 and 24.

After the Department has repaid the California Water Fund in full and after each series of Water System Revenue Bonds is repaid, the Department will reduce the charges to all contractors in an equitable manner in a total amount that equals the amount of the charges under Article 50(b)(1) that the Department determines is not needed for future financing of facilities of the System which, in whole or in part, will serve the purposes of the water supply contract with the Agency.

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(f) To the extent economically feasible and justifiable, as determined by the State after consultation with contractors, the State shall maintain insurance or other forms of security protecting bondholders and nondefaulting contractors against costs resulting from the failure of any contractor to make the payments required by this article.

(g) Before issuing each series of water system revenue bonds, the State shall consult with the contractors, prepare a plan for the State's future financing of water system facilities, and give the Agency an opportunity to comment on the plan. The plan shall include but not be limited to the size of any water system revenue bond issuances and the form of any necessary resolutions or supplements.

(h) Defaults.

(1) If a contractor defaults partially or entirely on its payment obligations calculated under this article and sufficient insurance or other security protecting the non-defaulting contractors is not provided under Article 50(f), the State shall allocate a portion of the default to each non-defaulting contractor. The Agency's share of the default shall be equal to an amount determined by multiplying the total default amount to be charged to all non-defaulting contractors by the ratio that the Agency's maximum Table A entitlement bears to the maximum Table A entitlements of all non-defaulting contractors. However, such amount shall not exceed in any year 25 percent of the Water System Revenue Bond financing costs that are otherwise payable by the Agency in that year. The amount of default to be charged to non-defaulting contractors shall be reduced by any receipts from insurance protecting non-defaulting contractors and bond debt service coverage from a prior year and available for such purpose.

(2) If a contractor defaults partially or entirely on its payment obligations under this article, the State shall also pursuant to Article 20, upon six months' notice to the defaulting contractor, suspend water deliveries under Article 20 to the defaulting contractor so long as the default continues. The suspension of water deliveries shall be proportional to the ratio of the default to the total water system revenue bond payments due from the defaulting contractor. However, the State may reduce, eliminate, or not commence suspension of deliveries pursuant to this subparagraph if it determines suspension in the amounts otherwise required is likely to impair the defaulting contractor's ability to avoid further defaults or that there would be insufficient water for human consumption, sanitation, and fire protection. The State may distribute the suspended water to the non-defaulting contractors on terms it determines to be equitable.

(3) During the period of default, credits otherwise due the defaulting contractor shall be applied to payments due from the defaulting contractor.

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(4) Except as otherwise provided in Article 50(h)(3), the defaulting contractor shall repay the entire amount of the default to the State with interest compounded annually at the Surplus Money Investment Fund rate before water deliveries that had been suspended shall be fully resumed to that contractor. If the defaulting contractor makes a partial repayment of its default, the Department may provide a proportional restoration of suspended deliveries. The amount of the default to be repaid shall include any amounts previously received by the State from insurance proceeds, bond debt service coverage, or other reserves, and payments from other contractors pursuant to this subparagraph (h). The defaulting contractor shall not be entitled to any make-up water deliveries as compensation for any water deliveries suspended during the period when the contractor was in default.

(5) At such time as the default amount is repaid by the defaulting contractor, the non-defaulting contractors shall receive credits in proportion to their contributions towards the amount of the default with interest collected by the State on the defaulted amount.

(6) In the event there is an increase in the amount a non-defaulting contractor contributes to reserves and/or bond debt service coverage, such increase shall be handled in the same manner as provided in Article 50(a).

(7) Action taken pursuant to this subarticle shall not deprive the State of or limit any remedy provided by this contract or by law for the recovery of money due or which may become due under this contract.

(i) Power of Termination.

(1) The Department and the Agency agree to negotiate in good faith the development of a means to provide adequate protection for the Department's cash flow into priorities one and two for revenues under Water Code Section 12937(b) with the goal of obtaining agreement by April 1, 1987. The Department and the Agency agree to continue negotiations beyond April 1, 1987 if necessary to meet their common goal of arriving at agreement.

(2) If such an agreement has not been reached by April 1, 1987, and if the Director of Water Resources determines that adequate progress has not been made toward such an agreement, the Director may give notice to the Agency and other contractors that he intends to exercise the power to terminate provided in this subarticle 50(i). The Director's authority to give such a notice shall terminate on July 1, 1988.

(3) After six months from the date of issuing the notice of intent to terminate, but in no event later than January 1, 1989, the Director may terminate the authority of the Department to issue additional series of water

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system revenue bonds using the repayment provisions of Article 50. The Department shall promptly notify the Agency and other contractors that the Director has exercised the power of termination.

(4) No additional series of water system revenue bonds shall be issued under the provisions of this Article 50 after the Director has exercised the power to terminate, but Article 50 shall remain in effect as to any series of water system revenue bonds issued prior to the time the Director exercises the power to terminate.

(5) An exercise of the power to terminate provided in this subarticle 50(i) shall also rescind any changes made by this amendment in the schedule of payment of overpayment or underpayment of capital costs resulting from a change in the project interest rate and shall also rescind the addition of item (7) to Article 1(r). However, if the Department has borrowed any funds under Article 1(r)(7), Article 1(r)(7) shall remain in effect as to that and only that borrowing. Upon the exercising of the power to terminate, subarticles 28(e) and (f) shall be rescinded and Article 1(r) shall read as shown on Attachment Number 1 to this amendment.

(6) At any time before January 1, 1989, so long as the Director has not already exercised the power of termination, the Director may irrevocably waive his right to exercise the power of termination or may rescind any previously issued notice of intention to terminate.

(7) If the Director does not exercise the power of termination before January 1, 1989, this Subarticle 50(i) shall expire, and the remainder of this Article 50 shall remain in effect. Changes made by this amendment to other articles shall also remain in effect.

(j) [78]Amounts payable under this article shall not be affected by any reductions in payments pursuant to Article 51.

51. [79]FINANCIAL ADJUSTMENTS.

(a) General Operating Account

(1) The State shall maintain a General Operating Account to provide the moneys needed to pay obligations incurred by the State of the types described in Water Code sections 12937 (b) (1) and (2) in the event of emergency or cash flow shortages.

[78] Amended: Amendment No. 16
[79] Amended: Amendment No. 16

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(2) An initial deposit of $15 million shall be made available from revenue bond reserves that are no longer required by revenue bond covenants and that would otherwise be credited to the contractors including the Agency. In 1998 or when the funds become available an additional $7.7 million will be deposited in the General Operating Account from revenue bond reserves that are no longer required by revenue bond covenants and that would otherwise be credited to the contractors including the Agency, bringing the deposits to that account under this article to $22.7 million.

(3) The balance in the General Operating Account will increase pursuant to subdivision (e)(3)(v) of this article to an amount determined by the State but not in excess of $32 million. However, after the year 2001, the maximum amount of the fund may increase or decrease annually by not more than the same percentage as the increase or decrease in the charges, other than power charges for pumping water, to all the contractors for the previous year from the charges for the year before that for obligations under subdivisions (c)(2)(ii) and (iii) of this article.

(b) State Water Facilities Capital Account

(1) The State shall establish a State Water Facilities Capital Account to be funded from revenues available under Water Code section 12937(b)(4). Through procedures described in this article and as limited by this article, the State may consider as a revenue need under subdivision (c)(2)(v) of this article and may deposit in the State Water Facilities Capital Account the amounts necessary to pay capital costs of the State Water Facilities for which neither general obligation bond nor revenue bond proceeds are available, including but not limited to planning, reconnaissance and feasibility studies, the San Joaquin Valley Drainage Program and, through the year 2000, the CALFED Bay-Delta Program.

(2) The Director of the Department of Water Resources shall fully consult with the contractors and consider any advice given prior to depositing funds into this account for any purposes. Deposits into this account shall not exceed the amounts specified in subdivision (c)(2)(v) of this article plus any amounts determined pursuant to subdivision (e)(1)(iii) of this article.

(3) The State shall use revenue bonds or other sources of moneys rather than this account to finance the costs of construction of any major capital projects.

(c) Calculation of Financial Needs

(1) Each year the State shall calculate in accordance with the timing provisions of Articles 29 and 31 the amounts that would have been charged

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(but for this article) to each contractor as provided in other provisions of this contract.

(2) Each year the State shall also establish its revenue needs for the following year for the following purposes, subject to the following limitations:

(i) The amount required to be collected under the provisions of this contract, other than this article, with respect to all revenue bonds issued by the State for Project Facilities.

(ii) The amount required for payment of the reasonable costs of the annual maintenance and operation of the State Water Resources Development System and the replacement of any parts thereof as described in Water Code section 12937(b)(1). These costs shall not include operation and maintenance costs of any Federal Central Valley Project facilities constructed by the United States and acquired by the State of California after 1994, other than the State's share of the joint use facilities which include San Luis Reservoir, the San Luis Canal and related facilities.

(iii) The amount required for payment of the principal of and interest on the bonds issued pursuant to the Burns-Porter Act as described in Water Code section 12937(b)(2).

(iv) Any amount required for transfer to the California Water Fund in reimbursement as described in Water Code section 12937(b)(3) for funds utilized from said fund for construction of the State Water Resources Development System.

(v) For the years 1998 and thereafter, the amount needed for deposits into the State Water Facilities Capital Account as provided in subdivision (b) of this article, but (A) not more than $6 million per year for the years 1998, 1999 and 2000, and (B) not more than $4.5 million per year for the years 2001 and thereafter.

(3) Subject to the provisions of subdivision (e) of this article, the State shall reduce the annual charges in the aggregate for all contractors by the amounts by which the hypothetical charges calculated pursuant to subdivision (c)(1) above exceed the revenue needs determined pursuant to subdivision (c)(2) above. The reductions under this article shall be apportioned among the contractors as provided in subdivisions (d), (e), (f) and (g) of this article. Reductions to contractors shall be used to reduce the payments due from the contractors on each January 1 and July 1; *Provided*, however, that to the extent required pursuant to subdivision (h) of this article, each Agricultural Contractor shall pay to the Agricultural Rate Management Trust Fund an amount equal to the reduction allocated to such Agricultural Contractor. Any

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default in payment to the trust fund shall be subject to the same remedies as any default in payment to the State under this contract.

(4) The State may submit a supplemental billing to the Agency for the year in an amount not to exceed the amount of the prior reductions for such year under this article if necessary to meet unanticipated costs for purposes identified in Water Code section 12937(b)(1) and (2) for which the State can issue billings under other provisions of this contract. Any supplemental billing made to the Agency for these purposes shall be in the same proportion to the total supplemental billings to all contractors for these purposes as the prior reduction in charges to the Agency in that year bears to the total reductions in charges to all contractors in that year and shall be treated as reducing the amount of the reduction made available for that year to the Agency by the amount of the supplemental bill to the Agency.

(5) The State may also submit a supplemental billing to the Agency for the year if necessary to meet unanticipated costs for revenue bond debt service and coverage for which the State can issue a statement of charges under provisions of this contract other than this article. The relative amounts of any supplemental billing made to the Agency and to other contractors for revenue bond purposes shall be governed by such other applicable provisions of this contract.

(6) Payment of any supplemental billing shall be due thirty days after the date of the invoice. Delinquency and interest on delinquent amounts due shall be governed by Article 32.

(d) Apportionment of Reductions between Agricultural and Urban Contractors

(1) Reductions available under this article are projected to begin to occur in 1997. The numbers and percentages in this subdivision reflect certain estimates of dollars and sharing of reductions. The actual reductions may vary slightly from the amounts described below. The State shall determine the availability of reductions for each year in accordance with this article.

(2) Reductions shall be phased in as follows:

(i) In 1997 reductions in the amount of $14 million are projected to be available and shall be applied as follows: the first $10 million of reductions shall be apportioned among the Agricultural Contractors, and the remaining reductions shall be apportioned among the Urban Contractors.

(ii) In 1998 reductions in the amount of $17 million are projected to be available and shall be applied as follows: the first $10

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million of reductions shall be apportioned among the Agricultural Contractors, and the remaining reductions shall be apportioned among the Urban Contractors.

(iii) In 1999 reductions in the amount of $32 million are projected to be available and shall be applied as follows**:** the first $10 million of reductions shall be apportioned among the Agricultural Contractors, and the remaining reductions shall be apportioned among the Urban Contractors.

(iv) In 2000 reductions in the amount of $33 million are projected to be available and shall be applied as follows: the first $10 million of reductions shall be apportioned among the Agricultural Contractors, and the remaining reductions shall be apportioned among the Urban Contractors.

(3) (i) In the event that the aggregate amount of reductions in any of the years 1997 through 2000 is less than the respective amount projected for such year in subdivision (d)(2) above, the shortfall shall be taken first from reductions that would have been provided to Urban Contractors. Only after all reductions to Urban Contractors have been eliminated in a given year shall the remaining shortfall be taken from reductions scheduled for Agricultural Contractors. Any projected reductions not made available due to such shortfalls in the years 1997 through 2000 shall be deferred with interest at the project interest rate to the earliest subsequent years when reductions in excess of those projected for those years are available. Such deferred reductions with interest at the project interest rate shall be applied to the charges of the contractors whose reductions have been deferred.

(ii) In the event that the aggregate amount of reductions available in any of the years 1997 through 2000 is greater than the sum of (A) the respective amount projected for such year in subdivision (d)(2) above, plus (B) the amount of any shortfall with accrued interest at the project interest rate, remaining from any prior year to be applied, the excess shall be applied for the purposes and in the amounts per year described in subdivisions (e) (3) (iii), (iv), (v) and (vi) of this article, in that order.

(4) In 2001 and in each succeeding year reductions equal to or in excess of $40.5 million are projected to be available and shall be applied as follows:

(i) If reductions are available in an amount that equals or exceeds $40.5 million, $10 million of reductions shall be apportioned among the Agricultural Contractors, and $30.5 million of reductions shall be apportioned among the Urban Contractors. If reductions are

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available in an amount greater than $40.5 million, the excess shall be applied as provided in subdivision (e)(3) of this article, subject however to subdivision (e)(1).

(ii) If reductions are available in an amount less than $40.5 million in any of these years, the reductions shall be divided on a 24.7% - 75.3% basis between the Agricultural Contractors and the Urban Contractors respectively. Any such reductions not made due to shortages shall be applied without interest in the next year in which reductions in an amount in excess of $40.5 million are available pursuant to subdivision (e)(3) of this article with any remainder that is not available carried over without interest to be applied in the earliest subsequent years when reductions in excess of $40.5 million are available.

(5) Annual charges to a contractor shall only be reduced prospectively from and after the date it executes the Monterey Amendment to this contract. Apportionments of reductions shall be calculated on the assumption that all contractors have executed such amendment.

(e) Review of Financial Requirements

(1) In 2001 and every fifth year thereafter the Director of the Department of Water Resources, in full consultation with the contractors, will review the financial requirements of the State Water Resources Development System and determine the following:

(i) The amount of revenues that are needed for State Water Resources Development System purposes in addition to those needed for the purposes specified in subdivisions (c)(2)(i), (ii), (iii), and (iv) of this article;

(ii) If the aggregate amount that would have been charged to all contractors in any year but for this article exceeds the sum of (A) the amount of revenues needed for the purposes specified in subdivisions (c)(2)(i), (ii), (iii) and (iv), plus (B) $40.5 million, plus (C) the amount determined pursuant to subdivision (c)(2)(v) of this article, the amount of such excess.

(iii) The amount of the excess determined in subdivision (e)(1)(ii) above that should be collected by the State for additional State Water Resources Development System purposes and the amount of such excess that should be used for further annual charge reductions.

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(2) After making the determinations required above, the State may collect the revenues for additional State Water Resources Development System purposes in the amount determined pursuant to subdivision (e)(1)(iii) above.

(3) If and to the extent that as a result of such determinations, the aggregate amount to be charged to contractors is to be reduced by more than $40.5 million per year, the following priorities and limitations shall apply with respect to the application of such additional reductions:

(i) First, reductions shall be allocated to make up shortfalls in reductions from those projected for the years 1997 through 2000 with interest at the project interest rate pursuant to subdivision (d)(3)(i).

(ii) Second, reductions shall be allocated to make up shortfalls in reductions from those projected for the years beginning with 2001 without interest pursuant to subdivision (d)(4)(ii).

(iii) Third, additional reductions in the amount of $2 million per year shall be apportioned among the Urban Contractors until a total of $19.3 million in such additional reductions have been so applied.

(iv) Fourth, reductions up to an additional $2 million per year shall be allocated to make up any shortfalls in the annual reductions provided for in subdivision (e)(3)(iii).

(v) Fifth, $2 million per year shall be charged and collected by the State and deposited in the General Operating Account to bring the account ultimately up to an amount determined by the State but not in excess of $32 million with adjustments as provided in subdivision (a) of this article. Any amount in the account in excess of this requirement shall be returned to general project revenues.

(vi) Sixth, remaining amounts if any shall be used for reductions divided on a 24.7% - 75.3% basis between the Agricultural Contractors and the Urban Contractors respectively.

(f) Apportionment of Reductions among Urban Contractors.

Reductions in annual charges apportioned to Urban Contractors under subdivisions (d) and (e) of this article shall be further allocated among Urban Contractors pursuant to this subdivision. The amount of reduction of annual charges for each Urban Contractor shall be based on each Urban Contractor's proportionate share of total allocated capital costs as calculated below, for both project conservation and project transportation facilities, repaid by all Urban Contractors over the project repayment period.

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(1) The conservation capital cost component of the reduction allocation shall be apportioned on the basis of maximum annual entitlement. Each Urban Contractor's proportionate share shall be the same as the percentage of that contractor's maximum annual entitlement to the total of all Urban Contractors' maximum annual entitlements.

(2) The transportation capital cost component of the reduction allocation shall be apportioned on the basis of transportation capital cost component repayment obligations, including interest over the project repayment period. Each Urban Contractor's proportionate share shall be the same as the percentage that the contractor's total transportation capital cost component repayment obligation is of the total of all Urban Contractors' transportation capital cost component repayment obligations.

(i) Recalculations shall be made annually through the year 1999. Beginning in the year 2000 recalculations shall be made every five years unless an Urban Contractor requests a recalculation for an interim year and does so by a request in writing delivered to the Department by January 1 of the year in which the recalculation is to take place.

(ii) The transportation capital cost component repayment obligations, for purposes of this Article 51(f), shall be based in the year of recalculation on the then most recent Department of Water Resources Bulletin 132, Table B-15, "Capital Cost Component of Transportation Charge for Each Contractor," or its equivalent, excluding any costs or entitlement associated with transfers of entitlement from Agricultural Contractors pursuant to Article 53.

(3) To reflect the relative proportion of the conservation capital cost component and the transportation capital cost component to the total of all capital cost repayment obligations, the two cost components shall be weighted as follows:

(i) The conservation capital cost component shall be weighted with a thirty percent (30%) factor. The weighting shall be accomplished by multiplying each Urban Contractor's percentage of maximum annual entitlements as calculated in subdivision (f)(1) of this article by thirty percent (30%).

(ii) The transportation capital cost component shall be weighted with a seventy percent (70%) factor. The weighting shall be accomplished by multiplying each Urban Contractor's percentage of transportation capital cost component repayment obligations as calculated in subdivision (f)(2) of this article by seventy percent (70%).

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(iii) A total, weighted capital cost percentage shall be calculated for each Urban Contractor by adding the weighted conservation capital cost component percentage to their weighted transportation capital cost component percentage.

(4) The total amount of the annual charges to be reduced to Urban Contractors in each year shall be allocated among them by multiplying the total amount of annual charges to be reduced to the Urban Contractors by the total, weighted capital cost percentages for each such contractor. If the amount of the reduction to an Urban Contractor is in excess of that contractor's payment obligation to the Department for that year, such excess shall be reallocated among the other Urban Contractors.

(5) In the case of a permanent transfer of urban entitlement, the proportionate share of annual charge reductions associated with that entitlement shall be transferred with the entitlement to the buying contractor. In the case of an entitlement transfer by either Santa Barbara County Flood Control and Water Conservation District or San Luis Obispo County Flood Control and Water Conservation District, the reductions in annual charges to that agency shall be allocated (a) on the basis of that entitlement being retained by that agency which bears Coastal Branch Phase II transportation costs, (b) on the basis of that entitlement being retained by that agency which does not bear Coastal Branch Phase II transportation costs, and (c) on the basis of the balance of that agency's entitlement which also does not bear Coastal Branch Phase II transportation costs.

(g) Apportionment of Reductions Among Agricultural Contractors

(1) Reductions in annual charges apportioned to Agricultural Contractors under subdivisions (d) and (e) of this article shall be allocated among the Agricultural Contractors pursuant to this subdivision. The amount of reduction of annual charges for each Agricultural Contractor for the years 1997 through 2001 shall be based on each Agricultural Contractor's estimated proportionate share of the total project costs, excluding the variable operation, maintenance, power and replacement components of the Delta Water Charge and the Transportation Charge and also excluding off-aqueduct power charges, to be paid by all Agricultural Contractors for the years 1997 through 2035, calculated without taking into account this article. For purposes of these calculations, Kern County Water Agency's and Dudley Ridge Water District's estimated project costs shall not include any costs associated with the 45,000 acre-feet of annual entitlement being relinquished by those contractors pursuant to subdivision (i) of Article 53. Also, for purposes of these calculations, an Agricultural Contractor's estimated project costs shall not be reduced by the transfer of any of the 130, 000 acre-feet of annual entitlements provided for in subdivisions (a) through (i) of Article 53. The proportionate shares for 1997 through 2001 shall be calculated as follows:

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(i) Each Agricultural Contractor's statement of charges received on July 1, 1994, shall be the initial basis for calculating the proportionate shares for the five years 1997 through 2001.

(ii) Each Agricultural Contractor's estimated capital and minimum components of the Delta Water Charge and the Transportation Charge (excluding off-aqueduct power charges) and Water Revenue Bond Surcharge shall be totaled for the years 1997 through 2035.

(iii) Kern County Water Agency and Dudley Ridge Water District totaled costs shall be reduced for the 45,000 acre-feet of annual entitlement being relinquished by them.

(iv) Any reductions in an Agricultural Contractor's totaled costs resulting from the transfer of any of the 130,000 acre-feet of annual entitlement shall be re-added to that contractor's costs.

(v) Each Agricultural Contractor's proportionate share shall be computed by dividing that contractor's total costs by the total costs for all Agricultural Contractors determined pursuant to subparagraphs (ii), (iii) and (iv) above.

(2) The reductions in annual charges, for 1997 through 2001, shall be calculated using the method described in subdivision (g)(1) of this article.

(3) The allocation shall be recalculated using the same method described in subdivision (g)(1) of this article every five years beginning in 2002, if any Agricultural Contractor requests such a recalculation. Any recalculation shall be based on project cost data beginning with the year that the recalculation is to become effective through 2035.

(h) Agricultural Rate Management Trust Fund

(1) Establishment. Through a trust agreement executed contemporaneously with this amendment, the State and the Agricultural Contractors that sign the Monterey Amendments shall establish the Agricultural Rate Management Trust Fund with a mutually agreed independent trustee.

(2) Separate Accounts. The trustee shall maintain within the trust fund a separate account for each Agricultural Contractor that signs the trust agreement to hold deposits made pursuant to this article.

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(3) Deposits. Each Agricultural Contractor that signs the trust agreement shall deposit into such contractor's account within the trust fund, at the same time as payments would otherwise be required by this contract to be made to the State, an amount equal to the amount by which such contractor's charges under this contract have been reduced by reason of this article, until the balance in such contractor's account within the trust fund is the same percentage of $150,000,000 as such contractor's percentage share of reductions made available to all Agricultural Contractors as specified in subdivision (g) of this article. In 2002 and every fifth year thereafter, the Agricultural Contractors will review the maximum accumulation in the trust fund (the "Cap") and determine whether the cap should be adjusted. However, the Cap shall not be reduced below an aggregate of $150,000,000 for all Agricultural Contractor accounts.

(4) Trust Fund Disbursements.

(i) In any year in which the State's allocation of water to an Agricultural Contractor by April 15th of that year is less than one-hundred percent (100%) of the contractor's requested annual entitlement for that year, the trustee shall, to the extent there are funds in that contractor's account, distribute to the State from such account for the benefit of that contractor an amount equal to the percentage of the total of that contractor's statement of charges for that year, as redetermined by the State on or about May 15th of that year, for (a) the Delta Water Charge; (b) the capital cost and minimum operation, maintenance, power and replacement components of the Transportation Charge (including off-aqueduct power charges); and (c) the water system revenue bond surcharge, that is equal to the percentage of that contractor's annual entitlement for that year that was not allocated to it by the State by April 15th of that year.

(ii) In addition to the provisions of subdivision (h)(4)(i) of this article, if on April 15 of any year any of the irrigable land within the Tulare Lake Basin Water Storage District (Tulare) is flooded, and Tulare in writing requests the trustee to do so, the trustee shall, to the extent there are funds in Tulare's account, distribute to the State from such account for the benefit of Tulare an amount equal to the percentage of the total of Tulare's statement of charges for that year, as redetermined by the State on or about May 15th of that year, for (a) the Delta Water Charge; (b) the capital cost and minimum components of the Transportation Charge (including off-aqueduct power charges); and (c) the water system revenue bond surcharge, that is equal to the percentage of the irrigable land within Tulare that is flooded on April 15.

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(iii) Each Agricultural Contractor shall remain obligated to make payments to the State as required by other articles in this contract. Any amount to be disbursed pursuant to subdivisions (h)(4)(i) and (h)(4)(ii) shall be paid by the trustee to the State on July 1 of the year involved and shall be credited by the State toward any amounts owed by such respective Agricultural Contractor to the State as of that date. However, an Agricultural Contractor may direct the trustee to make the disbursement to that Agricultural Contractor which shall in turn make the payment to the State as required by other provisions of this contract. If the amount to be disbursed exceeds the amount owed to the State by such contractor as of July 1, the excess shall be disbursed by the Trustee to the State at the time of and in payment of future obligations owed to the State by such contractor. Alternatively, upon the request of such contractor, all or part of the excess shall be paid by the trustee to that contractor in reimbursement of prior payments by the contractor to the State for that year.

(5) Payment of Supplemental Bills. In any year in which a supplemental bill has been submitted to an Agricultural Contractor pursuant to subdivision (c)(4) of this article, such supplemental bill shall be treated as reducing by an equal amount the obligation of such contractor for that year to make payments into the Agricultural Rate Management Trust Fund. To the extent that such contractor has already made payments to the trust fund in an amount in excess of such contractor's reduced trust fund payment obligation, such contractor may request the trustee to use the excess from the trust fund to pay the supplemental bill.

(6) Discharge of Payment Obligation. Each payment to the State by the trust fund shall discharge and satisfy the Agricultural Contractor's obligation to pay the amount of such payment to the State. No reimbursement of the trust fund by the Agricultural Contractor for such payments shall be required. However, each Agricultural Contractor shall continue to make deposits to the trust fund matching the amount of each year's reductions as provided in subdivision (d) of this article so long as the amount in that contractor's account is less than its share of the Cap.

(7) Distribution of Funds in Excess of the Cap. Whenever accumulated funds (including interest) in an Agricultural Contractor's account in the trust fund exceed that contractor's share of the Cap, or the estimated remaining payments the contractor is required to make to the State prior to the end of the project repayment period, that contractor may direct the trustee to pay such excess to the contractor.

(8) Termination of Trust Fund. At the end of the project repayment period, the Agricultural Rate Management Trust Fund shall be terminated and

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any balances remaining in the accounts for each of the Agricultural Contractors shall be disbursed to the respective Agricultural Contractors.

(i) Definitions. For the purposes of this article, the following definitions will apply:

(1) "Agricultural Contractor" shall mean the following agencies as they now exist or in any reorganized form:

(i) County of Kings,

(ii) Dudley Ridge Water District,

(iii) Empire West Side Irrigation District,

(iv) Kern County Water Agency for 993,300 acre-feet of its entitlement,

(v) Oak Flat Water District,

(vi) Tulare Lake Basin Water Storage District.

(2) "Urban Contractor" shall mean every other agency having a long term water supply contract with the State as they exist as of the date of this amendment or in any reorganized form as well as Kern County Water Agency for 119,600 acre-feet of its entitlement.

(j) Except as provided in subdivisions (c)(4) and (c)(5), this article shall not be interpreted to result in any greater State authority to charge the contractors than exists under provisions of this contract other than this article.

52. [80]KERN WATER BANK.

(a) The State shall convey to the Kern County Water Agency (KCWA) in accordance with the terms set forth in the agreement between the State of California Department of Water Resources and Kern County Water Agency entitled "Agreement for the Exchange of the Kern Fan Element of the Kern Water Bank" (the Kern Water Bank Contract), the real and personal property described therein.

(b) Subject to the approval of KCWA, other contractors may be provided access to and use of the property conveyed to KCWA by the Kern Water Bank Contract for water storage and recovery. Fifty percent (50%) of any project water remaining in storage on December 31, 1995, from the 1990 Berrenda Mesa Demonstration Program and the La Hacienda Water Purchase Program shall be

[80] Amended: Amendment No. 16

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transferred to KCWA pursuant to the Kern Water Bank Contract. The remaining fifty percent (50%) of any such water (approximately 42,828.5 acre-feet) shall remain as project water and the State's recovery of such project water shall be pursuant to the provisions of a separate recovery contract. Any other Kern Water Bank demonstration program water shall remain as project water and the State's recovery of such water shall be pursuant to the provisions of the respective contracts for implementation of such demonstration programs.

53. [81]PERMANENT TRANSFERS AND REDUCTIONS OF ENTITLEMENT.

(a) Article 41 provides that no assignment or transfer of a contract or any part thereof, rights thereunder or interest therein by a contractor shall be valid unless and until it is approved by the State and made subject to such reasonable terms and conditions as the State may impose. In accordance with State policy to assist water transfers, the State and the County of Kings, Dudley Ridge Water District (DRWD), Empire West Side Irrigation District, Kern County Water Agency (KCWA), Oak Flat Water District and Tulare Lake Basin Water Storage District (for the purposes of this article the "Agricultural Contractors") shall, subject to the conditions set forth in this article, expeditiously execute any necessary documents and approve all contracts between willing buyers and willing sellers until permanent transfers totaling 130,000 acre-feet of annual entitlements of the Agricultural Contractors and, to the extent provided in such contracts, rights in project transportation facilities related to such annual entitlement have been made to other contractors (the "Urban Contractors") or noncontractors in accordance with the provisions of this article. Such approval requirement shall apply to all contracts executed prior to January 1, 2011. KCWA shall be responsible for approval of such transfers for any portion of the 130,000 acre-feet not previously made available under this article by the other Agricultural Contractors. A contract between a willing buyer and a willing seller shall mean a contract between (1) a buyer which is an Urban Contractor or, to the extent provided in subdivision (e) of this article, a noncontractor and (2) a seller which is an Agricultural Contractor or a public entity which obtains project water from an Agricultural Contractor.

(b) The State shall not be obligated to approve any transfer of annual entitlements if in its judgment the transfer would impair the security of the State's bondholders and the State may impose conditions on any transfer as necessary to make the delivery of the water operationally feasible and to assure that the transportation costs associated with the transferred entitlement are fully repaid. Transfers not approved by the State shall not be considered as part of the 130,000 acre-feet of annual entitlements provided for in this article.

(c) KCWA member units shall have 90 days to exercise a right of first refusal to purchase any annual entitlements being offered for sale to Urban Contractors by another KCWA member unit pursuant to this article, other than those

[81] Amended: Amendment No. 16

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annual entitlements made available to Urban Contractors by subdivision (d) of this article, by agreeing to pay the same price offered by the buyer. Any such sales to KCWA member units exercising such right of first refusal shall not be considered a part of the 130,000 acre-feet of annual entitlements provided for in this article.

(d) Any permanent transfers of annual entitlements by Agricultural Contractors to noncontractors, including transfers to KCWA urban member units or to KCWA's Improvement District Number 4, other than transfers pursuant to subdivision (c) of this article, will be considered a part of the 130,000 acre-feet of annual entitlements provided for in this article if the Urban Contractors have been given a right of first refusal to purchase such annual entitlements as well as transportation rights in accordance with the following terms and procedure:

(1) The Agricultural Contractor shall provide the State a copy of a bona fide contract or Proposed Contract (the "Proposed Contract") and the State shall, within five working days of receipt, provide copies of such Proposed Contract to all Urban Contractors together with a Notice of Proposed Contract stating the date on or before which a Notice of Intent to Exercise a Right of First Refusal (NOI) must be delivered to both the State and the seller, which date shall be 90 days from the date the State mails the Notice of Proposed Contract.

(2) The Proposed Contract shall provide for the transfer of rights in project transportation facilities sufficient to deliver to the seller's service area in any one month eleven percent (11%) of the annual entitlement being transferred or such greater amount as the seller determines to sell; *Provided,* however, that sellers shall not be obligated to sell any transportation rights in the Coastal Aqueduct.

(3) To exercise the right of first refusal, an Urban Contractor shall deliver to the State and the seller its NOI within the time period stated in the Notice of Proposed Contract and shall proceed in good faith to try to complete the transfer to the Urban Contractor. If two or more Urban Contractors deliver NOI's to the State, the amount of annual entitlement and transportation rights being sold shall be allocated among those Urban Contractors that are prepared to perform the purchase by the Performance Date provided for herein in proportion to their maximum annual entitlements, or in another manner acceptable to the Urban Contractors delivering the NOIs. An offer by an Urban Contractor in its NOI to purchase less than the entire annual entitlement and transportation right being transferred shall not be deemed to be an effective exercise of the right of first refusal unless other Urban Contractors submit NOIs to purchase the remainder of the annual entitlement and transportation right or the noncontractor buyer agrees to purchase the remainder at the same unit price and on the same terms and conditions provided for in the Proposed Contract. The Performance Date shall be the date upon which the Urban Contractor is prepared to perform the purchase, which

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date shall be the later of: (1) 180 days after the delivery of the NOI or (2) the date set forth in the Proposed Contract for the noncontractor buyer to perform the purchase.

The Performance Date shall be extended at the request of the Urban Contractor if a temporary restraining order or preliminary injunction is in effect as a result of a lawsuit challenging the execution of the contract on the basis of noncompliance with the California Environmental Quality Act. Such extensions shall continue until five days after the temporary restraining order or injunction expires or until the Urban Contractor requests it be discontinued, whichever occurs first. The Urban Contractor shall be liable for any damages suffered by the seller as a result of such extensions of the Performance Date.

(4) If the seller and the noncontractor buyer under the Proposed Contract make any substantive changes in the Proposed Contract, such changes shall constitute a new Proposed Contract that cannot be performed without compliance with all of the procedures set forth in this article.

(5) If an Urban Contractor issuing a NOI fails to complete its exercise of the Right of First Refusal by the Performance Date, the seller shall be free to sell its entitlement in substantial conformance with the terms and conditions set forth in the Proposed Contract. An Urban Contractor issuing a NOI may assign its rights to exercise a right of first refusal to another Urban Contractor and the assignee shall have the same rights as the assignor to complete the purchase by the Performance Date.

(6) In exercising the Right of First Refusal, an Urban Contractor, at its option, may either agree to perform the Proposed Contract in its entirety, including all of its terms and conditions, or agree to pay the price offered under the Proposed Contract for the annual entitlement and transportation rights without condition and without being entitled to enforce or being subject to any other provisions of the Proposed Contract.

(e) As used in this article, “price” shall mean the dollar amount of consideration provided for in the Proposed Contract.

(f) Upon the effective date of any such transfer, the seller shall be relieved of and the buyer shall become liable to the State for all prospective Delta Water Charges, the related Transportation Charges and any other charges for the annual entitlements and associated transportation rights transferred unless the seller and buyer provide otherwise in the contract for the transfer and the State approves such other provisions. However, the contractor making the sale shall remain obligated to the State to make the payments if the buyer defaults on its payments to the State related to the water transferred and is not a party to a long term water supply contract of the type contained in Department of Water Resources Bulletin Number 141. If the contractor making the sale is required to make any payments to the State as a result of the buyer’s

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default, the entitlement transferred to the defaulting buyer shall, if provided for in the Proposed Contract, revert back to the contractor making the sale. The buyer may also be liable for any charges imposed pursuant to subdivision (g) of this article.

(g) A contractor which is a buyer of annual entitlement pursuant to this article may receive deliveries using any portion of the capacity previously provided by the State in each reach of the project transportation facilities for such contractor that is necessary for transporting the entitlement purchased by it on the same basis as any other entitlement provided for in its Table A in effect prior to the date of the Monterey Amendment. Such contractor may also use any transportation rights transferred to it by a seller in the same manner as the seller was entitled to use them and any unused capacity in any of the reaches specified in this paragraph so long as project operations and/or priority of service of water to other contractors participating in repayment of capital costs in such reaches is not adversely affected. The State shall not be responsible for any resulting adverse impacts upon its ability to provide such contractor peaking capacity. The capital cost and minimum, operation, maintenance, power and replacement components of the Transportation Charge allocated to a buying contractor needing transportation capacity in excess of the capacity factors on which its charges are based in any reach shall be determined prospectively based upon the increase in the buying contractor's annual entitlement resulting from the purchase, and service of water to fulfill annual entitlement to other contractors shall not be impaired. The capital cost and minimum operation, maintenance, power and replacement components of the Transportation Charges shall then be reallocated among the other entities participating in repayment of costs of that reach. For the purposes of this determination, all payments received by the State from the seller relating to the annual entitlement sold shall be deemed to have been received from the buying contractor. Any increased Transportation minimum operation, maintenance, power and replacement component charges allocated to the buying contractor pursuant to this subdivision (g) shall begin January 1 of the year following the effective date of the transfer.

(h) Individual contractors may transfer entitlements among themselves in amounts in addition to those otherwise provided for in this article.The State shall expeditiously execute any necessary documents and approve all contracts involving permanent sales of entitlements among contractors, including permanent sales among Urban Contractors. Such sales shall be subject to the provisions of subdivisions (b), (f) and (g) of this article; *Provided*, however, that for a buying contractor needing transportation capacity in excess of the capacity factors on which its charges are based in any reach, reallocation of the Transportation capital cost component charges for transfers other than (i) the 130,000 acre-feet provided for in this article and (ii) the approximate 33,000 acre-feet of transfers proposed from contractors located in Santa Barbara or San Luis Obispo counties, shall be determined both prospectively and retroactively.

(i) On January 1 following the year in which such Monterey Amendments take effect and continuing every year thereafter until the end of the project repayment

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period: (i) Kern County Water Agency's (KCWA) annual entitlement for agricultural use as currently designated in Table A-1 of its contract shall be decreased by 40,670 acre-feet; (ii) Dudley Ridge Water District's (DRWD) annual entitlement as currently designated in Table A of its contract shall be decreased by 4,330 acre-feet; and (iii) the State's prospective charges (including any adjustments for past costs) for the 45,000 acre-feet of annual entitlements to be relinquished by KCWA and DRWD thereafter shall be deemed to be costs of project conservation facilities and included in the Delta Water Charge for all contractors in accordance with the provisions of Article 22. If by November 20, 1995 and each October 1 thereafter until the Monterey Amendments of both KCWA and DRWD take effect, KCWA and DRWD at their option notify the State in writing that they will relinquish up to their shares of 45,000 acre-feet of annual entitlements for the following calendar year beginning before the Monterey Amendments take effect, the State, when and if the Monterey Amendments take effect, shall adjust the charges retroactively for the acre-feet relinquished by KCWA and DRWD to January 1 of each year for which water was relinquished. The delivery points for the 45,000 acre-feet of annual entitlement to be relinquished shall be identified for the State by KCWA and DRWD to enable the State to calculate the transportation costs for the 45,000 acre-feet to be included in the Delta Water Charge.

54. [82]USAGE OF LAKES CASTAIC AND PERRIS.

(a) The State shall permit the contractors participating in repayment of the capital costs of Castaic Lake (Reach 30) and Lake Perris (Reach 28J) to withdraw water from their respective service connections in amounts in excess of deliveries approved pursuant to other provisions of the state water contracts. Each such contractor shall be permitted to withdraw up to a Maximum Allocation from the reach in which it is participating. The contractors participating in repayment of Castaic Lake may withdraw a collective Maximum Allocation up to 160,000 acre-feet pursuant to this article, which shall be apportioned among them pursuant to the respective proportionate use factors from the Department of Water Resources' Bulletin 132-94, Table B-1 upon which capital cost repayment obligations are based, as follows:

Castaic Lake

Participating Contractor	Proportionate Use Factor	Maximum Allocation (Acre Feet)
The Metropolitan Water District of Southern California	0.96212388	153,940
Ventura County Flood Control and Water Conservation District	0.00860328	1,376
Castaic Lake Water Agency	0.02927284	4,684
Total	**1.00000000**	**160,000**

[82] Amended: Amendment No. 16

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The Metropolitan Water District of Southern California, as the only contractor participating in repayment of Lake Perris, shall be allocated a Maximum Allocation at Lake Perris of 65,000 acre-feet based upon a proportionate use factor of 1.00000000.

The Maximum Allocation totals of 160,000 acre-feet and 65,000 acre-feet shall not be subject to adjustment. The individual contractor's Maximum Allocations shall be adjusted only as agreed to among the contractors desiring to adjust their Maximum Allocations. Adjustments between the contractors shall be subject to approval of the State which approval shall be given unless there are adverse impacts upon another contractor participating in the reach which are unacceptable to such contractor. The participating contractors will, in consultation with the State, cooperate with each other in an effort to promote efficient utilization of Castaic Lake, and to minimize any adverse impacts to each other, through coordination of deliveries pursuant to other provisions of the State Water Contract as well as withdrawals of allocations pursuant to this article.

(b) The State shall operate Castaic and Perris Reservoirs as transportation facilities in a manner consistent with this article. A contractor desiring to withdraw a portion or all of its Maximum Allocation shall furnish the State with a proposed delivery schedule. The proposed schedule may be submitted as part of the preliminary water delivery schedule submitted pursuant to Article 12(a)(1). Upon receipt of a schedule the State shall promptly review it to ensure that the amounts, times and rates of delivery will be consistent with the State's ability to operate the reach. The contractor may modify its proposed delivery schedule at any time, and the modified schedule shall be subject to review in the same manner. If necessary, the State may modify the schedule after consultation with the contractor and other contractors participating in repayment of that reach but may not change the total quantity of water to be withdrawn. As part of the consultation, the State shall advise a contractor if it determines a withdrawal will adversely impact the rate of delivery provided for the contractor in this contract. The State shall not be responsible for any such impacts.

(c) A contractor may withdraw all or a portion of its Maximum Allocation. It shall restore any withdrawn portion of such allocation by furnishing an equivalent amount of replacement water to the reservoir from which the water was withdrawn within five years from the year in which the withdrawal takes place. The unused portion of the allocation, in addition to any replacement water furnished to the reservoir, shall remain available for subsequent withdrawal. The State shall keep an accounting of the contractor's storage withdrawals and replacements. In any year, the State shall permit a contractor to withdraw an amount equivalent to the contractor's Maximum Allocation minus remaining replacement water requirements due to previous withdrawals. If the contractor fails to schedule and replace the withdrawn water within the five-year return period, the State shall provide the replacement water from water scheduled for delivery to the contractor in the sixth year or as soon as possible thereafter. The total amount of scheduled annual entitlement which a contractor can use in any one year for restoring its Maximum Allocation and storing water in surface storage facilities outside of its service area pursuant to Article 56 shall

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be the sum of the maximum amount the contractor can add to storage that year pursuant to Article 56 and the amount of acre-feet shown in column 2 of the following table, depending on the State's final water supply allocation percentage as shown in column 1.

1. **Final Water Supply Allocation Percentage**	**2. Maximum Acre-Feet of Scheduled Entitlement for Restoring Maximum Allocation***
50% or less	100,000
51%	98,000
52%	96,000
53%	94,000
54%	92,000
55%	90,000
56%	88,000
57%	86,000
58%	84,000
59%	82,000
60%	80,000
61%	78,000
62%	76,000
63%	74,000
64%	72,000
65%	70,000
66%	68,000
67%	66,000
68%	64,000
69%	62,000
70%	60,000
71%	58,000
72%	56,000
73%	54,000
74%	52,000
75 to 99%	50,000
100%	no limit

* Excludes the maximum amount that can be added to storage in a year pursuant to Article 56, which may be used in addition to the amounts in this table to restore Maximum Allocation.

A contractor may use any of this total amount for replacement water but cannot use any more than that provided for in Article 56 to add to storage in project surface conservation facilities and in nonproject surface storage facilities. There shall be no limit under this article on the amount of scheduled annual entitlement a contractor can use to restore its Maximum Allocation in a year when its percentage of annual water supply allocation is one-hundred percent (100%), nor shall there be any limit under this article on the amount of interruptible water, nonproject water or water obtained through an exchange which a contractor can use to restore its Maximum Allocation.

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(d) For any replacement water furnished to reservoir storage pursuant to this article, the responsible contractor shall pay the State charges for the conservation, if any, and transportation of such replacement water as are associated with the type of replacement water that is furnished, as if such water were delivered to the turnout at the reservoir to which the replacement water is furnished. Adjustments from estimated to actual costs shall be subject to provisions applicable to the type of replacement water. The State shall not charge contractors for water withdrawn pursuant to this article.

(e) The State shall operate capacity in Castaic and Perris Reservoirs, not required for purposes of Maximum Allocation deliveries, in compliance with the requirement of Article 17(b) of The Metropolitan Water District of Southern California's water supply contract with the State to maintain an amount of water reasonably sufficient to meet emergency requirements of the contractors participating in repayment of that reach. A contractor receiving water pursuant to this article accepts that the State shall not be liable for any damage, direct or indirect, arising from shortages in the amount of water to be made available from that reservoir to meet the contractor's actual emergency requirements as a result of prior storage withdrawals by that contractor pursuant to this article. Nothing in this article shall permit or require the State to adjust allocations or deliveries under Article 18.

(f) To the extent a contractor, during a calendar year, uses all or a portion of its Maximum Allocation, the State may, to the extent necessary to service project purposes, reduce that contractor's requested peaking service. Such reduction in peaking service shall only occur to the extent such usage of Maximum Allocation causes the State to be unable to provide all peaking service requested. This paragraph shall not apply to the extent the contractor requested usage of Maximum Allocation as part of the preliminary water delivery schedule submitted pursuant to Article 12(a)(1).

(g) The State may reduce water stored in Castaic Lake and Lake Perris to the extent necessary for maintenance and to respond to emergencies resulting from failure of project transportation facilities or of other supply importation facilities serving the State project service area. The State shall promptly replace water within the Maximum Allocation as soon as the need for the reduction terminates.

55. [83]TRANSPORTATION OF NONPROJECT WATER.

(a) Subject to the delivery priorities in Article 12(f), contractors shall have the right to receive services from any of the project transportation facilities to transport water procured by them from nonproject sources for delivery to their service areas and to interim storage outside their service areas for later transport and delivery to their service areas: *Provided*, that except to the extent such limitation in Section 12931 of the Water Code be changed, a contractor shall not use the project transportation facilities under this option to transport water the right to which was secured by the

[83] Amended: Amendment No. 16

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contractor through eminent domain unless such use be approved by the Legislature by concurrent resolution with the majority of the members elected to each house voting in favor thereof.

(b) For any nonproject water delivered pursuant to this article, contractors shall pay the State the same (including adjustments) for power resources (including on-aqueduct, off-aqueduct, and any other power) incurred in the conservation and transportation of such water as if such nonproject water were entitlement water, as well as all incremental operation, maintenance, and replacement costs, and any other incremental costs, which may include an administrative or contract preparation charge, all as determined by the State. Incremental costs shall mean those nonpower costs which would not be incurred if nonproject water were not scheduled for or delivered to contractors. Only those contractors not participating in the repayment of a reach shall be required to pay a use of facilities charge for the delivery of nonproject water from or through that reach. Costs for transporting water placed into interim storage shall be paid in the same manner provided for in subdivision (c)(6) of Article 56.

(c) The amounts, times and rates of delivery of nonproject water shall be provided for pursuant to a water delivery schedule to be issued in the same manner as provided for in Article 12. The costs specified in this article shall be paid for at the same time the corresponding project water costs are paid.

56. [84]USE, STORAGE AND SALE OF PROJECT WATER OUTSIDE OF SERVICE AREA AND STORAGE OF WATER IN PROJECT SURFACE CONSERVATION FACILITIES.

(a) State Consent to Use of Project Water Outside of Service Area

Notwithstanding the provisions of Article 15(a), the State hereby consents to the Agency storing project water outside its service area for later use within its service area in accordance with the provisions of subdivision (c) of this article and to the Agency selling project water for use outside its service area in accordance with the provisions of subdivision (d) of this article.

(b) Groundwater Storage Programs

The Agency shall cooperate with other contractors in the development and establishment of groundwater storage programs.

(c) Storage of Project Water Outside of Service Area

(1) A contractor may elect to store project water outside its service area for later use within its service area, up to the limits and in accordance with the provisions provided for in this subdivision (c) and any applicable water

[84] Amended: Amendment No. 16

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right laws, by setting forth on the preliminary water delivery schedule submitted to the State on or before October 1 of each year pursuant to Article 12(a) the quantity of project water it wishes to store in the next succeeding year. There shall be no limit on the amount of project water a contractor can store outside its service area during any year in a then existing and operational groundwater storage program. The amount of project water a contractor can add to storage in project surface conservation facilities and in nonproject surface storage facilities located outside the contractor's service area each year shall be limited to the lesser of the percent of the contractor's Table A annual entitlement shown in column 2 or the acre-feet shown in column 3 of the following table, depending on the State's final water supply allocation percentage as shown in column 1. However, there shall be no limit to storage in nonproject facilities in a year in which the State's final water supply allocation percentage is one hundred percent. These limits shall not apply to water stored pursuant to Article 12(e).

1. Final Water Supply Allocation Percentage	2. Maximum Percent of Agency's Annual Entitlement That Can be Stored	3. Maximum Acre-Feet That Can be Stored
50% or less	25%	100,000
51%	26%	104,000
52%	27%	108,000
53%	28%	112,000
54%	29%	116,000
55%	30%	120,000
56%	31%	124,000
57%	32%	128,000
58%	33%	132,000
59%	34%	136,000
60%	35%	140,000
61%	36%	144,000
62%	37%	148,000
63%	38%	152,000
64%	39%	156,000
65%	40%	160,000
66%	41%	164,000
67%	42%	168,000
68%	43%	172,000
69%	44%	176,000
70%	45%	180,000
71%	46%	184,000
72%	47%	188,000
73%	48%	192,000
74%	49%	196,000
75% or more	50%	200,000

(2) Storage capacity in project surface conservation facilities at any time in excess of that needed for project operations shall be made available to

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requesting contractors for storage of project and nonproject water. If such storage requests exceed the available storage capacity, the available capacity shall be allocated among contractors requesting storage in proportion to their annual entitlements designated in their Table A's for that year. A contractor may store water in excess of its allocated share of capacity as long as capacity is available for such storage.

(3) If the state determines that a reallocation of excess storage capacity is needed as a result of project operations or because of the exercise of a contractor's storage right, the available capacity shall be reallocated among contractors requesting storage in proportion to their annual entitlements designated in their Table A's for that year. If such reallocation results in the need to displace water from the storage balance for any contractor or noncontractor, the water to be displaced shall be displaced in the following order of priority:

First, water, if any, stored for noncontractors.

Second, water stored for a contractor that previously was in excess of that contractor's allocation of storage capacity.

Third, water stored for a contractor that previously was within that contractor's allocated storage capacity.

The State shall give as much notice as feasible of a potential displacement.

(4) Any contractor electing to store project water outside its service area pursuant to this subdivision may not sell project water under the provisions of subdivision (d) of this article during the year in which it elected to store project water. This limitation shall not apply to replacement water furnished to Castaic and Perris Reservoirs pursuant to Article 54, nor to the storage of water introduced into a groundwater basin outside a contractor's service area if recovery is intended to occur within that contractor's service area.

(5) The restrictions on storage of project water outside a contractor's service area provided for in this subdivision (c), shall not apply to storage in any project offstream storage facilities constructed south of the Delta after the date of this amendment.

(6) For any project water stored outside its service area pursuant to this subdivision (c), a contractor shall pay the State the same (including adjustments) for power resources (including on-aqueduct, off-aqueduct, and any other power) incurred in the transportation of such water as the contractor pays for the transportation of annual entitlement to the reach of the project

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transportation facility from which the water is delivered to storage. If annual entitlement is stored, the Delta Water Charge shall be charged only in the year of delivery to interim storage. For any stored water returned to a project transportation facility for final delivery to its service area, the contractor shall pay the State the same for power resources (including on-aqueduct, off-aqueduct, and any other power) incurred in the transportation of such water calculated from the point of return to the aqueduct to the turn-out in the contractor's service-area. In addition, the contractor shall pay all incremental operation, maintenance, and replacement costs, and any other incremental costs, as determined by the State, which shall not include any administrative or contract preparation charge. Incremental costs shall mean those nonpower costs which would not be incurred if such water were scheduled for or delivered to the contractor's service area instead of to interim storage outside the service area. Only those contractors not participating in the repayment of a reach shall be required to pay a use of facilities charge for use of a reach for the delivery of water to, or return of water from, interim storage.

(7) A contractor electing to store project water in a nonproject facility within the service area of another contractor shall execute a contract with that other contractor prior to storing such water which shall be in conformity with this article and will include at least provisions concerning the point of delivery and the time and method for transporting such water.

(d) Sale of Project Water For Use Outside Service Area

(1) If in any year a contractor has been allocated annual entitlement that it will not use within its service area, the contractor has not elected to store project water in accordance with the provisions of subdivision (c) of this article during that year, and the contractor has not elected to carry over entitlement water from the prior year pursuant to the provisions of Article 12(e), the contractor may sell such annual entitlement for use outside its service area in accordance with the following provisions.

(2) Each year the State shall establish an annual entitlement water pool (the Pool) for contractors wishing to sell or buy project water pursuant to the provisions of this subdivision. The Pool shall constitute the exclusive means of selling portions of annual entitlements not desired by contractors that year. Contractors willing to sell to or buy water from the Pool shall notify the State in writing of their desire to do so indicating the quantity to be sold or purchased. Contractors shall have the first priority to purchase all water placed in the Pool. The State may purchase any water remaining in the Pool not purchased by contractors at the same price available to contractors and use such water for the purpose of providing additional carryover storage for contractors: *Provided*, that the State shall consult with the contractors prior to making any such purchases.

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(3) Each year, the price per acre-foot to be paid by the State to contractors selling water placed in the Pool on or before February 15 that is purchased by a contractor requesting such purchase by March 1 or by the State on March 1 shall be equal to fifty percent (50%) of the Delta water rate as of that date. The price per acre-foot to be paid to the State for the purchase of water from the Pool by a contractor placing a request for such purchase on or before March 1 shall be equal to fifty percent (50%) of the Delta water rate as of that date. Any water placed in the Pool on or before February 15 that is not purchased by contractors or the State by March 1 may be withdrawn from the Pool by the selling contractor.

(4) Each year the price per acre-foot to be paid by the State to contractors selling water remaining in the Pool or placed in the Pool after February 15, but on or before March 15 that is purchased by a contractor requesting such purchase by April 1 or by the State on April 1 shall be equal to twenty-five percent (25%) of the Delta water rate as of that date. The price per acre-foot to be paid to the State for the purchase of water from the Pool by a contractor placing a request for such purchase between March *2* and April 1 shall be equal to twenty-five percent (25%) of the Delta water rate as of the later date. Any water placed in the Pool on or before March 15 that is not purchased by a contractor or the State by April 1 may be withdrawn from the Pool by the selling contractor.

(5) If there are more requests from contractors to purchase water from the Pool than the amount in the Pool, the water in the Pool shall be allocated among those contractors requesting such water in proportion to their annual entitlements for that year up to the amount of their requests. If requests to purchase water from the Pool total less than the amount of water in the Pool, the sale of Pool water shall be allocated among the contractors selling such water in proportion to their respective amounts of water in the Pool.

(6) Any water remaining in the Pool after April 1 that is not withdrawn by the selling contractor shall be offered by the State to contractors and noncontractors and sold to the highest bidder: *Provided*, that if the highest bidder is a noncontractor, all contractors shall be allowed fifteen days to exercise a right of first refusal to purchase such water at the price offered by the noncontractor. The price to be paid to the selling contractor shall be the amount paid by the buyer exclusive of the amount to be paid by the buyer to the State pursuant to subdivision (d)(7) of this article.

(7) For any water delivered from the Pool to contractors, the buyer shall pay the State the same for power resources (including on-aqueduct, off-aqueduct, and any other power) incurred in the transportation of such water as if such water were entitlement water, as well as all incremental operation, maintenance, and replacement costs, and any other incremental costs, as determined by the State, which shall not include any administrative or contract

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preparation charge. Incremental costs shall mean those nonpower costs which would not be incurred if such water were not scheduled for or delivered to the buyer. Only those buyers not participating in the repayment of a reach shall be required to pay any use of facilities charge for the delivery of such water from or through the reach. Adjustments from estimated to actual costs shall be computed by the State pursuant to these provisions and shall be paid by the buyer or credited to the buyer at the times and interest rates described in Article 28(c).

(e) Continuance of Article 12(e) Carry-over Provisions

The provisions of this article are in addition to the provisions of Article 12(e), and nothing in this article shall be construed to modify or amend the provisions of Article 12(e). Any contractor electing to sell project water during any year in accordance with the provisions of subdivision (d) of this article, shall not be precluded from using the provisions of Article 12(e) for carrying over water from the last three months of that year into the first three months of the succeeding year.

(f) Bona Fide Exchanges Permitted

Nothing in this article shall be deemed to prevent the Agency from entering into bona fide exchanges of project water for use outside the Agency's service area with other parties for project water or nonproject water if the State consents to the use of the project water outside the Agency's service area. Also, nothing in this article shall be deemed to prevent the Agency from continuing those exchange or sale arrangements entered into prior to September 1, 1995, which had previously received any required State approvals. A "bona fide exchange" shall mean an exchange of water involving a contractor and another party where the primary consideration for one party furnishing water to another is the return of a substantially similar amount of water, after giving due consideration to the timing or other nonfinancial conditions of the return. Reasonable payment for costs incurred in effectuating the exchange and reasonable deductions from water delivered, based on expected storage or transportation losses may be made. A "bona fide exchange" shall not include a transfer of water from one contractor to another party involving a significant payment unrelated to costs incurred in effectuating the exchange. The State, in consultation with the contractors, shall have authority to determine whether transfers of water constitute "bona fide exchanges" within the meaning of this paragraph and not disguised sales.

(g) Other Transfers

Nothing in this article shall be deemed to modify or amend the provisions of Article 15(a), or Article 41, except as expressly provided for in subdivisions (c) and (d) of this article.

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[85]All balances of wet weather and Article 12(d) water otherwise available to any contractor executing the Monterey Amendment shall be eliminated as of the effective date of such amendment and no new balances for such water shall be established.

[86]Effective Dates and Phase-in.

(a) No Monterey Amendment to any contractor's water supply contract shall take effect unless and until both of the following have occurred (1) the Monterey Amendments to both the Kern County Water Agency's and The Metropolitan Water District of Southern California's contracts have been executed and no legal challenge has been filed within sixty days of such execution or, if filed, a final judgment of a court of competent jurisdiction has been entered sustaining or validating said amendments; and (2) the State has conveyed the property which constitutes the Kern Fan Element of the Kern Water Bank to Kern County Water Agency pursuant to the Kern Water Bank Contact provided for in Article 52 either on or before October 1, 1996 or, if the conveyance on such date has been prevented by an interim court order, within ninety days after such court order has become ineffective so long as said ninety days expires not later than January 1, 2000. The October 1, 1996 date and the January 1, 2000 date may be extended by unanimous agreement of the State, Kern County Water Agency and The Metropolitan Water District of Southern California.

(b) The State shall administer the water supply contracts of any contractors that do not execute the Monterey Amendment so that such contractors are not affected adversely or to the extent feasible beneficially by the Monterey Amendments of other contractors' water supply contracts.

(c) If a court of competent jurisdiction issues a final judgment or order determining that any part of a contractor's Monterey Amendment is invalid or unenforceable, all provisions of that amendment shall be of no force or effect as to such contractor, except as provided in subdivisions (e) and (f) of this paragraph.

(d) If any part of the Monterey Amendment of the Kern County Water Agency's or The Metropolitan Water District of Southern California's contracts or if the conveyance of the Kern Fan Element of the Kern Water Bank to the Kern County Water Agency provided for in Article 52 is determined by a court of competent jurisdiction in a final judgment or order to be invalid or unenforceable, the Monterey Amendments of all contractors and the Kern Water Bank Contract shall be of no force and effect except as provided in subdivisions (e) and (f) of this paragraph.

(e) Notwithstanding subdivisions (c), (d) and (f) of this paragraph, if any part of the Monterey Amendment of the Kern County Water Agency's or The Metropolitan Water District of Southern California's contract is determined by a court

[85] Amended: Amendment No. 16
[86] Amended: Amendment No. 16

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of competent jurisdiction in a final judgment or order to be invalid or unenforceable, and if Articles 52 and 53(i) have been implemented (i.e., the property which constitutes the Kern Fan Element of the Kern Water Bank has been conveyed by the State and the 45,000 acre-feet of annual entitlements have been relinquished to the State), the implementation of the relinquishment shall not be reversed unless the implementation of the conveyance is also reversed, and conversely, implementation of the conveyance shall not be reversed unless implementation of the relinquishment is also reversed. Nothing in this subdivision shall affect any party's right to seek additional damages, compensation or any other remedy available at law or in equity.

(f) The total invalidity or unenforceability of one contractor's Monterey Amendment as provided for in subdivision (c) of this paragraph or of all contractor's Monterey Amendments as provided for in subdivision (d) of this paragraph or of the Kern Water Bank Contract as provided for in subdivision (d) of this paragraph may be avoided only if such invalidity or unenforceability is explicitly waived in writing signed by the State, Kern County Water Agency and The Metropolitan Water District of Southern California. In cases arising under subdivision (c) or (d), the affected contractor whose Monterey Amendment has been determined to be partially invalid or unenforceable must first request the waiver.

57. [87]Article 57 Is Intentionally Left Blank for Future Use.

58. [88]DETERMINATION OF DEPENDABLE ANNUAL SUPPLY OF PROJECT WATER TO BE MADE AVAILABLE BY EXISTING PROJECT FACILITIES.

In order to provide current information regarding the delivery capability of existing project conservation facilities, commencing in 2003 and every two years thereafter the State shall prepare and mail a report to all contractors, and all California city, county, and regional planning departments and agencies within the contractors' project service areas. This report will set forth, under a range of hydrologic conditions, estimates of overall delivery capability of the existing project facilities and of supply availability to each contractor in accordance with other provisions of the contractors' contracts. The range of hydrologic conditions shall include the delivery capability in the driest year of record, the average over the historic extended dry cycle and the average over the long-term. The biennial report will also include, for each of the ten years immediately preceding the report, the total amount of project water delivered to all contractors and the amount of project water delivered to each contractor.

IN WITNESS WHEREOF, the parties hereto have executed this contract on the date first above written.

[87] Amended: Amendment No. 18
[88] Amended: Amendment No. 18

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Approved as to legal form
and sufficiency:

For Chief Counsel
Department of Water Resources
P. O. Box 388
Sacramento, California

Attest:

County Clerk and Ex-Officio Clerk
Solano County Flood Control and
Water Conservation District
Solano County Court House
Fairfield, California

Approved ss to form:

Special Counsel

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

By
Director

SOLANO COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

By
Chairman, Board of Directors

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APPENDIX A

TABLE A

AS SHOWN IN THE CONTRACT
BETWEEN
THE STATE OF CALIFORNIA
THE DEPARTMENT OF WATER RESOURCES AND
SOLANO COUNTY WATER AGENCY
AND
AMENDMENTS NO. 6, 7, 11, 17, AND 18

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TABLE A
ANNUAL ENTITLEMENTS
SOLANO COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

<As shown in the original Contract>

Year	Total Annual Amount In Acre-feet
1	6,750
2	8,000
3	9,400
4	10,800
5	12,100
6	14,000
7	16,500
8	20,000
9	27,000
10	34,500
11	42,000
and each succeeding year thereafter, for the term of this contract as a Maximum Annual Entitlement.	42,000

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TABLE A AMENDED

<As shown in Amendment No. 6>

Year	Total Annual Amount In Acre Feet
1980	500
1981	650
1982	800
1983	950
1984	12,100
1985	14,000
1986	16,500
1987	20,000
1988	27,000
1989	34,500
1990 and each succeeding year thereafter, for the term of this contract as a maximum entitlement	42,000

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TABLE A AMENDED
ANNUAL ENTITLEMENTS
SOLANO COUNTY FLOOD CONTROL AND
WATER CONSERVATION DISTRICT

<As shown in Amendment No. 7>

Year	Total Annual Amount In Acre-Feet
1984	1,100
1985	1,250
1986	2,300
1987	13,750
1988	15,660
1989	18,420
1990	21,250
1991	22,300
1992	24,170
1993	26,130
1994	28,080
1995	34,250
1996	37,800
1997	38,250
1998	38,710
1999	39,170
2000	39,620
2001	40,080
2002	40,540
2003	41,000
2004	41,450
2005	41,500
2006	41,550
2007	41,600
2008	41,650
2009	41,700
2010	41,750
2011	41,800
2012	41,850
2013	41,000
2014	41,950
2015 and each succeeding year thereafter, for the term of this contract as Maximum Annual Entitlement	42,000

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TABLE A
ANNUAL ENTITLEMENTS
SOLANO COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

<As shown in Amendment No. 11>

Year	Total Annual Amount In Acre-feet
1980	500
1981	650
1982	800
1983	950
1984	1,100
1985	1,250
1986	1,400
1987	1,550
1988	15,660
1989	18,420
1990	21,250
1991	22,300
1992	24,170
1993	26,130
1994	28,080
1995	34,250
1996	37,800
1997	38,250
1998	38,710
1999	39,170
2000	39,620
2001	40,080
2002	40,540
2003	41,000
2004	41,450
2005	41,500
2006	41,550
2007	41,600
2008	41,650
2009	41,700
2010	41,750
2011	41,800
2012	41,850
2013	41,000
2014	41,950
2015 and each succeeding year thereafter, for the term of this contract as a Maximum Annual Entitlement	42,000

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TABLE A: ANNUAL ENTITLEMENT
SOLANO COUNTY WATER AGENCY

<As shown in Amendment No. 17>

Year		Total Annual Amount In Acre-feet
1	(1980)	500
2	(1981)	650
3	(1982)	800
4	(1983)	950
5	(1984)	1,100
6	(1985)	1,250
7	(1986)	1,400
8	(1987)	1,500
9	(1988)	15,660
10	(1989)	18,420
11	(1990)	21,250
12	(1991)	22,300
13	(1992)	24,170
14	(1993)	26,130
15	(1994)	28,080
16	(1995)	34,250
17	(1996)	37,800
18	(1997)	38,250
19	(1998)	38,710
20	(1999)	39,170
21	(2000)	39,620
22	(2001)	45,836
23	(2002)	46,296
24	(2003)	46,756
25	(2004)	47,206
26	(2005)	47,256
27	(2006)	47,306
28	(2007)	47,356
29	(2008)	47,406
30	(2009)	47,456
31	(2010)	47,506
32	(2011)	47,556
33	(2012)	47,606
34	(2013)	47,656
35	(2014)	47,706
36	(2015)	47,756
And each succeeding year thereafter, for the term of this contract as a maximum Annual entitlement:		47,756

This Amendment is contingent upon the effectiveness of Water Supply Contract Amendment No. 33, between the State and the KCWA. If either amendment ceases to be effective for any reason, including but not limited to any court order or judgment entered in *Planning and Conservation League v. DWR & CCWA*, Agency agrees that the State may in its

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discretion and consistent with the law then in effect as determined by the State, identify the date on which the contract amendments shall be deemed inoperative, for the purpose of assuring timely repayment of contract obligations and orderly administration of the long-term water supply contracts.

The Agency agrees to indemnify, defend, and hold harmless the State and any of its officers, agents, or employees from any liability, expenses, defense costs, attorney fees, claims, actions, liens and lawsuits of any kind arising from or related to any and all action implementing this Amendment and associated agreements.

Except as amended herein, the provisions of the contract, including but not limited to Articles 12(b) and 12(c) (as amended herein), will remain in full force and effect.

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TABLE A
SOLANO COUNTY WATER AGENCY

<As shown in Amendment No. 18>

Year		Total Annual Amount In Acre-feet
1	(1980)	500
2	(1981)	650
3	(1982)	800
4	(1983)	950
5	(1984)	1,100
6	(1985)	1,250
7	(1986)	1,400
8	(1987)	1,500
9	(1988)	15,660
10	(1989)	18,420
11	(1990)	21,250
12	(1991)	22,300
13	(1992)	24,170
14	(1993)	26,130
15	(1994)	28,080
16	(1995)	34,250
17	(1996)	37,800
18	(1997)	38,250
19	(1998)	38,710
20	(1999)	39,170
21	(2000)	39,620
22	(2001)	45,836
23	(2002)	46,296
24	(2003)	46,756
25	(2004)	47,206
26	(2005)	47,256
27	(2006)	47,306
28	(2007)	47,356
29	(2008)	47,406
30	(2009)	47,456
31	(2010)	47,506
32	(2011)	47,556
33	(2012)	47,606
34	(2013)	47,656
35	(2014)	47,706
36	(2015)	47,756
And each succeeding year thereafter, for the term of this contract as a maximum Annual entitlement:		47,756

In any year, the amounts designated in this Table A shall not be interpreted to mean that the State is able to deliver those amounts in all years. Article 58 describes the State's process for providing current information for project delivery capability.

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Except for Article 58, the changes made by this amendment are solely for clarification purposes, and are not intended to nor do they in any way change the rights, obligations or limitations on liability of the State or the Agency established by or set forth in the contract, and this amendment shall be interpreted in accordance with this intent.

At the time of execution of this Agreement and thereafter, the effectiveness of this Amendment is dependent upon the effectiveness of the Agency's Monterey Amendment (all provisions therein) and the Kern Fan Element Transaction.

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Appendix C-1.2: DWR Settlement Agreement

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State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

SETTLEMENT AGREEMENT AMONG THE DEPARTMENT OF WATER RESOURCES OF THE STATE OF CALIFORNIA, SOLANO COUNTY WATER AGENCY, AND CITIES OF FAIRFIELD, VACAVILLE, AND BENICIA FOR PURPOSES OF WATER SUPPLY

This Agreement is made and entered into as of the 19th day of May, 2003, pursuant to the provisions of the California Water Resources Development Bond Act, the Central Valley Project Act and other applicable laws of the State of California, among the State of California, acting by and through the Department of Water Resources ("the Department"), the Solano County Water Agency ("SCWA"), a California water agency formed under the laws of California, and the Cities of Fairfield, Vacaville, and Benicia (collectively "the Cities") for purposes of settling issues of water supply.

RECITALS

A. On February 23, 1998, the Cities filed separate applications (Fairfield 30680, Benicia 30681, and Vacaville 30682) with the California State Water Resources Control Board ("SWRCB"), pursuant to Water Code sections 11460-11465 to divert and use surface water in their service areas for purposes of providing additional water supplies and to improve water supply reliability to meet water demands and development objectives in their General Plans.

B. The Cities are each implementing water conservation measures as a means of reducing their respective demand for water, but each City still requires an additional water supply.

C. The City of Fairfield, as lead agency, in May 2002, certified a Final Environmental Impact Report ("FEIR") on the Cities of Fairfield, Vacaville and Benicia Water Rights Appropriations Project (prepared by the City of Fairfield and dated March 2002).

D. The FEIR analyzes the potential environmental effects resulting from the proposed appropriation of water diverted from Barker Slough using available capacity of the existing Barker Slough Pumping Plant ("Barker Slough") and the North Bay Aqueduct ("NBA").

E. The Department constructed and operates the NBA as part of the State Water Project ("SWP"), for purposes of supplying water under its water supply contracts with SCWA and Napa County Flood Control and Water Conservation District.

F. The Cities have water supply contracts with SCWA to obtain SWP water through the NBA.

G. The Parties desire to avoid disputing the issues of appropriation during a SWRCB water rights hearing and therefore intend to execute a Settlement Agreement that will provide a water supply to the Cities. In turn, the Cities will withdraw their applications before the SWRCB.

H. In order to convey water provided by this Settlement Agreement, SCWA, acting on behalf of the Cities, and the Department intend to enter into, concurrent with this Agreement, a separate Agreement for conveyance of non-Project Water by a SWP contractor.

NOW, THEREFORE, the Parties mutually agree as follows:

1. PURPOSE

This Agreement is to settle water supply issues and avoid adversarial hearings before the SWRCB regarding the Cities' water rights applications.

2. DEFINITIONS

When used in this Agreement, the following definitions shall apply:

a. "Balanced Conditions" are defined for the Sacramento-San Joaquin Delta in the "Agreement Between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and the State Water Project," dated November 24, 1986 ("COA") as the periods when it is agreed by the U.S. Bureau of Reclamation and the Department that releases from upstream Central Valley Project ("CVP") and SWP reservoirs plus unregulated flow approximately equal the water supply needed to meet Sacramento Valley inbasin uses, plus exports.

b. "Excess Conditions" are defined for the Sacramento-San Joaquin Delta in the COA as those periods when it is agreed by the U.S. Bureau of Reclamation and the Department that releases from CVP and SWP upstream reservoirs plus unregulated flow exceed Sacramento Valley inbasin uses, plus exports.

c. "Project Water" shall mean water made available for delivery to the SWP contractors by SWP conservation facilities and transportation facilities included in the SWP system.

d. "Settlement Water" shall mean the amount of water provided under the terms of this Agreement by the Department to SCWA, for use by the Cities.

e. "SCWA Long-Term Water Supply Contract" shall mean Water Supply Contract No. 160260 Between the State of California Department of Water Resources and Solano County Water Agency, as amended.

f. "Standard Term 91" is defined in the SWRCB Water Right Decision 1594 (Nov. 1983) and Order WR 84-2 (Feb. 1984).

g. "Sacramento Valley inbasin uses" is defined by the COA and means legal uses of water in the Sacramento Basin, including water required to meet Sacramento-San Joaquin Delta water quality standards.

3. AMOUNT AND ACCOUNTING OF SETTLEMENT WATER

a. The Department shall make available Settlement Water to SCWA:

i. During Excess Conditions, and

ii. During Balanced Conditions when Standard Term 91, as described in Article 3(b), below, is not in effect.

b. The Department shall not be required to make Settlement Water available pursuant to this Agreement when the SWRCB requires other water users to curtail diversions pursuant to Standard Term 91. The Department will provide notice to SCWA and the Cities that diversions under this Agreement are curtailed consistent with the periods of curtailment established by the SWRCB under Standard Term 91.

c. The maximum amount of Settlement Water the Department shall provide SCWA for use by the Cities in any calendar year shall be 31,620 acre-feet.

d. The quantity of Settlement Water actually delivered through the NBA to SCWA in any year shall depend upon the Cities' actual demands, hydrology,

and the availability of capacity to convey the Settlement Water pursuant to the "Agreement for Conveying Settlement Water through the North Bay Aqueduct by the Department of Water Resources to the Solano County Water Agency for the Cities of Fairfield, Vacaville, and Benicia" executed concurrently with this Agreement, attached as Exhibit A and incorporated herein by this reference ("Conveyance Agreement").

e. Settlement Water shall be for use within the Cities' respective spheres of influence ("SOI"), as they may be modified, and shall not be transferred outside the combined SOIs of the Cities as presently shown on the attached Exhibit B, incorporated herein by this reference and as later modified, without the Department's approval.

f. Settlement Water made available pursuant to this Agreement shall be diverted under water rights held by the Department for the SWP but the Settlement Water shall not be considered Project Water.

4. CONVEYANCE AND SCHEDULING OF SETTLEMENT WATER

a. Conveyance and scheduling of Settlement Water by the Department shall be pursuant to the Conveyance Agreement.

b. SCWA shall schedule the Settlement Water consistent with applicable terms of the SCWA Long-Term Water Supply Contract.

5. PAYMENT FOR SETTLEMENT WATER

a. Payment shall be made by SCWA, in accordance with Article 6 below, for that quantity of Settlement Water pumped at Barker Slough during Balanced Conditions. The charge for such water shall be an amount equivalent to the

Delta Water Rate in 2002, plus 3 percent compounded annually for future years, or the Delta Water Rate in each year, whichever is less.

b. For Settlement Water delivered during Excess Conditions, no payment shall be required except for conveyance costs pursuant to the Conveyance Agreement.

6. TIME AND METHOD OF PAYMENT (INVOICING PROVISIONS)

a. At the end of each month, the Department will bill SCWA for Settlement Water pumped at Barker Slough during Balanced Conditions. All payments shall be due within 30 days after the date of the Department's billing, and interest shall be charged if payments are delinquent by more than 30 days.

b. SCWA shall pay the Department accrued interest on all overdue payments at the penalty interest rate specified in Article 32 of the SCWA Long-Term Water Supply Contract per month from the due date to the date of payment.

7. CONDITIONS PRECEDENT

a. The terms of this Agreement, except for Article 7(b) below, shall have no effect until completion of the following:

i. The Cities have withdrawn Applications 30680, 30681, and 30682 that are before the SWRCB.

ii. A document pursuant to the California Environmental Quality Act ("CEQA"), if necessary, is completed and Notices of Determination are filed by the City of Fairfield as lead agency and the Department as a responsible agency, and any material changes in the project or in this Agreement that are required to comply with requirements of CEQA

have been made and agreed to by the Department, SCWA, and the Cities.

iii. The Department has obtained any necessary permits or biological opinions pursuant to State and Federal Endangered Species Acts ("ESA"), in order to address any potential impacts to endangered species that might occur as a result of using the NBA to convey Settlement Water under this Agreement.

b. The Parties shall diligently pursue completion of the Conditions Precedent upon execution of this Agreement.

8. MATERIAL CHANGES IN SWP COSTS

a. In the event the Department incurs additional material SWP costs to comply with any new or revised permit terms or conditions, including but not limited to biological opinions under ESA, resulting from this Agreement, the Parties agree that such costs shall be paid as follows:

i. SCWA and the Cities shall be responsible for additional material SWP costs incurred by the Department and attributable to the Settlement Water and will receive a credit as an offset against such costs from the payments made for Settlement Water pursuant to Article 5(a), plus 3 percent per annum, which represents the time-value of money previously paid to the Department.

ii. Any additional material SWP costs exceeding the credits given SCWA and the Cities will be paid by SCWA to the Department, as provided in Article 6. In that event, SCWA and the Cities shall receive credits

equal to the amount paid by SCWA to the Department, plus 3 percent per annum, which represents the time-value of money previously paid. These credits will be applied as an offset against future payments for Settlement Water under Article 5(a).

iii. SWCA shall maintain accounts pursuant to this Article and shall submit such accounts to the Department by January 31 each year or upon the Department's request. The accounts shall show a historical record of all SCWA payments pursuant to this Article and Article 5(a), costs applied against such payments, and the credit balance available from such payments.

b. "Additional material SWP costs" do not include costs that would be recoverable through the Transportation Charge for the NBA under the SWP long-term water supply contracts.

c. The Parties shall recognize that this Agreement may not be the sole cause of new or revised permit terms or conditions referenced in this Article, and SCWA and the Cities will be responsible only for costs caused by the Settlement Water which consequently may be a portion of the resulting total material SWP costs. In that event, SCWA and the Cities' cost share shall be determined in an equitable and proportional manner.

d. Should the Parties dispute any of the additional material SWP costs attributed to SCWA and the Cities or the payment of such costs, then the Parties shall submit the matter to arbitration as provided in Article 23(b).

9. TERM OF AGREEMENT

The term of this Agreement shall be from the date specified in the first paragraph of page 1 of this Agreement and shall remain in effect until December 31, 2035, but with option for continued service as follows:

a. By written notice to the Department at least six months prior to the expiration of the term of this Agreement, the SCWA and the Cities may elect to receive continued service after expiration of said term under the following conditions unless otherwise agreed to:

i. Service of Settlement Water in amounts provided in Article 3.

ii. Service of Settlement Water at no greater cost to the SCWA and the Cities than would have been the case had this Agreement continued in effect.

iii. Service of Settlement Water under the same physical conditions of service, including time, place, amount and rate of delivery as provided for herein and as provided in the Conveyance Agreement.

iv. Service of Settlement Water with the option to utilize the SWP transportation facilities as provided in Articles 18(c) and 55 of the SCWA Long-Term Water Supply Contract, to the extent such options are then applicable.

b. Other terms and conditions of the continued service shall be reasonable and equitable and shall be mutually agreed upon. In the event that said terms and conditions provide for continued service for a limited number of years only, the SCWA and the Cities shall have the same option to receive continued

service here provided for upon the expiration of that and each succeeding period of continued service.

10. LIMITATIONS ON FUTURE WATER RIGHT APPLICATIONS

During the term of this Agreement, and any subsequent renewals thereof, no City shall file an application for water under the Area-of-Origin statutes (Water Code § 11460, *et seq.*) for the amount of water needed to meet the existing and future demands for that City as described in the FEIR for the Cities' Water Rights Appropriation Project as a maximum annual diversion of 11,800 acre-feet for the City of Fairfield; 10,500 acre-feet for the City of Benicia; and 9,320 acre-feet for the City of Vacaville; or a total maximum diversion of all Cities of 31,620 acre-feet.

11. TERMINATION OF AGREEMENT

The Parties may terminate this Agreement by written agreement of all the Parties. If terminated, the Cities may apply for water as if this Agreement had not been entered into.

12. CALIFORNIA ENVIRONMENTAL QUALITY ACT

a. The Parties shall ensure that the requirements of CEQA are met before this Agreement becomes effective. If it is determined that additional environmental documentation is necessary, to supplement the FEIR prepared by the City of Fairfield, Fairfield will be the lead agency for purposes of any supplemental environmental review, and the Department, the City of Vacaville, the City of Benicia, and SCWA will be responsible agencies. The Cities shall be responsible for defending litigation arising pursuant to CEQA

findings made by the lead agency and relevant documents that the lead agency has prepared.

b. The Parties acknowledge that this Agreement does not and cannot commit them to a definite course of action regarding the implementation of this Agreement before they have complied with CEQA to the extent required.

13. REASONABLE COOPERATION

The Department, the Cities and SCWA will reasonably cooperate and provide mutual assistance to each other in obtaining any approvals or permits that may be required to perform the obligations under this Agreement. Should there be any obligation to consult or obtain a permit under either the State or Federal ESA, the Department shall initiate the consultation process.

14. OPINIONS AND DETERMINATIONS

Where the terms of this Agreement provide for action to be based upon the opinion, judgment, approval, review, or determination of any Party, such terms are not intended to be and shall never be construed as permitting such opinion, judgment, approval, review, or determination to be arbitrary, capricious, or unreasonable. Whenever the Department exercises its discretion in operation of the SWP, pursuant to this Agreement, or the Conveyance Agreement, the Department shall do so in a reasonable and equitable manner and shall act in good faith to not arbitrarily restrict nor interfere with water deliveries to the Cities pursuant to this Agreement and the Conveyance Agreement.

15. WATER RIGHTS NOT AFFECTED

This Agreement shall not be construed as a waiver of the Cities' legal claim to water pursuant to Water Code sections 11460-11465 or to limit the Cities' right to file any other application or petition with regard to water rights for other purposes or for additional quantities of water to meet future demands of the Cities which exceed the demand that can be met by the diversion of 31,620 acre-feet nor shall it limit the Department's right to challenge any such claims or actions by the Cities.

16. NO WAIVER OF RIGHTS OUTSIDE OF THIS AGREEMENT

All elements of this Agreement shall be treated as a settlement of a dispute between the Department and the Cities, and as such, neither the Cities, the Department, nor SCWA have waived any right that it otherwise may have outside of this Agreement. This Agreement shall not be considered an amendment to SCWA's Long-Term Water Supply Contract, including Table A of that Contract. This Agreement shall not be construed to limit or modify the Department's authority under the SCWA Long-Term Water Supply Contract. This Agreement shall not be regarded as a precedent for future agreements and shall not bind the Department's future activities with respect to other non-Project Water supply or conveyance proposals.

17. GOVERNING LAW

This Agreement shall be interpreted and enforced pursuant to the laws of the State of California.

18. AMENDMENT

This Agreement may be amended by written mutual agreement of the Parties.

19. ASSIGNS AND SUCCESSORS OBLIGATED

This Agreement shall be binding upon and inure to the benefit of the assigns or successors-in-interest of the Parties herein. No assignment shall be made without the prior written consent of the other Parties. Such consent shall not be unreasonably withheld.

20. ADDITIONAL DOCUMENTS

Each Party agrees to make, execute and deliver any and all documents and to join in any application or other action reasonably required to implement this Agreement.

21. NOTICE

Any and all communications or notices in connection with this Agreement shall be in writing and either hand-delivered or sent by United States first class mail, postage prepaid, or by facsimile or electronic mail followed by written notice sent by U.S. mail, and addressed as follows:

Chief
State Water Project Analysis Office
Department of Water Resources
Post Office Box 942836
Sacramento, California 94236-0001

General Manager
Solano County Water Agency
508 Elmira Road
Vacaville, California 95687

Director of Public Works
City of Fairfield
1000 Webster Street
Fairfield, California 94533-4883

Director of Public Works
City of Vacaville
650 Merchant Street
Vacaville, California 95688

Director of Public Works
City of Benicia
250 E. "L" Street
Benicia, California 94510

The Parties may change the foregoing addresses by providing written notice in compliance with this Article.

22. CONSTRUCTION AND INTERPRETATION

The Parties agree and acknowledge that this Agreement has been arrived at through negotiation, and that each Party has had a full and fair opportunity to revise the terms of this Agreement. Consequently, the normal rule of construction that any ambiguities are to be resolved against the drafting Party shall not apply in construing or interpreting this Agreement.

23. RESOLUTION AND DISPUTES

a. Except as provided below by Article 23(b), should any dispute arise concerning any provision of this Agreement, or the Parties' rights and obligations there under, the Parties shall meet and confer in an attempt to resolve the dispute. The costs associated with mediation of a dispute shall be shared equally between the Parties. Prior to commencing any legal action, the Party commencing such action shall provide the other Parties 30 days' written notice of such action; provided, that such notice

shall not be required where a delay in commencing an action would prejudice the interests of the Party that intends to file suit. During the 30-day notice period, the Parties shall attempt to resolve the dispute.

b. If after good faith efforts to reach agreement, the Parties fail to agree on terms to cover costs of any material changes in SWP costs described by Article 8 of this Agreement, then the Parties shall submit the matter to a panel of arbitrators. The panel of arbitrators shall be established by a mutually agreed upon date and shall be composed of one representative of the Department, one representative of the Cities, and a third mutually agreed upon arbitrator who shall act as chair of the panel. If no agreement can be reached on selection of the third arbitrator, the third person shall be appointed in the manner provided by Section 1281.6 of the Code of Civil Procedure. The panel may settle disagreements and shall make binding decisions regarding the amount and method of payment of costs to resolve the dispute arising from Article 8. The arbitration shall be completed within 14 days from the date of establishing the panel, unless the time is extended by mutual agreement of all the Parties. The expenses of the Department's representative shall be paid by the Department, the expenses of the Cities representative shall be paid by the Cities, and the expenses of the chair of the panel shall be paid one-half by the Department and one-half by the Cities.

24. SUPPORTING RESOLUTIONS

Each Party represents that it has legal authority to enter into this Agreement and to perform its obligations hereunder. SCWA and the Cities of Fairfield, Vacaville, and Benicia shall each submit to the Department, concurrent with execution of this Agreement, a duly authorized resolution or other document evidencing that authority and authorizing the person executing this Agreement to do so.

IN WITNESS WHEREOF, the Parties hereto have made and entered into this Agreement on the date specified in the first paragraph of page 1 of this Agreement.

Approved as to Legal Form and Sufficiency:

Chief Counsel
Department of Water Resources

CC 5/14/03

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Director

MAY 19 2003

SOLANO COUNTY WATER AGENCY

Signature

Vice Chair
Title

March 13, 2003
Date

CITY OF FAIRFIELD

Signature

Mayor
Title

3/17/03
Date

CITY OF VACAVILLE

Signature

MAYOR
Title

MARCH 13, 2003
Date

CITY OF BENICIA

Signature

MAYOR
Title

3/18/03
Date

Attachments: Exhibit A Agreement for Conveying Settlement Water through NBA
Exhibit B Map of Cities' Spheres of Influence

2 of 7

EXHIBIT A

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

AGREEMENT FOR CONVEYING SETTLEMENT WATER THROUGH THE NORTH BAY AQUEDUCT BY THE DEPARTMENT OF WATER RESOURCES TO THE SOLANO COUNTY WATER AGENCY FOR THE CITIES OF FAIRFIELD, VACAVILLE, AND BENICIA

This Conveyance Agreement is made and entered in as of the 19th day of May 2003, pursuant to the provisions of the California Water Resources Development Bond Act, the State Central Valley Project Act, and other applicable laws of the State of California, between the Department of Water Resources of the State of California ("the Department"), and the Solano County Water Agency ("SCWA") on behalf of the Cities of Fairfield, Vacaville and Benicia (collectively "the Cities"), existing and acting pursuant to the laws of the State of California.

RECITALS

A. The purpose of this Conveyance Agreement is to establish the terms and conditions under which the Department will convey, through the North Bay Aqueduct ("NBA"), Settlement Water made available by the Department under the "Settlement Agreement Among the Department of Water Resources of the State of California, the Solano County Water Agency, and the Cities of Fairfield, Vacaville and Benicia for Purposes of Water Supply" ("Settlement Agreement"),

e. "Settlement Water" means the amount of water provided under the terms of the Settlement Agreement by the Department to SCWA, for use by the Cities.

f. "SCWA Long-Term Water Supply Contract" means Water Supply Contract No. 160260 Between the State of California Department of Water Resources and Solano County Water Agency, as amended.

g. "State Water Project" or "SWP" means the project developed pursuant to the provisions of the California Water Resources Development Bond Act.

2. TERM OF AGREEMENT

This Conveyance Agreement shall be coterminous with the Settlement Agreement, except as provided in Article 10, and is subject to and incorporates by reference Articles 7 (Conditions Precedent) and 12 (California Environmental Quality Act) of the Settlement Agreement.

3. CONVEYANCE

The Department agrees to convey Settlement Water from the Delta through the existing facilities of the NBA to Reaches 1, 2 and 3A of the NBA for SCWA on behalf of the Cities subject to the terms and conditions of this Conveyance Agreement, and the Cities are third-party beneficiaries with the ability to enforce the terms and conditions of this Conveyance Agreement. The Cities may, at their option, request that the Department modify existing facilities of the NBA, if required, in order to convey Settlement Water, subject to reimbursing the Department for the costs of the modifications.

4. AVAILABLE CAPACITY IN THE NBA

Available capacity in the NBA will be determined by the Department, subject to Article 12 below, pursuant to the following:

a. The amounts, times and rates of conveyance shall be consistent with the SCWA and Napa County Flood Control and Water Conservation District ("NCFCWCD") Long-Term Water Supply Contracts, the Department's determination of overall conveyance ability in the NBA (including but not limited to any regulatory or water quality restrictions limiting NBA pumping), planned SWP operations and maintenance for the NBA, and Delta conditions as specified in Articles 2 and 3 of the Settlement Agreement.

b. Priority to the use of the NBA to deliver Settlement Water shall be consistent with the SCWA and NCFCWCD Long-Term Water Supply Contracts, with Settlement Water being classified as Non-Project Water.

c. The Department will not pump Settlement Water into the NBA from any source other than the intake of the NBA, presently at the Barker Slough Pumping Plant ("Barker Slough"). Because the source of Settlement Water is the same as the source of SWP water in the NBA, the commingling of Settlement Water with SWP water in the NBA is not expected to diminish the beneficial use or quality of either. The Department will not pump water through the NBA, including Settlement Water, should the Department determine that cessation of pumping is necessary to protect the NBA from a significant water quality impact.

5. CONVEYANCE SCHEDULE

SCWA shall be responsible for requesting the delivery of Settlement Water with the Department, and the Department shall process the request in the same manner as requests under SCWA's Long-Term Water Supply Contract, as follows:

a. Preliminary Water Delivery Schedule Request: On or before October 1 of each year, SCWA shall submit in writing to the Department a preliminary water delivery schedule request, indicating the amounts, times, rates of delivery and points of delivery for Settlement Water desired by SCWA, on behalf of the Cities during each month of the following year. Upon receipt of the preliminary water delivery schedule request, the Department shall review the proposed times and rates of delivery to SCWA for consistency with Article 4 of this Conveyance Agreement. When appropriate, SCWA shall provide subsequent revisions of this water delivery schedule request to the Department, as needed.

b. Notice of Water Delivery and Conveyance Availability: The Department shall notify SCWA of the Department's ability to convey Settlement Water as soon as possible prior to the date when conveyance becomes available.

c. Weekly Schedule Requests: Following the Department's notice of conveyance availability, SCWA shall submit a weekly schedule request to the Department's Delta Field Division and shall concurrently fax the

schedule request to the State Water Project Analysis Office, of the Department, for approval pursuant to Article 4 of this Conveyance Agreement. SWPAO shall notify SCWA in a timely manner consistent with the SCWA Long-Term Water Supply Contract if SWPAO does not approve SCWA's schedule request.

d. Except as specifically provided in the Conveyance Agreement, water delivery schedules, revisions, and approvals shall be in accordance with the SCWA Long-Term Water Supply Contract.

6. CONVEYANCE LOSSES

At present, the Department does not assign conveyance losses to NBA water deliveries. In the event that during the term of this Conveyance Agreement the Department conducts operational studies in coordination with NBA contractors and determines conveyance losses along the NBA, the Parties agree that subsequent deliveries of Settlement Water will be subject to such losses, and the quantity of Settlement Water, pumped by the Department at Barker Slough, will be reduced at the downstream points of delivery to account for the determined losses in a manner identical to SWP water, also conveyed through the NBA. Payments for Settlement Water will be based on the quantity pumped at Barker Slough.

7. RESPONSIBILITIES FOR DELIVERY AND DISTRIBUTION OF SETTLEMENT WATER

The Department is providing conveyance service only and is not responsible for the use, effects, or disposal of Settlement Water beyond SCWA's points of

delivery in Reaches 1, 2 and 3A of the NBA. Settlement Water delivered pursuant to this Conveyance Agreement shall be subject to Article 13 of the SCWA Long-Term Water Supply Contract.

8. CHARGES

SCWA shall pay the Department the following SWP charges associated with the delivery of Settlement Water from the Delta to Reaches 1, 2 and 3A of the NBA, in accordance with the SCWA Long-Term Water Supply Contract:

a. A contract preparation fee of $2,000 to cover the Department's costs for the preparation and execution of this Conveyance Agreement;

b. An administrative fee for each month Settlement Water is scheduled for conveyance, as determined each year by the Department for the year of delivery consistent with charges to other SWP contractors for administration of other similar conveyance agreements. This fee will cover the Department's costs to administer the Settlement Agreement and this Conveyance Agreement, including maintenance of records, preparation of conveyance schedules, and preparation of billings. The administrative fee for similar conveyance agreements during 2002 is $250.00 per month;

c. A monthly fee for the Variable Operation, Maintenance, Power, and Replacement (OMP&R) Components of the Transportation Charge to Reaches 1, 2 and 3A and Off-Aqueduct Facilities Charges for the year of delivery for each acre-foot delivered;

d. Any identified demonstrable increase in non-power costs, resulting from the delivery of Settlement Water, pursuant to this Conveyance Agreement that would otherwise be borne by the SWP contractors not signatory to this Conveyance Agreement or by the Department and are not addressed elsewhere in this Conveyance Agreement and, further, that would not be applied to the NBA Capital or Minimum OMP&R Components of the Transportation Charge under the Department's long-term water supply contracts.

e. Charges will be updated as necessary, and will be consistent with the Department's Long-Term Water Supply Contracts.

f. The Department shall apply costs consistent with the Department's long-term water supply contract policy to the NBA Capital or Minimum OMP&R components of the Transportation Charge. There shall be no adjustment in the proportional use of facility factors for repayment of the NBA capital or minimum OMP&R required as a result of the terms of this Conveyance Agreement or the Settlement Agreement.

9. BILLINGS AND PAYMENTS

a. Upon execution of this Conveyance Agreement, the Department will bill SCWA for the $2,000 contract preparation fee under Article 8(a) of this Conveyance Agreement. SCWA will be billed for the monthly administrative charges under Article 8(b) of this Conveyance Agreement.

b. The Department will bill SCWA for all payments and fees in Articles 8(b–d) on a monthly basis. All payments shall be due within 30 days after the

date of the Department's billing, and interest shall be charged if payments are delinquent by more than 30 days.

c. SCWA shall pay the Department accrued interest on all overdue payments at the penalty interest rate specified in Article 32 of the SCWA Long-Term Water Supply Contract per month from the due date to the date of payment.

10. AGREEMENT TERMINATION

The Parties may terminate this Conveyance Agreement by mutual written agreement.

11. AGREEMENT NOT A PRECEDENT

This Conveyance Agreement shall not be regarded as a precedent for future agreements and shall not bind the Department's future activities with respect to other Non-Project Water conveyance proposals. No waiver by either Party of any provision of this Conveyance Agreement shall be deemed a waiver of any other provision or of any subsequent breach by either Party of the same or any other provisions.

12. OPINIONS AND DETERMINATIONS

Where the terms of this Conveyance Agreement provide for action to be based upon the opinion, judgment, approval, review, or determination of either Party, such terms are not intended to be and shall never be construed as permitting such opinion, judgment, approval, review, or determination to be arbitrary, capricious, or unreasonable. Whenever the Department exercises its discretion in operation of the SWP pursuant to the Settlement Agreement or this

Conveyance Agreement, the Department shall do so in a reasonable and equitable manner and shall act in good faith to not arbitrarily restrict or interfere with water deliveries to the Cities pursuant to the Settlement Agreement and the Conveyance Agreement.

13. RESOLUTION OF DISPUTES

Should any dispute arise concerning any provision of this Conveyance Agreement, or the Parties' rights and obligations there under, the Parties shall meet and confer in an attempt to resolve the dispute. The costs associated with mediation of a dispute shall be shared equally between the Parties. Prior to commencing any legal action, the Party commencing such action shall provide the other Party 30 days' written notice of such action; provided, that such notice shall not be required where a delay in commencing an action would prejudice the interests of the Party that intends to file suit. During the 30-day notice period, the Parties shall attempt to resolve the dispute.

14. LIABILITY

Except for damage or loss resulting from willful misconduct or negligence by the Department, its employees, officers or agents, or reduction in allocation of SWP water to SWP contractors due to implementation of the Settlement Agreement, SCWA agrees to hold the Department harmless from any direct or indirect loss, liability, cause of action, or claim and to indemnify the Department for all costs, damages, and liabilities arising out of this Conveyance Agreement, including any claims raised by the Cities.

15. UNCONTROLLABLE FORCES

If the Department is precluded in whole or in part from conveying Settlement Water as a result of uncontrollable forces, it is relieved from the obligation to convey the water to the extent it is reasonably unable to complete the obligation, due to the uncontrollable force. Uncontrollable forces shall include, but are not limited to, earthquakes, fires, tornadoes, floods and other natural disasters. SCWA shall not be entitled to recover any administrative costs paid nor conveyance costs for Settlement Water that was delivered either before or notwithstanding the occurrence of the uncontrollable force.

16. NOTICES

All oral, email and facsimile transmissions of notices, schedules, or requests, made in connection with this Conveyance Agreement, shall be confirmed in writing and shall be deemed properly served if delivered in person or sent by registered United States mail, postage prepaid. All notices, schedules or requests shall be sent to:

Chief
State Water Project Analysis Office
Department of Water Resources
Post Office Box 942836
Sacramento, California 94236-0001
(916) 653-4313

General Manager
Solano County Water Agency
508 Elmira Road
Vacaville, California 95687
(707) 451-2852

IN WITNESS WHEREOF, the Parties hereto have made and entered into this Agreement on the date specified in the first paragraph of page 1 of this Agreement.

Approved as to legal form
and sufficiency:

CC 5/14/03

Chief Counsel
Department of Water Resources

5/14/03

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Director

MAY 19 2003

SOLANO COUNTY WATER AGENCY

Duane Kuo

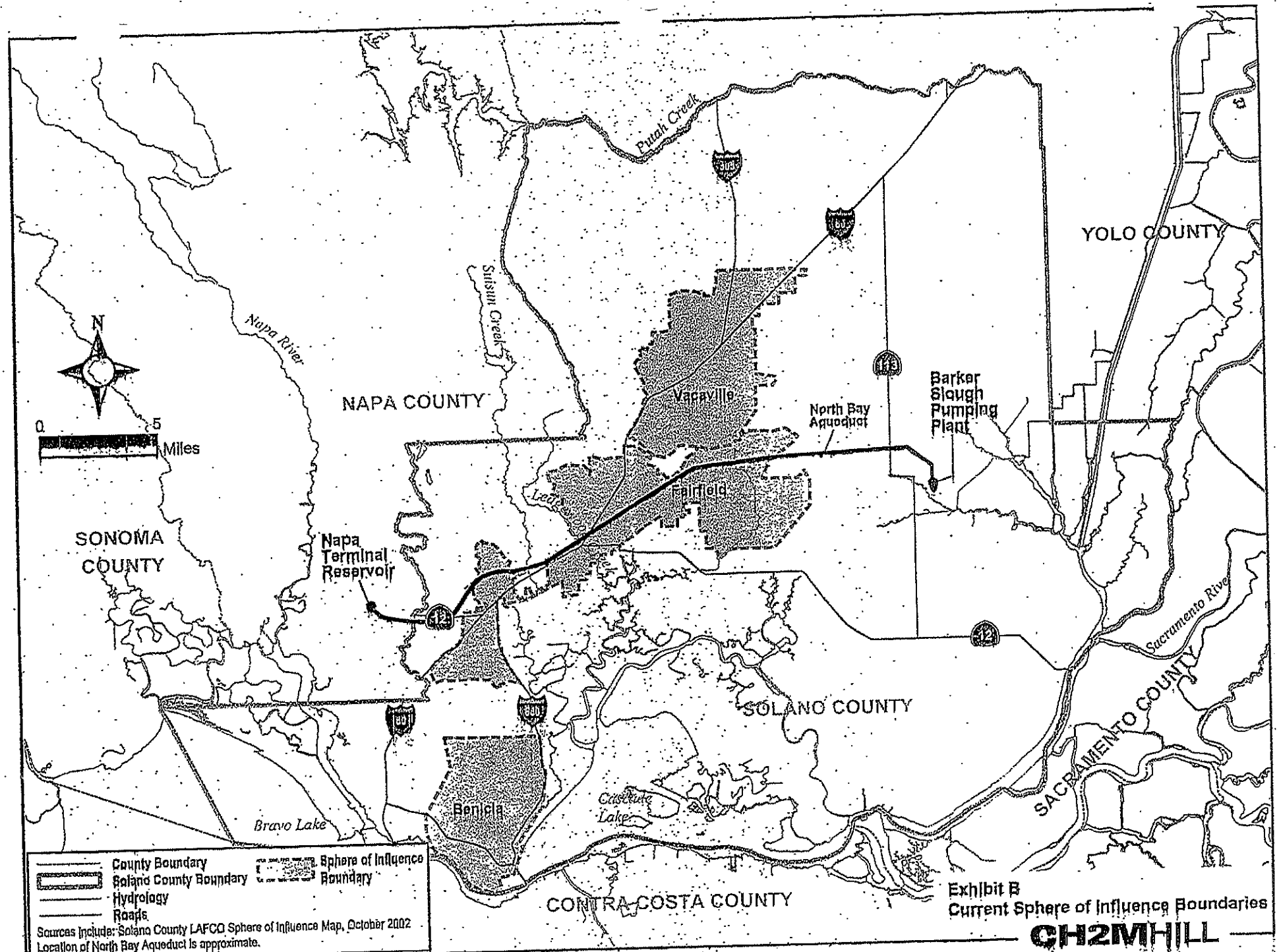
Signature

Vice Chair

Title

March 13, 2003

Date



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AGREEMENT WITH FAIRFIELD, VACAVILLE AND BENICIA FOR CONVEYANCE OF SETTLEMENT WATER THROUGH THE NORTH BAY AQUEDUCT

THIS AGREEMENT WITH FAIRFIELD, VACAVILLE AND BENICIA FOR CONVEYANCE OF SETTLEMENT WATER THROUGH THE NORTH BAY AQUEDUCT ("Agreement") is made as of this 13th day of March, 2003 by and between the Solano County Water Agency ("Agency"), a political subdivision of the State of California and the Cities of Fairfield, Benicia, and Vacaville (collectively, "Cities"), each political subdivisions of the State of California.

A. RECITALS.

1. WHEREAS, on February 23, 1998 the Cities filed separate applications with the California State Water Resources Control Board ("State Board") pursuant to Water Code §§11460-11465 to divert and use surface water in their service areas for the purpose of providing additional water supplies and to improve water supply reliability to meet water demands and development objectives in their General Plans.

2. WHEREAS, in order to avoid an adversarial water rights hearing before the State Board and to settle the Cities' water rights claims, DWR and the Cities executed a Settlement Agreement and a Conveyance Agreement, which provide the Cities with up to 31,620 acre feet per year of Settlement Water from the State Water Project. The Cities, in return for this settlement, agreed to withdraw their water right applications before the State Board.

3. WHEREAS, DWR constructed and operates the NBA as part of the SWP for purposes of supplying water under its water supply contracts with the Agency and the Napa County Flood Control and Water Conservation District.

4. WHEREAS, the Cities each have existing Member Unit Contracts with the Agency to receive a supply of NBA project water through the Agency.

5. WHEREAS, the Agency has entered into the Conveyance Agreement with DWR on behalf of the Cities setting forth the procedures for conveying Settlement Water through the NBA facilities. The Cities are not parties to the Conveyance Agreement but are designated third-party beneficiaries.

6. The Cities and the Agency enter into this Agreement to provide for the Cities to reimburse the Agency for all costs associated with conveying Settlement Water as set forth in the Conveyance Agreement and to provide a process for the Cities to order and schedule water supply made available through the Settlement Agreement through the Agency.

7. WHEREAS, on May 21, 2002 Fairfield, as lead agency pursuant to the California Environmental Quality Act, certified a final Environmental Impact Report on the Cities' water rights appropriation project. On February 18, 2003, Fairfield certified an addendum to the final Environmental Impact Report addressing the Settlement Agreement, Conveyance Agreement and this Agreement.

B. DEFINITIONS

As used in this Agreement, the following definitions shall apply:

1. AGENCY shall mean the Solano County Water Agency.

2. BENICIA shall mean the City of Benicia.

3. CONVEYANCE AGREEMENT shall mean that agreement entitled "Agreement for Conveying Settlement Water Through the North Bay Aqueduct by the Department of Water Resources to the Solano County Water Agency for the Cities of Fairfield, Vacaville, and Benicia" executed on _____, 2003.

4. DWR shall mean the California Department of Water Resources.

5. FAIRFIELD shall mean the City of Fairfield.

6. MASTER CONTRACT shall mean Water Supply Contract No. 160260 Between the State of California Department of Water Resources and the Solano County Water Agency for water supply from the State Water Project, as amended.

7. MEMBER UNIT CONTRACT shall mean the contract(s) for water supply from the NBA between the Agency and individual cities within Solano County who have elected to receive water from the NBA.

8. NBA shall mean the North Bay Aqueduct of the State Water Project.

9. NON-PROJECT WATER shall have the same definition as used in Article 1(kk) of the Master Contract, water made available for delivery to the Agency that is not Project Water as defined in Article 1(j) of the Master Contract.

10. PRIORITY AGREEMENT shall mean that agreement between the Cities, the Agency and Vallejo entitled "Agreement Regarding Priorities for Non-

Project Water Transported Through the North Bay Aqueduct," executed on _____, 2003.

11. SETTLEMENT AGREEMENT shall mean that agreement entitled "Settlement Agreement among the Department of Water Resources of the State of California, The Solano County Water Agency, and the Cities of Fairfield, Vacaville and Benicia for purposes of Water Supply" executed on _____, 2003.

12. SETTLEMENT WATER shall mean the water supply provided by DWR to the Agency through the Settlement Agreement for use by the Cities.

13. SWP shall mean the State Water Project, described as the State Project Facilities in Water Code §12934(d) as expanded from time to time.

14. VACAVILLE shall mean the City of Vacaville.

15. VALLEJO shall mean the City of Vallejo.

16. VALLEJO PERMIT WATER shall mean that water available pursuant to a 1948 priority License held by Vallejo (Application 12286, License 7848) to appropriate 31.52 cfs year round.

C. AGREEMENT

1. TERM AND EFFECTIVE DATE OF AGREEMENT

This Agreement shall become effective as of the effective date of the Settlement Agreement (pursuant to Section 7.a. of the Settlement Agreement) and shall remain in effect so long as both the Settlement Agreement and the Conveyance Agreements are in effect.

2. SCHEDULING OF SETTLEMENT WATER

Annually on or before September 15, each of the Cities shall submit respectively to the Agency a preliminary water delivery schedule request, indicating the amounts, times, rates and point of delivery for Settlement Water. The Cities shall provide subsequent revisions to the water delivery schedule as requested by the Agency. The Agency will notify the Cities when the Agency is notified of DWR's ability to convey Settlement Water pursuant to Section 5.b. of the Conveyance Agreement. Once conveyance becomes available in the NBA for Settlement Water, as determined pursuant to Section 5.b. of the Conveyance Agreement, the Cities shall submit weekly schedule requests to the Agency for the Agency's submittal to DWR pursuant to Section 5.c. of the Conveyance Agreement. The Agency shall notify the Cities if any schedule request for Settlement Water is disapproved, and will involve the Cities in the process for resolving any dispute with DWR regarding the scheduling for conveyance of Settlement Water.

3. WATER CLASSIFICATION

The Cities acknowledge that DWR has classified Settlement Water as Non-Project Water, the priority of which is governed by Article 12(f) of the Master Contract. The priority of Settlement Water to Vallejo Permit Water or other Vallejo non-project water in the NBA is specified in the Priority Agreement.

4. CONVEYANCE LOSS

The Cities acknowledge that DWR may impose conveyance losses on Settlement Water pursuant to Section 6 of the Conveyance Agreement.

5. CHARGES

a. Within thirty (30) days of execution of this agreement, each of the Cities shall pay to the Agency Six Hundred Sixty-Seven Dollars ($667.00) to reimburse the Agency for DWR's cost for preparation and execution of the Conveyance Agreement.

b. Each of the Cities shall reimburse the Agency one-third of the administrative fees charged to the Agency by DWR pursuant to Section 8.b. of the Conveyance Agreement.

c. Each of the Cities shall reimburse Agency for that city's share, as determined by the Agency, of the fee for the Variable Operations, Maintenance, and Replacement components of the Transportation Charge and the Off Aqueduct Facility Charges for the Settlement Water pursuant to Section 8.c.of the Conveyance Agreement.

d. Each of the Cities shall reimburse the Agency for that city's share, as determined by the Agency, of the payment for Settlement Water determined pursuant to Section 5.a. of the Settlement Agreement.

e. Each of the Cities shall reimburse the Agency for that city's share, as determined by the Agency, of any charges assessed to the Agency by DWR pursuant to Section 8.d. of the Conveyance Agreement.

6. PAYMENT PROCEDURES

The Agency will bill the Cities for the charges described in Section 5.b-d above after the end of the calendar year in which the water is delivered. If full payment of the charges identified in Section 5 of this Agreement is not received within thirty (30) days of billing by the Agency, the delinquent city shall remain obligated to pay the full amount due, plus interest on the full amount due at an annual interest rate equivalent to the interest earned on investments in the State of California Treasurers Office of Local Agency Investment Fund, plus two percent (2%), based on the most current reported interest rate for the time period during which the payment is not paid.

7. DELIVERY RESTRICTIONS

The Cities acknowledge that delivery of Settlement Water is dependent on all the factors specified in the Settlement and Conveyance Agreements. The Agency's obligation under this Agreement to furnish and convey Settlement Water is limited to the times and to the extent that DWR makes water and facilities required to furnish water available to the Agency pursuant to the Master Contract and/or any of the other agreements referenced in this Agreement.

8. NO IMPACT ON NBA PROJECT WATER

Nothing in this Agreement, or any of the other agreements referenced herein shall alter or affect the rights of the Cities or any of Agency's other

Member Units to receive water pursuant to and as specified in their Member Unit Contracts.

9. LIMITATIONS ON AGENCY OBLIGATIONS

The Agency shall not be liable for failure to perform any portion of this Agreement to the extent that such failure is caused by the failure of DWR to perform any obligation imposed on it by the Master Contract or the Settlement and Conveyance Agreements; provided, however, that the Agency shall diligently and promptly pursue all rights and remedies reasonably available to it to enforce the rights of the Agency against DWR relative to such failure to perform.

10. SHORTAGES

If at any time there occurs a shortage from any cause in the quantity of Settlement Water made available to Agency so that the total quantity made available to Agency is less than the total of all quantities of Settlement Water scheduled for by the Cities, Agency shall apportion the Settlement Water available among the Cities in proportion to the Cities' respective maximum rights to Settlement Water, specifically: 37.3% Fairfield, 33.2% Benicia, and 29.5% Vacaville.

11. APPLICABILITY OF MASTER CONTRACT.

This Agreement is subject to the obligations and limitations imposed upon the Agency by the Master Contract and the Settlement and Conveyance Agreements. Nothing in this Agreement shall relieve the Cities of the

obligation to schedule and make payments for water delivered pursuant to their Member Unit Contracts.

12. RESPONSIBILITY OF HANDLING WATER AND INDEMNIFICATION

Settlement Water made available to the Cities pursuant to this Agreement and the Settlement and Conveyance Agreements shall be delivered to the Cities at the location specified in Section 8 of their Member Unit Contracts. The Cities shall be responsible for the carriage, handling and control of water delivered under this Agreement after the water has passed the delivery point. Except for damage or loss resulting from the willful misconduct or negligence by the Agency, its employees, officers or agents, neither the Agency nor its officers, agents or employees shall be liable for any damage or claim of damage of any nature, including, without limitation, property damage, personal injury, or death arising out of this Agreement or connected with the control, carriage, handling, use disposal or distribution of such water beyond said delivery point, and the Cities shall indemnify and hold harmless the Agency and its officers, agents and employees from any such damage or claims of damage. In addition, the Cities will reimburse the Agency for the cost of any and all indemnification incurred by the Agency pursuant to Section 14 of the Conveyance Agreement.

13. NOTICES

All notices that are required, either expressly or by implication, to be given by any party to the other under this contract shall be delivered, faxed, e-

mailed or mailed, United States first-class postage prepaid, to the addresses then specified in the Member Unit Contracts for the applicable city. Notice shall be deemed given (a) two calendar days following mailing via regular or certified mail, returned receipt requested, (b) one business day after deposit with any one day delivery service assuring "next day" deliver, (c) upon actual receipt of notice, or (d) upon confirmed transmission, if by facsimile or email, whichever is earlier.

14. ASSIGNMENT PROHIBITED

The provisions of this Agreement shall apply to and bind the successors and assigns of the respective parties, but no assignment or transfer of this Agreement, or any part thereof or interest therein, shall be valid until and unless approved by the Agency in writing.

15. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the Cities and the Agency with regard to its subject matter. Any amendment, including oral modification, must be reduced to writing and signed by all parties to be effective.

IN WITNESS WHEREOF, the parties hereto have hereunto affixed their names the day and first year hereinabove written.

SOLANO COUNTY WATER AGENCY

By _____ Attest: _____

CITY OF FAIRFIELD

By _____ Attest: _____

CITY OF VACAVILLE

By _____ Attest: _____

CITY OF BENICIA

By _____ Attest: _____

AGREEMENT REGARDING PRIORITIES FOR NON-PROJECT WATER TRANSPORTED THROUGH THE NORTH BAY AQUEDUCT

THIS AGREEMENT REGARDING PRIORITIES FOR NON-PROJECT WATER TRANSPORTED THROUGH THE NORTH BAY AQUEDUCT ("Agreement") is made as of this 18th day of March, 2003 by and between the Solano County Water Agency ("Agency"), a political subdivision of the State of California and the Cities of Fairfield, Benicia, Vallejo and Vacaville (collectively, "Cities"), each political subdivisions of the State of California.

A. RECITALS.

1. WHEREAS, the Cities each have Member Unit Contracts with the Agency to receive a water supply from the NBA.

2. WHEREAS, the Agency is responsible for administering the Master Contract, including scheduling all water supplies available to the Agency and its Member Units from the NBA including, but not limited to Vallejo Permit Water and Settlement Water.

3. WHEREAS, Cities of Fairfield, Vacaville, and Benicia have entered into a Settlement Agreement that provides them with the right to receive up to 31,620 acre-feet per year of Settlement Water through the NBA from the State Water Project.

4. WHEREAS, the Agency has entered into a Conveyance Agreement with DWR in order to set forth the procedures for conveying Settlement Water through the NBA facilities. The Cities are not parties to the Conveyance Agreement but are designated third-party beneficiaries.

5. WHEREAS, the Agency and Cities of Fairfield, Vacaville, and Benicia have entered into a Local Conveyance Agreement to govern how the Agency will administer the Conveyance Agreement and specify scheduling and payment requirements of the Cities of Fairfield, Vacaville, and Benicia for Settlement Water and Settlement Water conveyance.

6. WHEREAS, through its Member Unit Contract with the Agency, Vallejo has an existing contractual right to have Vallejo Permit Water transported through the NBA at a rate not to exceed 31.52 cfs, and not to exceed 17,287 acre-feet annually. The Master Contract recognizes the transportation capacity allocated for Vallejo Permit Water in the NBA.

7. WHEREAS, the Cities and the Agency are entering into this Agreement in order to reach agreement on and clarify the relative priorities for delivery of water supplies through the NBA pursuant to the numerous agreements among the parties and DWR.

B. DEFINITIONS

As used in this Agreement, the following definitions shall apply:

1. AGENCY shall mean the Solano County Water Agency.

2. BENICIA shall mean the City of Benicia.

3. CONVEYANCE AGREEMENT shall mean that agreement between the Agency and DWR entitled "Agreement for Conveying Settlement Water Through the North Bay Aqueduct by the Department of Water Resources to the Solano County Water Agency for the Cities of Fairfield, Vacaville, and Benicia" executed on_____, 2003.

4. DWR shall mean the California Department of Water Resources.

5. FAIRFIELD shall mean the City of Fairfield.

6. LOCAL CONVEYANCE AGREEMENT shall mean that Agreement among the Agency, Fairfield, Vacaville and Benicia for Conveyance of Settlement Water through the North Bay Aqueduct of even date herewith.

7. MASTER CONTRACT shall mean Water Supply Contract No. 160260 Between the State of California Department of Water Resources and the Solano County Water Agency for water supply from the State Water Project, as amended.

8. MEMBER UNIT CONTRACT shall mean those individual contracts for water supply from the NBA between the Agency and cities within Solano County who have elected to receive water from the NBA.

9. NBA shall mean the North Bay Aqueduct of the State Water Project.

10 NON-PROJECT WATER shall have the same definition as used in Article1 (kk) of the Master Contract, water made available for delivery to the Agency that is not Project Water as defined in Article 1(j) of the Master Contract.

11. SETTLEMENT AGREEMENT shall mean that agreement entitled "Settlement Agreement among the Department of Water Resources of the State of California, The Solano County Water Agency, and the Cities of Fairfield, Vacaville and Benicia for purposes of Water Supply" executed on _____, 2003.

12. SETTLEMENT WATER shall mean the water supply provided by the Settlement Agreement by DWR to the Agency for use by Cities of Fairfield, Vacaville, and Benicia.

13. VACAVILLE shall mean the City of Vacaville.

14. VALLEJO shall mean the City of Vallejo.

15. VALLEJO PERMIT WATER shall mean that water available pursuant to a 1948 priority License held by Vallejo under Application 12286, License 7848 to appropriate 31.52 cfs year round.

C. AGREEMENT

1. CONVEYANCE OF VALLEJO PERMIT WATER

The Cities each agree that Vallejo's right to convey up to 31.52 cfs of Non-Project Water through the NBA, including but not limited to Vallejo Permit Water, has a higher priority than any Non-Project Water, including but not limited to Settlement Water, conveyed through the NBA by the Cities of Fairfield, Vacaville and Benicia. The conveyance of any Non-Project Water by Cities of Fairfield, Vacaville, and Benicia shall not infringe upon or restrict Vallejo's right to utilize the 31.52 cfs capacity in the NBA for conveyance of any Non-Project Water by Vallejo.

2. TERM AND EFFECTIVE DATE OF AGREEMENT

This Agreement shall become effective as of the effective date of the Settlement Agreement (pursuant to Section 7.a. of the Settlement Agreement) and shall remain in effect so long as both the Settlement Agreement and the Conveyance Agreement are in effect.

3. PRIORITIES

The Agency recognizes and will follow the priorities set forth in this Agreement when implementing its scheduling duties as described in Article 12 of the Master Contract and in the Conveyance Agreement. Notwithstanding the above, this Agreement is subject to the obligations and limitations imposed upon the Agency by the Master Contract and the Settlement and Conveyance Agreements.

4. NO AFFECT ON MEMBER UNIT CONTRACTS

Nothing in this Agreement, or any of the other agreements referenced in this Agreement, shall affect or alter the rights and priorities of the Cities and Vallejo or any of the Agency's other Member Units to receive water pursuant to and as specified in their Member Unit Contracts.

5. SCHEDULING

Nothing in this Agreement shall relieve the Cities or Vallejo of the obligation to schedule water as set forth in their Member Unit Contracts, the Settlement Agreement, and/or the Local Conveyance Agreement.

6. LIMITATIONS ON OBLIGATION OF AGENCY TO FURNISH WATER.

a. Notwithstanding the priorities set forth in this Agreement, the obligation of the Agency to furnish water hereunder shall be limited to the times and to the extent that water and facilities necessary for furnishing the same are available to the Agency as determined by the Master Contract and/or any of the other agreements referenced in this Agreement.

b. The Agency shall not be liable for failure to perform any portion of this

Agreement to the extent that such failure is caused by DWR's failure to perform any obligation imposed on it by the Master Contract or the Settlement Agreement; provided, however, that the Agency shall diligently and promptly pursue all rights and remedies reasonably available to it to enforce the rights of the Agency, the Cities against DWR relative to such failure to perform.

7. APPLICABILITY OF MASTER CONTRACT

This Agreement is subject to the obligations and limitations imposed upon the Agency by the Master Contract or the Settlement and Conveyance Agreements.

8. NOTICES

All notices required, either expressly or by implication, to be given by any party to the other under this contract shall be delivered, faxed, emailed or mailed, United States first-class postage prepaid, to the addresses specified in the Member Unit Contracts for the applicable city. Notice shall be deemed given (a) two calendar days following mailing via regular or certified mail, returned receipt requested, (b) one business day after deposit with any one day delivery service assuring "next day" deliver, (c) upon actual receipt of notice, or (d) upon confirmed transmission, if by facsimile or email, whichever is earlier.

9. ASSIGNMENT PROHIBITED

The provisions of this Agreement shall apply to and bind the successors and assigns of the respective parties, but no assignment or transfer of this Agreement, or any part thereof or interest therein, shall be valid until and unless approved by the Agency in writing.

10. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement between the Cities and the Agency with regard to its subject matter. Any amendment, including oral modification, must be reduced to writing and signed by all parties to be effective.

IN WITNESS WHEREOF, the parties hereto have hereunto affixed their names the day and first year hereinabove written.

SOLANO COUNTY WATER AGENCY

By Duane Kuo

Attest: D A Okk

CITY OF FAIRFIELD

By Karin MacMillan

Attest: Gina Merrill

****SIGNATURES CONTINUED ON NEXT PAGE***

CITY OF VACAVILLE

By _____

Attest: _____

CITY OF BENICIA

By _____

Attest: _____

****SIGNATURES CONTINUED ON NEXT PAGE***

CITY OF VALLEJO

By _____

David Martinez, City Manager

Attest: _____

Allison Villarante, City Clerk

APPROVED AS TO FORM:

_____

Fred Soley, City Attorney

APPROVED AS TO CONTENT:

_____

Mark Akaba, Public Works Director

Attest: _____

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Appendix C-1.3: Solano Irrigation District Agreement

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SOLANO IRRIGATION DISTRICT / CITY OF BENICIA
SOLANO PROJECT WATER ALLOTMENT TRANSFER AGREEMENT

THIS AGREEMENT is made and entered into on this 3rd day of March, 2009, by and between **SOLANO IRRIGATION DISTRICT**, an irrigation district organized and existing under and by virtue of Division 11 of the Water Code of the State of California (hereinafter referred to as "District"), and the **CITY OF BENICIA**, a general law city formed and existing under the laws of the State of California (hereinafter referred to as "City"). The parties enter into this Agreement for full and adequate consideration, the receipt of which is hereby evidenced and the adequacy is stipulated to and agreed to, as follows:

1. Definitions:

1.1 The phrases "Annual Allotment of Solano Project Water" or "Annual Allotment" shall mean the amount of allocated water District or City has contracted to receive as an annual delivery amount subject to (i) the orders of the Solano County Water Agency ("SCWA") reducing allotment to Participating Agencies under contractually permitted conditions, if any, (ii) other terms of the contract with the SCWA, and (iii) subject to application of the terms and provisions of the Solano Project Member's Agreement as to Drought Measures and Water Allocation executed on March 1, 1999 attached hereto as Exhibit "A" to this Agreement and included herein as if set forth in full ("Drought Measures Agreement"). In the case of District, the total amount of Annual Allotment of Solano Project Water is the amount of 141,000 acre-feet of water and, in addition thereto, assignment by Maine Prairie Water District to the District of 10,000 acre-feet of water, for a total of 151,000 acre-feet of water in each Water Year. In the case of City, it has no Participating Agency Contract and no annual allotment of Solano Project water.

1.2 The phrase "Water Year" means the period of one year commencing March 1 and terminating on the last day of February of the following calendar year.

1.3 The phrase "Renewal of District's Participating Agency Contract" means the renewal of the SCWA Agreement with the District for Participating Agency Contract for Solano Project Water Service dated March 1, 1999 providing for the delivery to District of 141,000 acre-feet of water from the Solano Project during each Water Year as validated in

accordance with Code of Civil Procedure Section 860 in the proceeding of *Solano County Water Agency v. All Persons,* Solano County Action No. 012612, and upon the lapse of its term, for successive periods of twenty-five (25) years or more thereafter (i) without reduction of the quantity of water available to District, and (ii) maintaining the Proportions of Payment Amounts per Acre-Foot payable by District.

1.4 The phrase "Proportions of Payment Amounts per Acre-Foot" shall mean the ratio of $15.00 per acre foot for Solano Project water delivered to Participating Agencies for industrial and municipal water use, and $2.65 per acre foot for Solano Project water delivered for irrigation use, or a ratio of 5.66:1 depending upon the character of use of the respective types of water from the Solano Project under the terms of Participating Agency Contracts.

1.5 The phrase "Voluntary Carryover Amount" and "Restricted Carryover Amount" shall have the meaning as set forth in the Drought Measures Agreement entered into by District and other Participating Agencies of SCWA.

2. Background of Agreement: District is the holder of a contractual right to receive allotments from the Solano Project as a Participating Agency of the SCWA under the terms of a Participating Agency Contract providing for the delivery of and allotment of 141,000 acre-feet of water in each Water Year from the Solano Project to District. The term of that Agreement is until the end of the Master Contract between SCWA and the United States on February 29, 2024. The parties anticipate thereafter that renewal of District's Participating Agency Contract will occur upon the same terms, conditions and quantities of water being delivered to District, including maintenance of the Proportions of Payment Amounts per Acre-Foot. In addition, District receives an assignment of 10,000 acre-feet of Solano Project water in each Water Year pursuant to a written agreement with Maine Prairie Water District. The length of the term of the Maine Prairie Water District Agreement is less than the term of District's Participating Agency Contract for 141,000 acre-feet.

2.1 District and SCWA have entered into an agreement with other Participating Agencies of SCWA providing for taking and diverting less than the full amount of Participating Agency Contract amounts with SCWA during Solano Project drought operating conditions. Under the terms of the Drought Measures Agreement, the Participating Agencies take

less water than their entitlement amounts to prepare for and buttress the operations of the Solano Project during prolonged drought conditions. City is not signatory to the Drought Measures Agreement, but shall be responsible to comply with the terms of the Drought Measures Agreement with regard to the portion of the District's Annual Allotment transferred under this Agreement.

2.2 City has asked District to agree to transfer to City upon and during the existence of certain conditions as set forth in this Agreement a portion of the Annual Allotment of Solano Project Water of District in each Water Year in consideration of the payment of sums of money to District. District has accepted that concept subject to certain conditions and terms, and this Agreement constitutes an agreement to provide for the implementation and enforcement of those transfers of a portion of the District's Annual Allotment of Solano Project Water to City subject to the terms and conditions of this Agreement.

2.3 Permission to and SCWA Notification of Transfer. City is a public agency in Solano County located within the SCWA Service Area as defined in Section 1(c) of the Master Contract. The transfer of a portion of the District's Annual Allotment of Solano Project Water to City is permitted under and subject to the restrictions of Section 7 of District's Participating Agency Contract. Per said Section 7 SCWA is to be notified in writing of any transfer of Solano Project water.

3. Term: Provided neither party has elected to terminate this Agreement pursuant to the provisions herein, the term of this Agreement shall be for so long as all of the following conditions exist: (i) District continues to hold a valid and enforceable Participating Agency Contract or Renewal of a Participating Agency Contract from SCWA or a successor organization holding substantially the same authority and rights, providing for the delivery of 141,000 acre-feet per annum; said amount of 141,000 acre-feet shall include the amounts of Annual Allotment of Solano Project Water agreed to be transferred to City under this Agreement in each Water Year from the Solano Project and is the total available to District before application of and enforcement of the Drought Measures Agreement; and (ii) the amount payable by District continues to conform to the Proportions of Payment Amounts per Acre-Foot (the "Required Terms"). However, the Agreement shall not be terminated if (i) District shall voluntarily accept

an Amended or Renewal Participating Agency Contract providing for delivery of less than 141,000 acre-feet per Water Year or different Proportions of Payment Amounts, or (ii) the conditions of paragraph 3.1 of this agreement shall exist, resulting in reductions of the performance of the parties. The effective date of termination of this Agreement upon District not holding a Participating Agency Contract with the Required Terms shall be the date of commencement of the Water Year following the occurrence of that event or condition. Upon and after the effective date of termination, (i) District shall not be required to transfer portions of the District's Annual Allotment of Solano Project Water to City in any Water Year under the terms of this Agreement, (ii) District shall not be obligated to refund or pay to City any amounts of money paid by City to District previously, and (iii) City shall be excused from any further Annual Payment Amount to District pursuant to Paragraph 5 below.

3.1 Partial Suspension and Termination of Allotment Transfer. If as a result of an act of God, nature, war or civil unrest, or a Court or governmental order, including any order or direction of SCWA in response to any of those conditions ("Force Majeure Conditions") during the term of any Participating Agency Contract in which the Required Terms are otherwise in effect and abided by, the Annual Allotment of water available to District and projected to be delivered to District in a Water Year is less than 141,000 acre feet, the transfer of Annual Allotment of Solano Project water to City under the terms of this Agreement shall be reduced in the same Proportion as the reduction in acre feet to be delivered to District bears to its 141,000 acre-feet Annual Allotment during the period of the Force Majeure Conditions. *Example:* If due to such a described Force Majeure Condition SCWA refuses or fails to deliver the full 141,000 acre-feet scheduled by District and delivers only 95% of that amount ordered by District, City would receive in that Water Year only 95% of the amount set forth in Paragraph 4 hereafter otherwise allocated to City from District's allocation. City shall not receive a credit or refund of any of the "One-Time Payment" to District under Paragraph 5, but the "Annual Payment Amount" under Paragraph 5 shall be reduced in proportion to the reduction in the Amount of Annual Allotment of Solano Project water transferred in that Water Year to City because of and during the existence of the Force Majeure Condition.

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3.2 City Termination. City may elect to terminate this Agreement in whole or in part by providing written notice (the Notice of Termination) that it wishes to terminate this Agreement and the amount of the District's Annual Allotment of Solano Project Water it wishes to terminate the transfer of annually for the remaining term of this Agreement. The termination shall be effective after such written notice commencing with the Water Year that commences more than three (3) years following delivery of the written notice (the Effective Termination Date). Upon and after the Effective Termination Date, City shall be excused from the amount of the Annual Payment Amount multiplied by the number of acre-feet City elects to terminate delivery of annually thereafter. District shall not be obligated to pay, refund or credit to City any of the One-Time Payment Amounts previously paid by City or the Annual Payment Amounts paid during the term of the Agreement or during the three (3) year period following the Notice of Termination prior to the Effective Termination Date attributable to the portion of the District's Annual Allotment of Solano Project Water no longer transferred pursuant to City's termination. The Notice of Termination, once given by City, shall not be rescindable or cancellable for any reason. Reacquisition of an amount terminated could be negotiated through a new Transfer Agreement between District and City. Any Voluntary Carryover or Restricted Carryover water set aside from District's transferred Annual Allotment by City prior to the Effective Termination Date shall remain the property of City.

3.3 If City shall elect to terminate in whole or in part under this Agreement, City shall promptly execute all documents required to terminate in whole or in part the transfer of a portion of the District's Annual Allotment of Solano Project Water under the terms of this Agreement. City shall bear any (i) costs or charges by SCWA or any other governmental agencies that would be due under this Agreement and are incurred upon the transferred portion of the District's Annual Allotment prior to the Effective Termination Date, (ii) any costs or charges of SCWA caused by the termination of transfers of Annual Allotment, and (iii) any direct, one-time costs or charges for the return and reinstatement of a portion of the District's Annual Allotment of Solano Project Water to District on and after the effective date of termination of this Agreement as to Annual Allotment transferred under the terms of this Agreement.

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4. Annual Allotment Transfer Amounts: Subject to the conditions and terms of this Agreement, commencing on March 1, 2009 and on March 1 of each Water Year thereafter, District shall transfer to City in each Water Year in which City complies with the terms and provisions of this Agreement, and this Agreement has not been wholly or partially terminated by City, two thousand (2,000) acre-feet of the District's Annual Allotment of Solano Project Water. District shall schedule the deliveries of this portion of the District's Annual Allotment to City by District foregoing such amount of water deliveries from Lake Berryessa and the Putah South Canal of the Solano Project in favor of City. City shall bear and perform any Restricted Carryover Amount obligations under the Drought Measures Agreement attributable to the portion of the District's Annual Allotment transferred from District to City for each Water Year during the term of this Agreement. Any Voluntary Carryover Amounts or Restricted Carryover Amounts accumulated by District in Water Years prior to the date of the first transfer under this Agreement, attributable to the portion of the District's Annual Allotment transferred under this Agreement, shall remain the sole and exclusive property of District and shall not be transferred to City.

5. Payment: City shall pay to District within thirty (30) days of its execution of the agreement, the sum of $5,000,000.00 computed as 2,000 acre-feet of water/year x $2,500.00 per acre-foot (the "One-Time Payment Amount"). In addition, within thirty (30) days of its execution of the agreement, and each March 1 of each Water Year thereafter, City shall pay the sum of Sixty-Two Dollars and Sixty-Two Cents ($62.62) per acre-foot of the portion of the District's Annual Allotment of Solano Project Water transferred, adjusted by the Consumer Price Index Amount per Paragraph 5.5 below (the "Annual Payment Amount"). The One-Time Payment and the Annual Payment Amount payable per acre-foot to District shall be paid to District without reduction for any Voluntary Carryover Reductions or Restricted Carryover Reductions borne by City from the portion of the District's Annual Allotment transferred in any Water Year.

5.1 Charges of SCWA or Other Governmental Entities. City shall pay all charges of SCWA applied to the Annual Allotment of Solano Project water transferred under the terms of this Agreement to City. District shall pay any taxes, fees, assessments or similar governmental charges levied or imposed by governmental entities other than SCWA upon the

Annual Allotment of Solano Project Water transferred to City. City shall pay any taxes, fees, assessments or similar governmental charges levied or imposed by governmental entities other than SCWA upon the Annual Allotment of Solano Project Water transferred to City which are charged or levied because of its use or disposition by City.

5.2 City Not to Participate in Maine Prairie Transfer to City or Third Party. District relies upon the assignment of 10,000 acre-feet of Solano Project water from Maine Prairie Water District to meet its delivery obligations, and reduction of this quantity will reduce the amount of water available to District to meet its obligations under this contract. City agrees that it will not directly or indirectly acquire, participate in, receive a benefit from, or approve of a transfer of Maine Prairie Water District Annual Allotment of Solano Project Water assigned to District in any Water Year to parties or persons other than District without the prior written consent of District. City agrees that a violation of this provision will constitute a material breach of this Agreement and upon determination that a material breach has occurred, District shall be entitled to elect to reduce the amount of District annual allotment transferred to City by the amount of Maine Prairie Water District Annual Allotment not received by District, with City continuing to pay the Annual Payment Amount or to recover the monetary damages suffered by District as a proximate result of the material breach.

5.3 Payment Dates. The Annual Payment Amount shall be paid on or before March 1 of each Water Year for the amount of Annual Entitlement of Solano Project Water ordered to be transferred by District to City under this Agreement during that following Water Year. Any additional charges due to transfers by City to third parties as specified under Paragraph 5.4 below, if any, attributable to the preceding Water Year ending on the last day of February, shall be payable on each July 1 following the end of the Water Year.

5.4 Additional Charge Due to Third Party Transfer by City. If in any Water Year during the term of this Agreement City shall transfer or forego the use of State Water Project water, or any other water supply water available to City on the effective date of this Agreement for use or application, directly or indirectly, by substitution, foregoance, exchange or transfer, for use and consumption by governmental entities or third parties outside of Solano County, and if City receives consideration in excess of the sum of $250 per acre-foot adjusted by

205 the Consumer Price Index Increase, then in addition to the Annual Payment Amounts, the
206 additional amounts received by City per acre-foot in excess of that amount for the water
207 foregone, transferred, deferred, or relinquished, shall be added to the consideration payable to the
208 District and paid to District on the Payment Date.

209 5.5 Consumer Price Index Increase Amount: The Annual Payment Amount
210 per acre-foot specified in Paragraph 5 above shall be increased or decreased by the percentage
211 change in the Consumer Price Index. The amount of increase or decrease in the United States
212 Department of Labor (or successor division or office) publication of the Consumer Price Index
213 for Urban Wage Earners and Clerical Workers, United States Average (1967 Base) CPI-W,
214 utilizing an index of 612.948 on December 31, 2007 as the base, shall be determined to the
215 preceding December 31 prior to commencement of each Water Year on March 1. The Consumer
216 Price Index Increase Amount shall be applied to the Annual Payment Amount and paid to
217 District for each acre-foot of Annual Allotment of Solano Project Water transferred in that Water
218 Year commencing March 1.

219 6. California Environmental Quality Act: The approval and execution of this
220 Agreement is contingent upon certification of the CEQA document by District and each of City
221 and District's findings and determinations as a lead agency or responsible agency under CEQA.
222 Pursuant to Section 15051(d) of the California Environmental Quality Act Guidelines ("CEQA"),
223 District is designated as the Lead Agency under CEQA for this Agreement and will prepare an
224 Initial Study and Checklist and whatever environmental documentation is required, including an
225 Environmental Impact Report if significant environmental impacts are identified for the Project.
226 The Project is agreed to be and is described as follows: "A proposed Agreement to accomplish
227 annual transfers of a quantity of Solano Irrigation District's Annual Allotment of Solano Project
228 Water to the City of Benicia in the amount of 2,000 acre-feet per year and the payment of
229 consideration from City to District for that transfer. The water quantities transferred will be
230 delivered in Lake Berryessa and the Putah South Canal and will be utilized by City primarily to
231 assure yield through drought periods for the existing City water service area, to enhance water
232 quality to City customers within the existing City water service area, to reduce water treatment
233 costs of City, to reduce energy consumption for water treatment, and to provide supplies for

234 replacement of reduced sources of State Water Project water due to State Water Project operating
235 conditions. The monies paid by City to the District shall be utilized by District to enhance its
236 system to maximize existing resources through construction of water conservation and
237 conjunctive use projects to (i) repair, replace, rehabilitate and install at new locations the
238 groundwater pumping capacity of District previously existing, (ii) to install and or replace
239 existing canal transmission facilities with impervious materials or to install pipe in the place of
240 earthen ditches and canals used to deliver District water, (iii) to cause return flow and drainage
241 recapture structures and pumping facilities to be repaired, refitted and expanded in capacity, and
242 (iv) other related expenditures to insure reliable and sustainable water supply deliveries. City is
243 designated as a Responsible Agency. District will bear the costs of completing the CEQA process
244 in regard to the transfer of water to City pursuant to this Agreement but may elect to terminate
245 the CEQA process at any time, and City shall have no claim against District for expense nor any
246 right to compel completion of the process.

247 6.1 Once District has prepared the CEQA document, City shall have the
248 obligation to process the document as a responsible agency and to meet any other legal
249 requirements in regard to the application and use of the water transferred hereunder by District to
250 City.

251 6.2 Each party reserves its full and entire discretion and authority regarding
252 whether to or how to approve this Agreement based upon the results of the CEQA process. If
253 there are any comments or legal challenges to District's CEQA process or City's CEQA process
254 by any person or entity that is not a party to this Agreement, then City or District may elect,
255 based upon the exercise of its reasonable and sole discretion, to terminate this Agreement. If
256 either City or District gives notice of its election to terminate this Agreement pursuant to this
257 Paragraph, the costs and expenses of negotiating and preparing this Agreement and the CEQA
258 process shall be borne by the respective party incurring those expenses, and no party shall have a
259 claim against the other party for attorney's fees, expert witness fees, costs or expenses, loss or
260 damage. Neither party shall be required to pursue litigation to the exhaustion of all judicial or
261 administrative proceedings in regard to the issues presented by a CEQA challenge or other form
262 of challenge, nor shall any party be barred from giving its notice of election to not proceed with

263 this Agreement until any challenges are finally resolved, if any.

264 7. Water Quality not Warranted. Water from the Solano Project delivered under this
265 Agreement shall be per the standards and limitations stated in paragraph 21 of the Contract
266 between the United States and Solano County Water Agency dated February 28, 1999. District
267 does not warrant the quality of the Solano Project Water.

268 8. Representations and Warranties of Authority: District represents and warrants
269 that it has the authority and has provided for all preconditions, acts and findings required by law
270 to provide for and enter into and perform the terms and provisions of this Agreement. City
271 represents and warrants that it has the authority and has provided for all preconditions, acts and
272 findings required by law to provide for and enter into and perform the terms and provisions of
273 this Agreement. Should the authority of either City or District be challenged in any legal or
274 administrative proceeding after the effective date of this Agreement, a party so challenged shall
275 indemnify and defend the other party, including paying the costs of attorney's fees, expert
276 witness fees and all other reasonable costs of defense of the other party from any claimed lack of
277 authority, power or authorization to enter into and perform the terms and provisions of this
278 Agreement.

279 9. Effective Date: The effective date of this Agreement shall be the date that the last
280 of the Board of Directors of District and the City Council of City shall have approved execution
281 and executed this Agreement, and SCWA has acknowledged notification of the transfer. Both
282 District and City shall upon the Effective Date of this Agreement execute such notices to SCWA
283 as shall be reasonably required to provide for the annual transfer of a portion of District's Annual
284 Allotment. After the Effective Date, upon termination of this Agreement or any portion of the
285 transfer of Annual Allotment, both District and City shall promptly execute and deliver notices to
286 SCWA in regard to the return of said portions of Annual Allotment amounts to District's
287 account, except that any amounts placed in a Voluntary Carryover Account or Restricted
288 Carryover Account during the term of this Agreement by City attributable to the waters
289 transferred by District will remain the sole and exclusive property of City.

290 10. Written Notice: Written notice under the terms of this Agreement shall be
291 provided to City and District at the following addresses by fax notice and by first class mail, as

292 follows:

293 If to District:

294 Solano Irrigation District
295 Attn: General Manager
296 508 Elmira Road
297 Vacaville, CA 95687
298 Facsimile: (707) 448-7347

299 If to City:

300 City of Benicia
301 Attn: Director of Public Works
302 250 East L Street
303 Benicia, CA 94510
304 Facsimile: (707) 747-1637

305 Notice shall be deemed effective and served five (5) calendar days following deposit in first class
306 mail.

307 11. Payment Form: All payments shall be made in lawful monies and currency of the
308 United States and shall be immediately payable and drawable by District.

309 12. Time is of the Essence. Time is of the essence in the performance of this
310 Agreement and of every term and provision thereof.

311 13. Parties to Act in Good Faith. Each of the parties agrees to act in good faith to
312 implement and to allow for the performance of the obligations and the rights specified herein,
313 and each party agrees not to do any act which would impair or make more difficult or impossible
314 the performance of this Agreement and of every right or term thereof.

315 14. No Assignment: The provisions of this Agreement shall apply to and bind the
316 successors and assigns of the respective parties hereto, but no assignment or transfer of this
317 Agreement or any part thereof or interest therein by any party shall be valid unless and until
318 approved in writing by the other party.

319 15. No Other Representations or Warranties: There are no other terms, conditions,
320 promises, or warranties either implied or explicit other than are contained within the written
321 terms of this Agreement.

322 16. Amendment or Modification: No amendment, modification or waiver of any
323 rights or terms of this Agreement shall be made except by a writing executed by each party

indicating on its face the intent to amend this Agreement.

17. Execution in Counterparts: This Agreement may be executed in several duplicate counterparts, each of which shall be an original.

18. SCWA Acknowledgement: SCWA executes this agreement for the purpose of acknowledging notification of the same per Section 7(a) of District's Participating Agency Contract. Each Party shall have the right to enforce the terms of this Agreement against the other Party.

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SOLANO IRRIGATION DISTRICT ("DISTRICT"):

Dated: 03/03/2009

ROBERT HANSEN, President
Board of Directors

Dated: 3-3-09

DAVID M. MANSFIELD, General Manager

CITY OF BENICIA ("CITY"):

Dated: 4/23/09

ELIZABETH PATTERSON, Mayor

Dated: 4/24/09

LISA WOLFE, City Clerk

Dated: 4-22-09

HEATHER McLAUGHLIN, City Attorney

SOLANO COUNTY WATER AGENCY ("SCWA"):

This Agreement has been received by the Solano County Water Agency ("SCWA"), which acknowledges notification of the subject transfer and concurs with the conformance of the transfer with the requirements and restrictions of the District's Participating Agency Contract.

Dated: 4/29/09

DAVID OKITA, General Manager

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State of California)
County of Solano)

On March 3, 2009, before me, Frank Weber, Notary Public, personally appeared **Robert Hansen** and **David M. Mansfield**, who proved to me on the basis of satisfactory evidence to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same in their authorized capacities, and that by their signatures on the instrument the persons, or the entity upon behalf of which the persons acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the forgoing paragraph is true and correct.

WITNESS my hand and official seal.

FRANK WEBER
Commission # 1740813
Notary Public - California
Solano County
My Comm. Expires May 19, 2011

Frank Weber, Notary Public
Commission Number: 1740813
Commissioned In: Solano County, State of California
Date Commission Expires: May 19, 2011
Vendor ID Number: NNA1
Phone Number: 707-455-4032

State of California)
County of Solano)

On April 23, 2009, before me, JAYNE M. YORK, Notary Public, personally appeared **Elizabeth Patterson**, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her authorized capacity, and that by her signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the forgoing paragraph is true and correct.

WITNESS my hand and official seal.

JAYNE M. YORK
Commission # 1734784
Notary Public - California
Solano County
My Comm. Expires Apr 20, 2011

Jayne M. York, Notary Public
Commission Number: 1734784
Commissioned In: Solano County, State of California
Date Commission Expires: 4/20/11
Vendor ID Number: NNA1
Phone Number: 707-746-4200

State of California)
County of Solano)

On April 24, 2009, before me, JAYNE M. YORK, Notary Public, personally appeared **Lisa Wolfe**, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that she executed the same in her authorized capacity, and that by her signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the forgoing paragraph is true and correct.

WITNESS my hand and official seal.

JAYNE M. YORK
Commission # 1734784
Notary Public - California
Solano County
My Comm. Expires Apr 20, 2011

Jayne M. York
_____, Notary Public
Commission Number: 1734784
Commissioned In: Solano County, State of California
Date Commission Expires: 4/20/11
Vendor ID Number: NNA1
Phone Number: 707-746-4200

State of California)
County of Solano)

On 4/22/09, 2009, before me, Diane L. Henry, Notary Public, personally appeared **Heather McLaughlin**, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the forgoing paragraph is true and correct.

WITNESS my hand and official seal.

DIANE L. HENRY
Commission # 1800006
Notary Public - California
Solano County
My Comm. Expires Jun 1, 2012

Diane L. Henry
_____, Notary Public
Commission Number: 1800006
Commissioned In: Solano County, State of California
Date Commission Expires: 6/1/2012
Vendor ID Number: NNA1
Phone Number: 707-746-4216

State of California)
County of Solano)

On April 29, 2009, before me, Frank Weber, Notary Public, personally appeared **David Okita**, who proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the forgoing paragraph is true and correct.

WITNESS my hand and official seal.

FRANK WEBER
Commission # 1740813
Notary Public - California
Solano County
My Comm. Expires May 19, 2011

Frank Weber, Notary Public
Commission Number: 1740813
Commissioned In: Solano County, State of California
Date Commission Expires: May 19, 2011
Vendor ID Number: NNA1
Phone Number: 707-455-4032

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EXHIBIT "A"

Solano Project Member's Agreement as to Drought Measures and Water Allocation executed on March 1, 1999.

SOLANO PROJECT MEMBERS'
AGREEMENT AS TO DROUGHT MEASURES
AND WATER ALLOCATION

THIS AGREEMENT, dated as of March 1, 1999, by and among the Solano Irrigation District, a California Irrigation District (hereinafter referred to as "SID"), Maine Prairie Water District, (hereinafter referred to as "MPWD"), the City of Fairfield, a California municipal corporation (hereinafter referred to as "Fairfield"), the City of Vacaville, a California municipal corporation (hereinafter referred to as "Vacaville"), the City of Suisun City (hereinafter referred to as "Suisun"), and the City of Vallejo, a California municipal corporation (hereinafter referred to as "Vallejo"), individually referred to or collectively referred to in this Agreement as "Party" or "Parties," respectively, is made and entered into and the Parties do, for full and adequate consideration, receipt of which is hereby acknowledged, agree as follows:

Section 1.0: Background Facts

1.1 The Parties are all, through contracts with the Solano County Water Agency ("SCWA"), Participating Agencies of the Solano Project, entitled to annual deliveries of water from the Solano Project in the following amounts:

Name of Party	Annual Entitlement (Acre-Feet ("AF")/Water Year)
Solano Irrigation District	141,000
Fairfield	9,200
Vacaville	5,600
Suisun City	1,600
Maine Prairie	15,000
Vallejo	14,750
Total:	187,150

The present contract between the United States and SCWA for Solano Project water supply ("Solano Project Master Contract") expires in 1999, and negotiations between the United States and SCWA for Solano Project Master Contract renewal and extension are underway, and the Member Unit Parties' contracts with SCWA for the annual entitlements will be extended or renewed.

(Final 1/25/99)

1.2 The Parties wish to provide for this Agreement as to the measures to be used in regard to the accounting of water not used from a Party's annual entitlement from the Solano Project in a year after renewal, and also to provide for contractually agreed-to and enforceable curtailments in the amounts of water taken under the respective Parties' annual entitlements during certain drought conditions. This Agreement provides for the accounting of and preservation of the rights of the Parties to those waters which are voluntarily or mandatorily curtailed.

1.3 The Parties wish to further provide in this Agreement for special measures which SID will implement should the drought conditions deepen and become more severe, resulting in reduction of storage in Lake Berryessa to certain levels despite all reasonable efforts of the Parties.

1.4 The Parties agree that each of the Background Facts in Section 1.0 *et seq.* is true and correct, and a portion of the consideration for this Agreement.

Section 2.0: <u>Definitions</u>.

2.1 The phrase "Storage in Lake Berryessa" shall mean the amount of water stored on the date specified in this Agreement within Lake Berryessa (i) excluding any amounts of water in dead storage which may not be physically released or diverted from Lake Berryessa for any reason, (ii) excluding any amounts of water held on that date in Voluntary Carryover Accounts by the Parties to this Agreement, but (iii) including any amounts of water held in Restricted Carryover Accounts by the Parties on that date. The Storage in Lake Berryessa shall be calculated utilizing the most current elevation capacity curve for Lake Berryessa approved by the United States.

2.2 The phrase "annual entitlements" shall mean the amount of water a Party is entitled to delivery each water year in the amounts set forth in Paragraph 1.1 above, where each "water year" begins on March 1, and ends on the last day of the following February, as set forth in the present contracts.

Section 3.0: <u>Renewal Contracts of Parties</u>

3.1. The Parties agree that the Parties shall each be entitled to renewal of their

Contract with SCWA for the purchase of water from the Solano Project annually on the basis of the annual amounts set forth in Paragraph 1.1 above.

3.2 It shall be a precondition to the enforceability of this Agreement that each of the Parties shall have received and accepted a renewal contract for Solano Project Water in the above amounts from SCWA ("Renewal Participating Agency Contract") and that the terms of those agreements have been accepted by each Party and approved by the United States Department of Interior, Bureau of Reclamation, if such approval is required by the Solano Project Master Contract, and the Renewal Participating Agency Contracts have each been validated in accordance with the provisions of California Code of Civil Procedure section 860, *et seq.* It shall be a further precondition of the enforceability of this Agreement that no material change has been made in the terms and provisions of each Renewal Participating Agency Contract including, without excluding other material changes, that:

3.2.1 The term of all of the Renewal Participating Agency Contracts shall be equivalent to the term of the renewed Solano Project Master Contract; and

3.2.2 The proportions of payment amounts per AF of water available under the Renewal Participating Agency Contracts shall be the same as the existing Contracts of $15.00 per AF for municipal and industrial ("M&I") water use and $2.65 per AF for irrigation use or a ratio of 5.66 to 1, depending on the respective purpose of use; and

3.2.3 There shall be included within all Renewal Participating Agency Contracts provisions permitting each Party to voluntarily retain carryover storage in Lake Berryessa for any unutilized portion of that Party's annual water entitlement under its Renewal Participating Agency Contract under the following conditions:

(a) The amount so voluntarily unutilized on the last day of February shall be added on that date to a carryover account ("Voluntary Carryover Account") for the Party that did not order delivery of the amount of water, but the Party shall pay SCWA for the undelivered water as if the water was delivered to the Party in that year in accordance with the Renewal Participating Agency Contract terms. No additional payment will be required for subsequent use of that water if there is no change in type of use.

(b) Any water in a Party's Voluntary Carryover Account may be utilized by that Party, in addition to all portions of their annual entitlement, in any water year subsequent to the water year in which it is added to the Party's Voluntary Carryover Account, or may be assigned, with approval by SCWA, to another Party to this Agreement, for use by the other Party in the year of non-diversion before its addition to a Party's Voluntary Carryover Account or for use in a subsequent water year from that assignee's Voluntary Carryover Account.

(c) Any water in a Party's Voluntary Carryover Account at the time that Lake Berryessa spills, or at a time in which emergency releases are made from Lake Berryessa for any other reason which releases are not delivered by the Solano Project to SCWA, may be lost as follows: The spill or emergency release shall be charged proportionately to each Party having a Voluntary Carryover Account and subtracted from the Parties' Voluntary Carryover Accounts then having a balance in their accounts to the extent of the spill or emergency release.

Example: Party A has 20,000 AF in its Voluntary Carryover Account, Party Y has 10,000 AF in its Voluntary Carryover Account, and Party X has 2,000 AF in its Voluntary Carryover Account, as these accounts exist at the time the spill condition commences, and these are the only carryover amounts presently in Lake Berryessa. A spill condition occurs in which water is not diverted into the Putah South Canal for beneficial use, or is not credited to a release requirement of the Solano Project in Putah Creek, including carriage losses upstream of Putah Diversion Dam. Each net acre foot spilling shall be charged proportionately to each Party's Voluntary Carryover Account. In the example, the percentages are: Party A, 62.5%; Party Y, 31.25%; Party X, 6.25%. If the net spill was of 16,000 AF, the Voluntary Carryover Accounts of all Parties would be reduced by 50%. If the net spill exceeded 32,000 AF, each Party's Voluntary Carryover Account would have a zero balance.

(d) No monies shall be reimbursable from SCWA to the Parties for the amounts paid for the Voluntary Carryover Account water to SCWA which is spilled.

(e) No evaporation, measurement or carriage loss will be charged upon any Party's Voluntary Carryover Account balance. No Party shall be charged a storage charge upon its Voluntary Carryover Account balances.

Section 4.0: Preparation of Drought Contingency Plans:

4.1 When Storage in Lake Berryessa falls below 800,000 AF as measured on December 1, the Parties will participate with SCWA staff in preparation of a Drought Contingency Plan which shall include reasonable water conservation measures, investigation of potential emergency supplies which could be imported without construction of new conveyance facilities, and other reasonable measures which could reduce the depletion of Storage in Lake Berryessa. Implementation of any of these measures by the Parties and SCWA will only be with the consent of the individual Parties electing to participate, and SCWA will not suspend or supersede provisions of the Participating Agency Renewal Contracts with SCWA. The Drought Contingency Plan shall also address terms and conditions for water sales pursuant to Paragraph 5.6(b). If Storage in Lake Berryessa exceeds 1.1 million AF on the following April 1, development of the Drought Contingency Plan shall be suspended.

Section 5.0 Mandatory Additions to Storage and Carryover Accounts by Parties ("Restricted Carryover Account"):

5.1 When Storage in Lake Berryessa is between 550,000 AF and 800,000 AF as measured on April 1 of any water year, then each of the Parties agrees to forego taking delivery of at least 5% of the Party's annual entitlement. If the Storage in Lake Berryessa is between 450,000 AF and 550,000 AF as measured on April 1, the Parties agree that they will forego taking delivery of at least 10% of their annual entitlements. On the first day of the next water year, a 5% (if Storage in Lake Berryessa had been between 550,000 AF and 800,000 AF the previous April 1) or 10% (if Storage in Lake Berryessa had been between 450,000 AF and 550,000 AF the previous April 1) portion of each Party's annual entitlement shall be credited to what will be called the Party's "Restricted Carryover Account."

5.2 Restricted Carryover shall be classified as either irrigation or M&I. For a Party that delivers only one class of water, 100% of its Restricted Carryover shall be designated of that class. For a Party that delivers both irrigation water and M&I water, the Restricted Carryover shall be segregated into irrigation ("irrigation Restricted Carryover") and M&I ("M&I Restricted Carryover") classes based on the amounts of each class of water acquired by that Party from SCWA during the water year in which the Restricted Carryover was generated.

Example: The Storage in Lake Berryessa is between 550,000 AF and 750,000 AF on April 1. Party A delivers both M&I and irrigation water, and in the current water year acquires 20% M&I and 80% irrigation from SCWA. The 5% of annual entitlement foregone amount deposited in Party A's Restricted Carryover Account the following water year would be classified as 1% M&I Restricted Carryover and 4% irrigation Restricted Carryover.

5.3 Notwithstanding the mandatory foregoance of a portion of its annual entitlement, a Party having a Voluntary Carryover Account balance from voluntary curtailment of use may take any portion of the Voluntary Carryover Account balance from that account in a water year.

5.4 A Party shall not withdraw water from its Restricted Carryover Account until either (a) the Storage in Lake Berryessa on a subsequent April 1 exceeds 800,000 AF, or (b) the Storage in Lake Berryessa on a subsequent April 1 falls below 450,000 AF. If the April 1 Storage in Lake Berryessa exceeds 800,000 AF, the Restricted Carryover Accounts shall convert to or combine with Voluntary Carryover Accounts of the respective Parties. If the April 1 Storage in Lake Berryessa falls below 450,000 AF, the water in Restricted Carryover Accounts will become available to the Member unit Parties as specified in Section 5.6 below.

Example: Party A serves only M&I water and has a Voluntary Carryover Account balance of 2,000 AF on April 1 and no Restricted Carryover Account balance. The April 1 Storage in Lake Berryessa is less than 800,000 AF but more than 550,000 AF. Party A will forego taking delivery of at least 5% of its annual entitlement in the current water year ending on the last day of February. Party A may, up to the last day of February, order and receive 95% of its annual entitlement and an additional 2,000 AF from its Voluntary Carryover Account, bringing its Voluntary Carryover Account to zero on the last day of the water year. The following water year, the Restricted Carryover Account of Party A will have the foregone amount of 5% in it, classified as 100% M&I Restricted Carryover. If the Storage in Lake Berryessa on April 1 of that year exceeds 800,000 AF, Party A's Restricted Carryover Account will convert to a Voluntary Carryover Account, and Party A is entitled to use the water at any time. If the Storage in Lake Berryessa falls below 450,000 AF on April 1 of that year, the water in Restricted Carryover Accounts will become available to the Parties as specified in Section 5.6

below. If the April 1 Storage in Lake Berryessa is any other amount (between 450,000 AF and 800,000 AF), the foregone amount remains in Party A's Restricted Carryover Account and is not available for use.

5.5 After successive water years in which Storage in Lake Berryessa is between 450,000 AF and 800,000 AF on April 1, water will tend to accumulate in the Restricted Carryover Accounts. The above provisions notwithstanding, however, accumulated water in a Party's Restricted Carryover Account (combined M&I and irrigation Restricted Carryover) shall not exceed 50% of that Party's annual entitlement.

Example: Same as last example (Section 5.4) except Party A starts with a Restricted Carryover Account balance of 48% of its annual entitlement. Party A would be required to deposit only 2% of its annual entitlement into its Restricted Carryover Account to bring the Restricted Carryover Account up to the maximum 50% of annual entitlement. Party A may take delivery and use up to 98% of its annual entitlement that water year, excluding any Voluntary Carryover.

5.6 When Storage in Lake Berryessa falls to less than 450,000 AF on April 1, the Parties will not be required to deposit additional water into Restricted Carryover attributable to that water year and water from the Restricted Carryover Accounts will be released to the Parties as follows:

a. The Parties shall have access to their M&I Restricted Carryover Account balances for M&I uses; and

b. The Parties shall have access to their irrigation Restricted Carryover balances for voluntary sale to other Parties for M&I uses based on terms and conditions established through the drought contingency planning process of Section 4.0.

Example: In 2006, Storage in Lake Berryessa is between 550,000 AF and 800,000 AF on April 1 after being above 800,000 AF the previous year. A 5% Restricted Carryover amount is required of all Parties for that water year. Since water orders are submitted to SCWA prior to March 1, the order for that year will be amended to reflect the reduction in available water supply for each of the Parties and the foregone amount will be credited to the Restricted Carryover Accounts on March 1, 2007. On April 1 in each of years 2007 and 2008,

Storage in Lake Berryessa is between 450,000 AF and 550,000 AF. On March 1, 2009, each Party will have 25% of its annual entitlement in its Restricted Carryover Account. On April 1, 2009, Storage in Lake Berryessa falls below 450,000 AF. The Parties will not be required to deposit further water into their Restricted Carryover Accounts that year, and each Party may use any M&I Restricted Carryover in its Restricted Carryover Account for M&I uses that year. Furthermore, Parties with irrigation Restricted Carryover may sell all or any part of that water to other Parties for M&I use pursuant to the drought contingency plan of Section 4.0 above. Any water not sold will remain irrigation Restricted Carryover in the selling Party's Restricted Carryover Account, and such water's disposition will be determined by the April 1 Storage in Lake Berryessa in subsequent years.

5.7 Any amounts of water which are mandatorily foregone and placed into the Restricted Carryover Accounts by the Parties pursuant to Paragraph 5.1 shall be subject to payment of the water charge to SCWA for the foregone amount. No additional payment will be required for subsequent use of that water if there is no change in the type of use.

5.8 In addition to the provisions above, when Storage in Lake Berryessa is less than 400,000 AF on April 1, SID will prepare to implement a voluntary agricultural water marketing program in order to sign up growers who are willing to sell their water allocations for the next water year beginning March 1 of the following year. The water obtained by this voluntary process will be marketed by SID to the Parties to meet M&I water needs of those Parties. The process, methods of determining cost, and conditions governing the marketing to Participating Agencies shall be reasonable and are generally outlined as to form in Exhibit "A" entitled "Solano Irrigation District Drought Impact Reduction Program" (referred to herein as "Program"). The SID Board of Directors may alter and modify the conditions, charges and terms of the Program from time to time, but the purposes of the Program of providing for voluntary relinquishment of agricultural water, while avoiding permanent adverse economic, environmental and social or organizational damage to the agricultural community and to the Parties' M&I users, and retaining the viability of SID, shall be reasonably retained in the Program adopted and implemented by SID. Parties desiring to obtain water from SID for M&I purposes will be provided a reasonable opportunity to comment on any proposed Program changes in advance of their implementation by SID.

5.9 If the Solano Irrigation District Drought Impact Reduction Program shall have been implemented for two or more successive years in the previous three years, and a total of more than 35,000 AF of water are subscribed during the three years to meet M&I water needs of Parties, and on the following April 1 Storage in Lake Berryessa is less than 400,000 AF, the amounts of water to be made available under the Program in that year shall be reduced by SID to a maximum of 5,000 AF.

Example A: Same as last example (Section 5.6), with the additional facts that Storage in Lake Berryessa drops below 400,000 AF on April 1 in years 2010 through 2012, and in year 2009 and 2010, the Program provides for the subscription of 20,000 AF annually for M&I use. Because in the successive years 2009 and 2010 the Program is utilized to provide 35,000 AF or more to M&I users, each Party would have the additional right to participate in the Program in year 2011, but only to the extent of the Party's share of a total Program amount not to exceed 5,000 AF. In year 2012, because more than 35,000 AF were subscribed to under the Program over the past three years and the program was in effect in at least two successive years within the previous three years, the Program shall be reduced again to a maximum of 5,000 AF. If Storage in Lake Berryessa continues below 400,000 AF on April 1, 2013, the 5,000 AF restriction would not be in effect because the Program did not provide 35,000 AF or more to M&I users over the past three years.

Example B: Same as last example, except Storage in Lake Berryessa is above 400,000 AF on April 1, 2010, and therefore the Program is not in effect that year. In year 2011 the program provides for the subscription of 20,000 AF for M&I use. In year 2012, the 5,000 AF restriction would not be in effect because, although the Program provided over 35,000 AF to M&I users over the past three years, the Program was not in effect in at least two successive years during that period. If Storage in Lake Berryessa continues below 400,000 AF on April 1, 2013, the 5,000 AF restriction would be in effect if the 2012 subscription was 15,000 AF or more (so that the combined 2011 and 2012 subscription was 35,000 AF or more).

5.10 Except as provided otherwise by this Section, Restricted Carryover will be treated the same as Voluntary Carryover.

Section 6.0: **No Assignments**

6.1 This Agreement, and the rights, duties and benefits given in it, may not be assigned by a Party to a non-Party without the advance written consent of all other Parties, and any attempted direct or indirect assignment without such consent is void. The amounts of water in a Party's Voluntary or Restricted Carryover Accounts may not be assigned directly or indirectly for the benefit of non-Parties and SCWA must consent to any such assignments between Parties. Approval of assignment of portions of a Party's annual entitlement to water under its Renewal Participating Agency Contract by SCWA shall carry with it the obligation to provide the Restricted Carryover Account amounts attributable to that entitlement.

Section 7.0: **Counterparts**

7.1 This Agreement may be executed in several duplicate counterparts, each of which shall be an original.

Section 8.0: **SCWA Consent**

8.1 The Solano County Water Agency executes this Agreement for the purposes of consenting to the terms hereof. Each Party shall have the right to enforce the terms of this Agreement against any or all other Parties.

SOLANO IRRIGATION DISTRICT

Dated: By: _____
President, Board of Directors

[SEAL] Attest:

_____
Secretary, Board of Directors

Approved as to form:

_____
District Counsel, Solano Irrigation District

MAINE PRAIRIE WATER DISTRICT

Dated: By: Milton Rayn
President, Board of Directors

[SEAL] Attest:

William H Holdener
Secretary, Board of Directors

Approved as to form:

George Barger
District Counsel

CITY OF FAIRFIELD

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk, City of Fairfield

Approved as to form:

_____
City Attorney, City of Fairfield

CITY OF SUISUN CITY

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk of the City of Suisun City

Approved as to form:

_____
City Attorney, City of Suisun City

MAINE PRAIRIE WATER DISTRICT

Dated: By: _____
President, Board of Directors

[SEAL] Attest:

_____
Secretary, Board of Directors

Approved as to form:

_____
District Counsel

CITY OF FAIRFIELD

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk, City of Fairfield

Approved as to form:

_____
City Attorney, City of Fairfield

CITY OF SUISUN CITY

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk of the City of Suisun City

Approved as to form:

_____
City Attorney, City of Suisun City

MAINE PRAIRIE WATER DISTRICT

Dated: By: _____
President, Board of Directors

[SEAL] Attest:

_____
Secretary, Board of Directors

Approved as to form:

_____
District Counsel

CITY OF FAIRFIELD

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk, City of Fairfield

Approved as to form:

_____
City Attorney, City of Fairfield

CITY OF SUISUN CITY

Dated: By: _____
Mayor

[SEAL] Attest:

Sharon Ventura
_____
Clerk of the City of Suisun City

Approved as to form:

_____
City Attorney, City of Suisun City

CITY OF VACAVILLE

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk of the City of Vacaville

Approved as to form:

_____
City Attorney, City of Vacaville

CITY OF VALLEJO

Dated: By: _____
City Manager

[SEAL] Attest:

_____
Clerk of the City of Vallejo

Approved as to form:

_____
City Attorney, City of Vallejo

CONSENTED TO:

SOLANO COUNTY WATER AGENCY

Dated: By: _____
President, Board of Directors

[SEAL] Attest:

_____
Secretary, Board of Directors

Approved as to form:

_____
District Counsel

CITY OF VACAVILLE

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk of the City of Vacaville

Approved as to form:

_____
City Attorney, City of Vacaville

CITY OF VALLEJO

Dated: 3/12/99 By: _____
City Manager

[SEAL] Attest:

_____
Clerk of the City of Vallejo

Approved as to form:

_____
City Attorney, City of Vallejo

CONSENTED TO:

SOLANO COUNTY WATER AGENCY

Dated: By: _____
President, Board of Directors

[SEAL] Attest:

_____
Secretary, Board of Directors

Approved as to form:

_____
District Counsel

CITY OF VACAVILLE

Dated: By: _____
Mayor

[SEAL] Attest:

_____
Clerk of the City of Vacaville

Approved as to form:

_____
City Attorney, City of Vacaville

CITY OF VALLEJO

Dated: By: _____
City Manager

[SEAL] Attest:

_____
Clerk of the City of Vallejo

Approved as to form:

_____
City Attorney, City of Vallejo

CONSENTED TO:

SOLANO COUNTY WATER AGENCY

Dated: By: _____
President, Board of Directors

[SEAL] Attest:

_____
Secretary, Board of Directors

Approved as to form:

_____
District Counsel

EXHIBIT "A"

SOLANO IRRIGATION DISTRICT
DROUGHT IMPACT REDUCTION PROGRAM ELEMENTS

The Program will include the following elements:

1.0 The District's Contract with the Parties requesting Municipal and Industrial Water:

1.1 Proportions in Program: On or about April 1 when it is determined that the amount of water in Storage in Lake Berryessa is less than 400,000 AF, excluding water which is in dead storage and water which is in the voluntary carryover accounts of the Parties to the Agreement, the Parties, including SID, delivering municipal and industrial water in proportion to the average annual amounts of municipal and industrial water ordered and paid for from the Solano Project by those Parties during the preceding five (5) full water years, shall be entitled to participate in the SID Drought Impact Reduction Program ("The Program").

1.2 No Assignment of Proportion of Program Water: All Parties seeking water under the Program for municipal and industrial use shall be entitled to their proportional share of the water made available by the Program. If a Party desires less than their proportional share of the Drought Impact Reduction Program water, they may not assign their relinquished portion of the Program water to any other Party, and the relinquished portion of the water will be divided in accordance with the percentage of the Program water requested by Parties, if any Party requests less than their proportional share.

1.3 District Target Price: On or before May 1, SID will establish and announce a target price per AF for the amount of water which will be deemed relinquished by a Landowner and/or Tenant within SID for the Program in the following water year.

1.4 Additional Costs: In addition to the target price payable to the Landowner and/or Tenant for each acre foot, SID shall establish the additional amounts payable to SID for its operation and maintenance costs, lost water revenues and other reasonable costs to be incurred in implementing the Program. SID will establish the amounts of water which will be allocated to each acre of land under the rules and regulations in the following water year in which the Program is to be implemented and to which the target price and charges of SID would apply if the Landowner and/or Tenant elect to participate in the Program.

1.5 Contract with District: Upon establishing the economic terms of the Program, ninety (90) days notice shall be provided to the Parties serving Municipal and Industrial water of their right to subscribe and contract to the terms of the Program and their right to purchase upon those terms their proportionate share of the Program water in the following water year. The Program water to be made available to the Parties providing for municipal and industrial water service, including SID, shall not exceed twenty thousand (20,000) AF in a water year, or the water allocation from 7,500 acres of SID land, whichever sum is less. A Party declining to or omitting to subscribe to its proportionate share of the Program water may subscribe to a lesser amount of water, or if no election to subscribe is made, their proportionate share shall be divided among the other participants in proportion to requests of the remaining Parties limited by those Parties' proportions established under Paragraph 1.1 above (five years' historic ordering of M & I water from Solano Project). All subscription requests shall be submitted in writing.

1.6 Solicitation Period: Because the terms will be announced and the subscriptions sought approximately 9 months before the relinquishment would commence to take effect, a period of at least 45 days beginning on or before August 1 will be provided for Landowners and Tenants within the boundaries of SID to offer in writing the amounts of water specified and committed to be purchased by the Parties for municipal and industrial purposes in the following water year under the Program.

1.7 Solicitation Complete - Finalization of Contract Amounts: If sufficient Landowner and/or Tenant participants are received within the initial 45-day period by SID, a final binding contract for these amounts shall be delivered by the Parties to SID for the purchases, and SID will submit contracts to the participating SID landowners and/or tenants for the relinquishment to take effect in the following water year.

1.8 Insufficient or Excessive Landowner Offers: If insufficient lands subscribe to the SID Program in the solicitation, and insufficient amounts of water are obtained to meet the total demand of the requesting Parties, which demand shall not exceed 20,000 AF or water from 7,500 acres, whichever is less in any water year, the Parties shall nevertheless be bound to purchase those amounts tendered by landowners and/or tenants from SID.

If the participating landowners and/or tenants offer amounts of water in excess of subscriptions of the Parties, the amounts tendered by each participant will be reduced by a factor representing the excess amount as a percent of the subscribed amount.

Final contracts with participants and the subscribing Parties shall be delivered to SID for approval on or before October 15.

1.9 Payment to District: The monies due to SID from the Parties shall be paid on or before October 15, and shall be obtained by SID and distributed by SID in accordance with its contractual terms with the Landowners and Tenants. Interest earned upon the payments prior to disbursement shall be credited to the Parties participating in the Program. The participating Parties shall pay to SCWA the municipal and industrial rate for the water so assigned by SID to the Parties prior to the Parties participating in the Program ordering and delivery of the water in the following water year.

1.10 No Upset Price: The provisions of the Parties' agreement with SID and the Landowner/Tenant agreement with SID will not provide for an upset price, and thus if the following water year is a plentiful water year, nevertheless the water to be transferred by SID to the Parties will be transferred on the first day of the subsequent water year and will be added to the account of the participating Parties in the Program on that day. Participating Parties should recognize that it is possible that spills of Lake Berryessa may occur after March 1, and thus it is theoretically possible to obtain water pursuant to the Program and to lose it forthwith without the ability to use it or hold it in a carryover account. Water transferred by SID to participating Parties will be treated as voluntarily added to the Party's carryover account if not utilized in the water year.

1.11 No Waiver or Transfer of Water Outside Solano Project Service Areas: As a condition of participating in the Program, no Party participating in the receipt of water from the Program shall directly or indirectly in the water year that deliveries are made under the Program (i) waive the ability to receive water from other sources available to it, or (ii) transfer directly or indirectly the amounts held by the Party in their Solano Project account or held by them pursuant to their State Water Project contracts or held as other water rights to any non-Party, or (iii) allow amounts to be received by the Party pursuant to the Solano Irrigation District Drought

Impact Reduction Program to be used for the benefit of a non-Party or for use outside the service area of the Solano Project.

1.12 Solano County Water Agency will be paid for the water transferred by SID at the municipal industrial rate by the purchaser in accordance with the schedule for payments by the Party to SCWA under the Renewal Member Unit Contract.

2.0 SIDs' Contract with Landowners/Tenants: The Program will be implemented with voluntarily participating landowners and tenants by SID determining an amount of water to be allocated by SID in the ensuing water year for each acre of participating land, and a price per acre divided by the number of AF to be allocated yielding a per AF price for water tendered by landowner and tenant to SID. Landowners will be required to allocate full measurable fields or tracts to the Program. Parcels of 20 acres or less in size will not be eligible. Water from land with permanent crops such as trees and vines will not be eligible for transfer. Participants in this relinquishment program shall not supplement their allocation with ground water at levels which exceed the historical average over the previous four (4) years. No more than 7,500 acres of SID lands will be removed from production in a water year under the Program. Specific guidelines and contract forms will be developed by SID prior to the beginning of the landowner solicitation period and that information will be provided in a notice to owners of eligible lands.

(Final 11/30/98)

of the Settlement Agreement, this is deemed a breach. The State will hold all benefits for Agency under the Settlement Agreement and Release in abeyance until the breaching party cures the breach by withdrawing the application or contract request.

(7) Modification of Sub-article 45(t)

It is expressly understood and agreed that this sub-article 45(t) may not be altered, amended, modified, or otherwise changed in any respect whatsoever except by a writing duly executed by authorized representatives of Agency, the State and Intervenors in the Action . The Parties hereby agree and acknowledge that they will make no claim at any time or place that this sub-article 45(t) has been orally altered or modified or otherwise changed by oral communication of any kind or character.

IN WITNESS WHEREOF, the Parties hereto have executed this amendment on the date first written above.

Approved as to legal form
and sufficiency:

for Cathy Crothers, Chief Counsel
Department of Water Resources

STATE OF CALIFORNIA
DEPARTMENT OF WATER
RESOURCES

Mark W. Cowin, Director

SOLANO COUNTY WATER
AGENCY

James Spering

Chairman Board of Directors
Title

Appendix C-1.4: Vallejo Agreement

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FILE COPY

Original ~~[illegible]~~
Agreements 108
Res. #399

213-620-9297

AGREEMENT FOR WATER SERVICE

THIS AGREEMENT, made and entered into this 5th day of FEBRUARY, 1962, by and between the CITY OF VALLEJO, a Municipal Corporation, hereinafter called "Vallejo", and the CITY OF BENICIA, a Municipal Corporation, hereinafter called "Benicia";

W I T N E S S E T H

WHEREAS, Vallejo owns and controls water, water rights, rights to water, pipelines for the transmission and distribution of water and treatment and storage facilities and has commenced construction of facilities for transmission of water from Monticello terminal reservoir and now has certain surplus water available for sale outside the territory presently served by the Vallejo Municipal Water System and,

WHEREAS, Benicia has contracted to purchase the water storage, treatment, transmission and distribution system now serving Benicia, has authorized revenue bonds in the total principal amount of One Million Two Hundred Thousand Dollars ($1,200,000) to finance said purchase, and is in need of a firm supply of water in order to take over said system and the responsibility for serving water to its inhabitants.

NOW, THEREFORE, in consideration of the premises and covenants, conditions and agreements hereinafter set forth to be kept and performed by the parties hereto, it is agreed as follows:

1. Point of Water Delivery. Vallejo shall furnish and Benicia shall accept the water at the point of delivery on Benicia's twelve-inch pipeline, southeasterly of the Vallejo-Benicia Township Line, where said pipe joins two six-inch pipes.

Vallejo shall meter water delivered through said point.

2. Computation on fiscal year basis. The year for reckoning minimum and maximum delivery begins on July 1st and ends of June 30th, annually.

3. Rate of Delivery. After completion of the construction of necessary transmission and pumping facilities hereinafter described, Vallejo shall deliver water at a rate not exceeding one million (1,000,000) gallons per day or the capacity of a 75-horsepower pump, whichever is less, and Benicia shall accept not less than 225 million gallons per year or a prorated amount thereof in relation to a period less than one year. If Benicia's demand exceeds the capacity of the 75-horsepower pump herein referred to, and if Vallejo agrees to supply such additional quantity any additional horsepower required must be provided by Benicia, unless the additional requirement results from Vallejo's distribution of water to areas adjoining the twelve-inch line referred to in Paragraph 1, in which event Vallejo shall provide the additional horsepower at its own expense. Such additional horsepower jointly required shall be jointly financed.

4. Vallejo Liability. Vallejo agrees to exercise reasonable diligence and care to effect the delivery of such quantities of water requested by Benicia within the limits of this Agreement out of any water surplus to Vallejo's requirements, but Vallejo shall not be liable for interruption or shortages caused by insufficiency of supply, rights of other users, or for any loss or damage occasioned thereby, nor delay or interruption caused by accident, Act of God, fires, strikes, riots or other causes beyond the control of Vallejo.

5. Benicia's Estimates. Benicia shall deliver to Vallejo an estimate of the quantity of water it will require and a schedule of drafts thereof during the following calendar month, at least fifteen (15) days before the beginning of each month; and, further, whenever the rate, time or quantity of draft is

expected to vary from said schedule, Benicia shall notify Vallejo of its revised requirement at least seventy-two (72) hours in advance of each such anticipated variance.

6. Meter. Vallejo shall furnish, install and maintain a six-inch meter at the point of delivery and record the readings of the same each month. Said meter's record shall be conclusive as to quantities of water furnished except as hereinafter provided. Said meter shall be checked for accuracy by representatives of Benicia and Vallejo within five (5) days after date of written requests of either; provided, however, that no two (2) such consecutive checks shall be separated by an interval of less than thirty (30) days. If the meter is found to be registering inaccurately by two (2) percent or more, charges for water shall be adjusted accordingly for the period, not exceeding thirty (30) days, the meter was in error.

7. Pump and Appurtenances. Not less than sixty (60) days prior to the date Benicia specifies for commencement of said water delivery, Benicia shall furnish to Vallejo at Lake Chabot Pump Station the seventy-five (75) horsepower pump, together with the hardware, fittings and valves, electrical switches and other appurtenances thereto, from Benicia's pump station in southern Napa County. Vallejo shall install said pump and equipment in said pump station and construct the pipelines and tie-ins necessary to deliver water through the existing twelve (12) inch pipe to the above-mentioned delivery and metering point. Benicia warrants said pump and materials to be furnished as being in good and servicable condition and any failure or failures thereof occurring within twelve (12) months after installation not attributable to faulty installation or neglect shall be repaired and/or replaced at Benicia's expense.

8. Connection Charge. Benicia shall pay to Vallejo, simultaneously with the execution of this Agreement, the sum

of Four Thousand Five Hundred and Seventy Five Dollars ($4,575.00) as a connection charge.

Deleted by Amendment #2

9. Use of 12 Inch Line. In consideration of authority to use said twelve (12) inch pipeline for delivery of water to areas adjoining it, Vallejo hereby transfers to Benicia permission to occupy, with said line, property owned by Vallejo upon which property the line is now located. Vallejo shall maintain and operate the pump, pipelines and meter at its cost and expense during the term of this Agreement. However, Vallejo's obligation for maintenance shall be limited to the repair and/or replacement of those parts of the facility requiring attention due to normal wear only. Any relocation, replacement and/or major improvement or rehabilitation shall be the responsibility of Benicia.

Amendment Attached

10. Option and Election to Buy Treated or Untreated Water. Benicia may purchase at its option either treated water as the same is customarily produced in Vallejo's water treatment plant, or untreated water in the following manner. For a period of one year from the date of commencement of water deliveries, the water supplied shall be treated. Benicia may at any time after one year from the date of commencement of service under this Agreement elect to receive untreated water in lieu of treated water; but may not change again without Vallejo's consent. Such election shall be made by written notice served on Vallejo at least twelve (12) months prior to the date the change is desired. In the event such election is made, all provisions of this Agreement, except those expressly limited to one type of water or the other, shall apply to both types.

11. Treated Water - Rates. Vallejo shall sell and Benicia shall pay for all treated water delivered at the rate of Twenty Four and One Tenth Cents ($0.241) per one thousand (1,000) gallons, subject, however, to the provisions of Paragraph 16. Commencing with the first day of the month following

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the completion of the pumping and transmission facilities referred to in Paragraph 7 hereof, and continuing for the period of this Agreement, or until the commencement date for the taking by Benicia of untreated water under Paragraph 10, whichever occurs first, Benicia shall pay monthly to Vallejo the sum of Four Thousand Five Hundred Seventeen and 08/100 Dollars ($4,517.08), and Vallejo shall credit said payments to Benicia's account for water delivered as provided herein. In any event, Benicia shall pay for the amount of water delivered as of the current billing date. All treated water provided by Vallejo under this Agreement shall be suitable for all domestic use, and shall meet the standards of the State Department of Public Health and the Solano County Department of Public Health, and Vallejo assumes full responsibility for providing and maintaining its quality to such standards.

12. Untreated Water - Rates. Vallejo shall sell and Benicia shall pay for all untreated water delivered pursuant to any Benicia election to take untreated water under Paragraph 10, at the rate of Twelve and One-Half Cents ($0.12 1/2) per one thousand (1,000) gallons, subject, however, to the provisions of Paragraphs 16 and 17. Commencing with the date of commencement for the taking by Benicia of untreated water, Benicia shall pay monthly to Vallejo Two Thousand Three Hundred Forty Three and 75/100 Dollars ($2,343.75), and Vallejo shall credit said payments to Benicia's account for water delivered, as provided herein. In any event, Benicia shall pay for the amount of water delivered as of the current billing date.

13. Untreated Water - Quality. It is expressly understood and agreed by Benicia that any untreated water furnished hereunder is not fit for human consumption, and Benicia hereby indemnifies and holds Vallejo harmless for any damage or claim for injury or illness to any person, livestock or other living thing which may in any way arise from the use of said untreated

water. This Agreement, insofar as it relates to untreated water, shall terminate if the State Department of Public Health or the Solano County Department of Public Health at any time demands that Vallejo cease the delivery of untreated water to Benicia. If required by the State or County Departments of Public Health, Benicia shall, at its own expense, install an approved backflow prevention device or any other additional facility required by those two agencies as a condition to continuance of the delivery of untreated water by Vallejo. The termination of this Agreement insofar as untreated water is concerned shall in no way affect the supply of treated water hereunder.

14. Billing and Payment. Vallejo shall bill Benicia before the tenth (10th) day of each month, and Benicia shall pay the amount billed within fifteen (15) days thereafter.

15. Suspension of Service in Case of Default. Should Benicia default payment of any sum due as provided herein, Vallejo may suspend the delivery of water to Benicia during the period of such default.

Revised - Per Amendment #2

16. Review of Costs. Vallejo will periodically review the cost of furnishing water as provided herein and is hereby empowered to notify Benicia of any increase or decrease of the price for water not later than the last day of March in any year. Such review and adjustment shall be made in the manner now followed by Vallejo and the United States Navy in establishing costs and price adjustments under their agreement for service to Mare Island Navy Yard. Any price change so determined shall become effective during the July following such notice and continue for not less than the succeeding two (2) contract years, and Benicia shall be obligated to pay the same.

17. Monticello Water. Both Vallejo and Benicia have rights and commitments to purchase water from the Monticello project. In the event Vallejo constructs pipeline facilities

11.8

to obtain water from this source, the cost of water delivered to Benicia under this Agreement may be increased or decreased on the basis of a cost analysis made as described in Paragraph 16. However, it is recognized that Benicia has commitments to purchase certain amounts of Monticello water and to pay for the same whether or not used. Accordingly, if and when Vallejo has facilities for taking water from this source, Vallejo will, if requested by Benicia, accept Benicia's allotment of water at Monticello terminal Reservoir within quantity limits of this Agreement and transport to Benicia a like quantity of water as satisfaction of Vallejo's commitments under this Agreement. Rate for such water shall be determined as the then calculated cost of treating and transporting said water to Benicia, if treated water is taken by Benicia, or transporting only if untreated water is taken by Benicia. Vallejo reserves the right to prescribe the times and rates of flow at which said water shall be accepted from Monticello terminal reservoir.

18. Modification and Termination. Vallejo's obligation to provide water and Benicia's obligation to pay for same under the terms of this Agreement shall commence not sooner than November 1, 1962, and upon completion of the construction of the necessary transmission and pumping facilities described in Paragraph 7, and shall continue in effect until November 1, 1997; provided, however, that this Agreement may be modified or terminated by mutual agreement at any time; and provided, further, that it may be unilaterally terminated upon one year's notice by Benicia when Benicia has provided facilities for an adequate new water supply.

Amendment attached

19. Notices. Any notice required under this agreement to either party shall be deemed to have been given when deposited in the United States mail in a sealed envelope, postage prepaid, and addressed as follows:

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To the City of Vallejo
Office of the City Manager
City Hall
Vallejo, California

To the City of Benicia
Office of the City Clerk
City Hall
Benicia, California

Either party may change its address by giving the other party written notice of its new address.

20. Successors and Assigns. This agreement shall inure to the benefit of and be binding upon each of the parties and their successors in interest.

21. Councilmen of Each Party Have Read Agreement. The members of the city council of each city assert that they have read and understand this Agreement.

IN WITNESS WHEREOF the parties hereto have hereunto affixed their names by their representatives thereunto duly authorized, all in the day and year first above written.

CITY OF VALLEJO, a municipal corporation,

BY _____
City Manager

ATTEST:

_____
City Clerk

CITY OF BENICIA, a municipal corporation,

BY _____
Mayor

ATTEST:

_____
City Clerk

APPROVED AS TO FORM: _____
City Attorney

APPROVED AS TO CONTENTS: _____
Public Works Director

APPROVED AS TO CONTENTS: _____
Water Superintendent

FUNDS AVAILABLE: _____
Finance Director

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AMENDMENT

That certain AGREEMENT FOR WATER SERVICE dated February 5, 1962, by and between the CITY OF VALLEJO, a Municipal Corporation, and the CITY OF BENICIA, a Municipal Corporation, is hereby amended as follows.

Paragraph 10 of said AGREEMENT FOR WATER SERVICE is hereby amended to read:

10. Option and Election to Buy Treated or Untreated Water. Benicia may purchase at its option either treated water as the same is customarily produced in Vallejo's water treatment plant, or untreated water in the following manner. For a period of one year from the date of commencement of water deliveries, the water supplied shall be untreated. Benicia may at any time after one year from the date of commencement of service under this Agreement elect to receive treated water in lieu of untreated water; but may not change again without Vallejo's consent. Such election shall be made by written notice served on Vallejo at least twelve (12) months prior to the date the change is desired. In the event such election is made, all provisions of this Agreement, except those expressly limited to one type of water or the other, shall apply to both types.

Paragraph 18 of said AGREEMENT FOR WATER SERVICE is hereby amended to read:

18. Modification and Termination. Vallejo's obligation to provide water and Benicia's obligation to pay for same under the terms of this Agreement shall commence not sooner than November 1, 1962, and upon completion of the construction of the necessary transmission and pumping facilities described in Paragraph 7, and shall continue in effect until ~~November 1, 2000~~ June 30th, 2003; provided, however, that this Agreement may be modified or terminated by mutual agreement at any time; and provided, further, that it may be unilaterally terminated

upon one year's notice by Benicia when Benicia has provided facilities for an adequate new water supply.

DATED this 9 day of april, 1962.

CITY OF VALLEJO, a Municipal Corporation

By _____
City Manager

ATTEST:
_____
City Clerk

CITY OF BENICIA, a Municipal Corporation

By _____
Mayor

ATTEST:
_____
City Clerk

APPROVED AS TO FORM: _____
CITY ATTORNEY

APPROVED AS TO CONTENTS: _____
PUBLIC WORKS DIRECTOR

APPROVED AS TO CONTENTS: _____
WATER SUPERINTENDENT

FILE COPY

AMENDMENT NO. 2
TO THE 1962 VALLEJO/BENICIA WATER AGREEMENT

That certain Agreement for Water Service dated 5 February 1962, and as amended on 9 April 1962, by and between the CITY OF VALLEJO, a Municipal Corporation, and the CITY OF BENICIA, a Municipal Corporation, is hereby amended to read:

Paragraph No. 1 of said Agreement for Water Service is hereby amended to read as follows:

1. Point of Water Delivery. Vallejo shall furnish and Benicia shall accept the water at the Monticello Terminal Reservoir and/or at the southern boundary of the Sky Valley Project when that Project is constructed and Tentative Map 88-10 is met, or at any combination of points of delivery. Benicia will be responsible for maintenance and operation of all facilities at Terminal Reservoir, and at any other points of diversion where facilities are owned and operated by Benicia, necessary to pump water into Benicia. Benicia shall provide a mechanism acceptable to Vallejo for measuring the volume of water taken at any point.

Paragraph No. 2 of said Agreement for Water Service is hereby amended to read as follows:

2. Computation on Yearly Basis. The year for reckoning minimum and maximum delivery begins on March 1st and ends on February 28th, annually.

Paragraph No. 3 of said Agreement for Water Service is hereby deleted and a new Paragraph No. 3 is added to read as follows:

3. Rate of Delivery. Vallejo shall deliver water to the City of Benicia in a quantity not to exceed 1,100 acre feet per year from all connection points. Depending upon point of delivery of Benicia's choosing, Vallejo shall not be required to deliver water at a rate which exceeds the normal capacity of its water system. Vallejo shall maintain a capacity to furnish up to 3 million gallons per day for service to Benicia at the southern boundary of that certain point in Sky Valley, known as the "Sky Valley Project", when said project is constructed.

Paragraph No. 6 of said Agreement for Water Service is hereby amended to read as follows:

6. Meter. Benicia shall provide a mechanism acceptable to the City of Vallejo at Terminal Reservoir for measuring the consumption of water. Should Benicia elect to take service from any other point in the City of Vallejo's system, Benicia will be responsible for furnishing and installing a meter acceptable to the City of Vallejo. If Benicia takes service from Vallejo's treated water system for fifty (50) days, or less, in any one year, Benicia will not be subject to the water service charges normally assessed for service in Vallejo. Should Benicia's usage

exceed fifty (50) days in any one year, Benicia will be subject to Vallejo's water service charge. Said meter's record shall be conclusive as to quantities of water furnished except as hereinafter provided. Said meter shall be checked for accuracy by representatives of Benicia and Vallejo within five (5) days after date of written requests of either; provided, however, that no two (2) such consecutive checks shall be separated by an interval of less than thirty (30) days. If the meter is found to be registering inaccurately by two percent (2%) or more, charges for water shall be adjusted accordingly for the period the meter was in error, not exceeding thirty (30) days.

Paragraph No. 7, Pump and Appurtenances, of said Agreement for Water Service is hereby deleted in its entirety.

Paragraph No. 8 of said Agreement for Water Service is hereby amended to read as follows:

8. Connection Charge. Benicia shall pay to Vallejo for any connection to the City of Vallejo's system, other than the connection at Terminal Reservoir, all charges imposed by the City of Vallejo for similar service within Vallejo.

Paragraph No. 9, Use of 12 Inch Line, of said Agreement for Water Service is hereby deleted in its entirety.

Paragraph No. 11 of said Agreement for Water Service is hereby amended to read as follows:

11. Treated Water - Rates. Vallejo shall sell and Benicia shall pay for all treated water delivered at the "Outside City Limits Rates" in effect when the water is taken. All treated water provided by Vallejo under this Agreement shall be suitable for all domestic use, and shall meet the standards of the State Department of Public Health and the Solano County Department of Public Health, and Vallejo assumes full responsibility for providing and maintaining the quality to such standards at the point of intertie with Benicia's water system.

Paragraph No. 12 of said Agreement for Water Service is hereby amended to read as follows:

12. Untreated Water - Rates. Vallejo shall sell and Benicia shall pay for all untreated water delivered at Terminal Reservoir an amount equal to Vallejo's cost for the following items. These costs shall be reviewed yearly.

Paragraph No. 16 of said Agreement for Water Service is hereby amended to read as follows:

1.	Cost of water	$15.00/AF
2.	Estimated screen maintenance	0.35/AF
3.	Estimated access maintenance	0.08/AF
4.	Additional cost by using permit water:	
	(a) Sludge Management	4.54/AF
	(b) Chemical cost (additional)	3.28/AF
5.	Out of City Limits fee at 10%	2.33/AF
TOTAL COST UNTREATED BERRYESSA WATER		$25.58/AF

16. Review of Costs. Vallejo will periodically review the cost of furnishing untreated water as provided herein and is hereby empowered to notify Benicia of any increase or decrease of the price for water not later than the last day of January in any year. Any price change as determined shall become effective during the July following such notice and continue for not less than the succeeding one (1) contract year, and Benicia shall be obligated to pay the same

Paragraph No. 18 of said Agreement for Water Service is hereby amended to read as follows:

18. Modification and Termination. Vallejo's obligation to provide water and Benicia's obligation to pay for same under the terms of this Agreement shall commence not sooner than 1 March 1989, and shall continue in effect until 28 February 2025; provided, however, that this Agreement may be modified or terminated by mutual agreement at any time; and provided, further, that it may be unilaterally terminated upon one (1) year's notice by Benicia when Benicia has provided facilities for an adequate new water supply.

Except as specifically amended herein, said Agreement shall be and remain in full force and effect.

Dated this 28th day of April, 1988.

(Signatures on Page 4)

CITY OF VALLEJO,
A Municipal Corporation

By _____
EDWARD G. WOHLENBERG
City Manager

APPROVED AS TO FORM:

_____
JOHN M. POWERS,
City Attorney

ATTEST:

By _____
MILDRED R. WATSON
City Clerk

CITY OF BENICIA,
A Municipal Corporation

By _____
Mayor

ATTEST:

By _____
City Clerk

BENWTR

Appendix C-1.5: Sulphur Springs Creek Water Right License

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STATE OF CALIFORNIA—STATE WATER RIGHTS BOARD

License for Diversion and Use of Water

APPLICATION 10596 PERMIT 6122 LICENSE 4900

THIS IS TO CERTIFY, *That* California Pacific Utilities Company
405 Montgomery Street
San Francisco 4, California
Notice of Assignment (Over)
has made proof as of April 8, 1957
(the date of inspection) to the satisfaction of the State Water Rights Board of a right to the use of the water of Sulphur Springs Valley Creek in Solano County

tributary to Suisun Bay

for the purpose of municipal use
under Permit 6122 *of the State Water Rights Board and that said right to the use of said water has been perfected in accordance with the laws of California, the Rules and Regulations of the State Water Rights Board and the terms of the said permit; that the priority of the right herein confirmed dates from* January 28, 1943; *and that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to the amount actually beneficially used for said purposes and shall not exceed* one and four tenths (1.4) cubic foot per second to be diverted from January 1 to December 31 of each year by direct diversion, and one thousand two hundred (1200) acre-feet per annum by storage to be collected from about December 1 of each year to about May 1 of the succeeding year.
Maximum withdrawal has been eight hundred (800) acre-feet per annum from storage.

The point of diversion of such water is *located* south forty-six degrees east (S46°E) one thousand three hundred fifty (1350) feet from NW corner of Section 24, T3N, R3W, MDB&M, being within NW¼ of NW¼ of said Section 24.

A description of the lands or the place where such water is put to beneficial use is as follows: within Sections 25, 26, 27, 34, 35 and 36, T3N, R3W, MDB&M, Sections 30 and 31, T3N, R2W, MDB&M and Sections 1 and 2, T2N, R3W, MDB&M, as shown on map filed with State Water Rights Board.

All rights and privileges under this license including method of diversion, method of use and quantity of water diverted are subject to the continuing authority of the State Water Rights Board in accordance with law and in the interest of the public welfare to prevent waste, unreasonable use, unreasonable method of use or unreasonable method of diversion of said water.

Reports shall be filed promptly by licensee on appropriate forms which will be provided for the purpose from time to time by the State Water Rights Board.

The right hereby confirmed to the diversion and use of water is restricted to the point or points of diversion herein specified and to the lands or place of use herein described.

FORM 64 COVERED BY LICENSE ORDER NO. 44

This license is granted and licensee accepts all rights herein confirmed subject to the following provisions of the Water Code:

Section 1625. Each license shall be in such form and contain such terms as may be prescribed by the board.

Section 1626. All licenses shall be under the terms and conditions of this division (of the Water Code).

Section 1627. A license shall be effective for such time as the water actually appropriated under it is used for a useful and beneficial purpose in conformity with this division (of the Water Code) but no longer.

Section 1628. Every license shall include the enumeration of conditions therein which in substance shall include all of the provisions of this article and the statement that any appropriator of water to whom a license is issued takes the license subject to the conditions therein expressed.

Section 1629. Every licensee, if he accepts a license does so under the conditions precedent that no value whatsoever in excess of the actual amount paid to the State therefor shall at any time be assigned to or claimed for any license granted or issued under the provisions of this division (of the Water Code), or for any rights granted or acquired under the provisions of this division (of the Water Code), in respect to the regulation by any competent public authority of the services or the price of the services to be rendered by any licensee or by the holder of any rights granted or acquired under the provisions of this division (of the Water Code) or in respect to any valuation for purposes of sale to or purchase, whether through condemnation proceedings or otherwise, by the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State, of the rights and property of any licensee, or the possessor of any rights granted, issued, or acquired under the provisions of this division (of the Water Code).

Section 1630. At any time after the expiration of twenty years after the granting of a license, the State or any city, city and county, municipal water district, irrigation district, lighting district, or any political subdivision of the State shall have the right to purchase the works and property occupied and used under the license and the works built or constructed for the enjoyment of the rights granted under the license.

Section 1631. In the event that the State, or any city, city and county, municipal water district, irrigation district, lighting district, or political subdivision of the State so desiring to purchase and the owner of the works and property cannot agree upon the purchase price, the price shall be determined in such manner as is now or may hereafter be provided by law for determining the value of property taken in eminent domain proceedings.

Dated: DEC 31 1957

STATE WATER RIGHTS BOARD

By Leslie C. Jopson
LESLIE C. JOPSON
Chief Engineer

11-20-62 RECEIVED NOTICE OF ASSIGNMENT TO City of Benicia

LICENSE 4900

STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

LICENSE
TO APPROPRIATE WATER

ISSUED TO California Pacific Utilities Company

DATED DEC 31 1957

2

Appendix C-1.6: Vacaville Purchase Agreement

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AGREEMENT BETWEEN THE CITY OF VACAVILLE AND THE CITY OF BENICIA RELATING TO THE PURCHASE OF SOLANO PROJECT CARRYOVER WATER

This Agreement is entered by and between the City of Vacaville, a municipal corporation in the State of California ("Vacaville"), and the City of Benicia, a municipal corporation in the State of California ("Benicia"), hereinafter collectively referred to as "the Parties" or individually as a "Party".

WHEREAS, the Parties are both member agencies of the Solano County Water Agency ("SCWA"); and

WHEREAS, Vacaville is a water right holder on the Solano Project licenses and therefore has direct access to water from the Solano Project, delivered through the Putah South Canal; and

WHEREAS, Benicia is not a water right holder on the Solano Project licenses and therefore does not have direct access to water from the Solano Project; and

WHEREAS, Benicia's water allocations from its primary water supply source, the State Water Project, have fluctuated and remain uncertain due to drought conditions; and

WHEREAS, Benicia wishes to purchase up to 4,000 acre-feet of Vacaville's Solano Project Carryover Water during the 2014 calendar year; and

WHEREAS, Vacaville has available Solano Project Carryover Water stored in the Solano Project reservoir, Lake Berryessa; and

WHEREAS, the Parties have a history of entering into water agreements that mutually benefit each Party.

NOW THEREFORE, the Parties for and in consideration of the mutual agreements and covenants contained in this Agreement, do agree as follows:

A. Definitions

1. "Solano Project". The project constructed by the U.S. Bureau of Reclamation consisting of Monticello Dam, Lake Berryessa, Putah Diversion Dam, Lake Solano, Putah South Canal, Terminal Reservoir, and ancillary facilities.

2. "Solano Project Water". Precipitation runoff from the Lake Berryessa watershed retained behind Monticello Dam and delivered through Solano Project facilities.

3. "Vacaville Solano Project Carryover Water" or "Carryover Water". A portion of Vacaville's Solano Project Water annual entitlement that has not been used in its water year of origin that has been stored in Lake Berryessa for use in subsequent years.

4. "Water Year". The water year for the Solano Project, defined by the U.S. Bureau of Reclamation as the first day in March (March 1) to the last day in February of the following year.

B. Term

This Agreement shall become effective on the date last written below, and shall continue in full force and effect until December 31, 2015. Subject to the Parties entering into a written amendment to this Agreement, the terms of this Agreement may apply retroactively.

C. Duties and Obligations

1. Vacaville will sell up to 4,000 acre-feet of Carryover Water from the Solano Project to Benicia, in blocks of 1,000 acre-feet. Said Carryover Water is currently stored in Lake Berryessa. Benicia will retain all of the rights to the purchased Carryover Water that Vacaville previously held, including the ability and right to store any unused portion of the purchased Carryover Water in Lake Berryessa from the current Water Year to subsequent water years.

2. Benicia will pay Vacaville two hundred dollars ($200) per acre-foot for the Carryover Water.

3. The first block(s) of Carryover Water will be available to Benicia on the effective date of this Agreement or August 21, 2014, whichever occurs first. Payment for this first block of Carryover Water shall be paid to Vacaville by wire transfer within 30 days of Vacaville receiving Benicia's request to purchase water and Vacaville's subsequent written notification to SCWA of the intent to sell water, whichever is later.

4. Benicia may request to purchase subsequent block purchases of Carryover Water by submitting written notice thereof to Vacaville not less than thirty (30) days prior to the requested delivery date, in the form of a letter request as shown in Attachment 1. The total amount of

the block purchases shall not exceed 4,000 acre-feet of Carryover Water.

5. Vacaville will provide a fully executed copy of this Agreement to the Solano County Water Agency for record keeping purposes.

6. Benicia retains sole responsibility for coordinating with the Solano County Water Agency for the delivery of the t Carryover Water once purchased. Delivery of the Carryover Water to Benicia will be made at the Cordelia Terminal Reservoir of the Putah South Canal.

D. Water Entitlements

This Agreement shall not affect, alter, or modify the water entitlements of either Party under any other existing agreement or arrangement.

E. Consequential Damages

The Parties waive claims against each other for consequential damages arising out or relating to this Agreement, including damages incurred for losses of use, income, profit, financing, and business.

F. Interpretation

Each Party has reviewed this Agreement and any question of doubtful interpretation shall not be resolved by any rule or interpretation against the drafting Party. This Agreement shall be construed as if both Parties drafted it. The captions and headings contained herein are for convenience only and shall affect the meaning or interpretation of this Agreement.

G. Notices

All notices and other communications required or permitted to be given under this Agreement shall be in writing and shall be personally delivered or mailed, postage prepaid and addressed to the respective parties as follows:

To Benicia:	City of Benicia 250 East L Street Benicia, CA 94510 ATTN: Director of Public Works
To Vacaville:	City of Vacaville 650 Merchant Street Vacaville, CA 95616 ATTN: Director of Utilities

Notice shall be deemed effective on the date personally delivered or, if mailed, three (3) days after deposit in the mail.

H. Governing Law

The Parties agree that the law governing this Agreement shall be that of the State of California.

I. Amendment of Agreement

This Agreement represents the entire understanding of the Parties as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered hereunder. This Agreement may only be modified by a written amendment duly executed by the Parties.

IN WITNESS WHEREOF, each of the Parties hereto have executed this Agreement on the last date entered below:

CITY OF VACAVILLE	CITY OF BENICIA
By: Laura C. Kuhn	By:
Title: CITY MANAGER	Title: CITY MANAGER
Date: 7/25/14	Date: 7/22/14
APPROVED AS TO FORM:	APPROVED AS TO FORM:
Gerald L. Hobrecht City Attorney	Heather Mc Laughlin City Attorney

Appendix C-2: Valero-Benicia Water Supply Agreement

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AGREEMENT

BETWEEN

THE CITY OF BENICIA

AND

VALERO REFINING COMPANY-CALIFORNIA

FOR THE SUPPLY OF UNTREATED WATER

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EXHIBIT A Methodology for Calculating Charges for Untreated Water and Initial Rate Calculation [Including Initial Rate Calculation Spreadsheet (with appropriate explanatory footnotes)] 23

AGREEMENT BETWEEN THE CITY OF BENICIA AND VALERO REFINING COMPANY-CALIFORNIA FOR THE SUPPLY OF UNTREATED WATER

This Agreement is entered into by and between the City of Benicia, a municipal corporation, ("**City**") and Valero Refining Company – California ("**Valero**") as of February 1, 2009, the Effective Date.

RECITALS

1. The City is the supplier of water (both treated and untreated) to its inhabitants, including the supply of such water for municipal and industrial ("M&I") purposes.
2. The City obtains this water from a variety of sources, including its primary suppliers, the California Department of Water Resources and the Solano County Water Agency.
3. Valero is the operator of the Refinery located in the City which has a need for a supply of Untreated Water.
4. The City has been supplying Valero with Untreated Water pursuant to the terms of an agreement that was assigned to Valero by the Exxon Company, U.S.A. in 2000 when Valero acquired the refinery; Exxon was assigned said agreement from the Humble Oil & Refining Company in 1988. Humble entered into the agreement in 1967.
5. The 1967 Agreement expires pursuant to its terms on January 31, 2009. Valero has requested that the City continue to supply Valero with certain quantities of Untreated Water.
6. The City is willing to supply and deliver such Untreated Water to the Refinery in accordance with the terms of this Agreement.
7. This Agreement addresses only the supply of Untreated Water from the City to Valero. Treated water supplied to Valero by the City is governed by the terms of Title 13, Division I of the City of Benicia Municipal Code.
8. On July 10, 2008, Valero entered into a settlement agreement with the Good Neighbor Steering Committee that included a commitment to provide up to $10,000,000 toward water conservation projects in the City of Benicia; the City of Benicia is a beneficiary of that agreement.

NOW, THEREFORE, for and in consideration of the promises set forth herein, the receipt and sufficiency of which are agreed upon, the Parties agree as follows:

1. DEFINITIONS.

"**Acre feet**" means, for purposes of this Agreement, a volume of water equivalent to 326,000 Gallons.

"**Affiliate**" means, in respect of any person or legal entity, any other individual, partnership, corporation, trust, entity, or association, directly or indirectly, through one or more intermediaries, who or which is controlling, controlled by, or under common control with such person or legal entity. The term "**control**," as used in the immediately preceding sentence, means, (i) with respect to a corporation or limited liability company, the right to exercise, directly or indirectly, more than fifty percent (50%) of the outstanding voting rights attributable to the controlled corporation or limited liability company, and, (ii) with respect to any other

individual, partnership, trust, entity, or association, the possession, directly or indirectly, of the power to direct or cause the direction of the management or policies of the controlled entity, by contract or otherwise.

"**Agreement**" means this Agreement between the City of Benicia and the Valero Refining Company-California for the Supply of Untreated Water, as such agreement may be amended, supplemented, or restated from time to time or at any time in accordance with its own terms.

"**Base Supply Quantity**" has the meaning as provided for in clause (i) of Article 7.

"**Business Day**" means any day other than Saturday, Sunday, a legal holiday, any holiday granted by the City generally to its employees, or a day on which banking institutions in California are authorized by Law or other governmental action to close.

"**CDWR**" means the California Department of Water Resources.

"**Claims**" means liabilities, obligations, losses, damages, penalties, claims (including without limitation claims involving liability and tort, strict liability, or otherwise), actions, suits, judgments, costs, expenses, and disbursements of any kind and nature whatsoever without any limitation as to amount.

"**Contract Year**" means each separate, successive twelve (12) month period, commencing on the Effective Date for the first year and thereafter on July 1, 2010 and each anniversary thereof throughout the Term.

"**Effective Date**" means February 1, 2009.

"**Expense**" means any payment for damages to property or injury resulting from a Claim or any payments for equipment, facilities, supplies, or services rendered that are incurred in the normal course of business.

"**Force Majeure Event**" means any cause or event which is reasonably beyond the control of a Party, and includes, without limitation, events such as and similar to flooding, lightning, landslide, earthquake, fire, drought, explosion, epidemic, quarantine, storm, hurricane, tornado, other natural disaster or adverse weather-related events (including extreme heat or cold), war (declared or undeclared), strikes, acts of a public enemy (including acts of terrorism), blockade, insurrection, revolution, expropriation or confiscation, power loss or shortage, breakage or cessation of or accident to equipment or facilities, and unavailability of fuel, power or raw materials, except to the extent that such circumstances or conditions are caused by or the result of any negligent act or omission, or willful misconduct of any Party, its Affiliates, or any of the employees, agents, contractors, subcontractors, or representatives of such Party or Affiliate. The Parties agree that the exception described herein does not create any new remedy, or add to or expand any remedy provided in this Agreement, for breach or material default hereof.

"**GPD**" means gallons per day.

"**GPM**" means gallons per minute.

"**Initial Term**" has the meaning as provided for in clause (i) of Article 4.

"**Law**" means any applicable federal, state, local, or municipal law, rule, regulation, statute, ordinance, order, judgment, or similar legal mandate issued by any Governmental Authority.

"**Losses**" has the meaning as provided for in Article 23.

"**Maximum Demand Quantity**" has the meaning as provided for in clause (i) of Article 7.

"**MGD**" means million gallons per day.

"**Minimum Annual Charges**" has the meaning as provided in clause (iv) of Article 9.

"**Minimum Monthly Payment**" has the meaning as provided in clause (iv) of Article 9.

"**Newly Dedicated Facilities**" has the meaning as provided for in clause (v) of Article 4.

"**Parties**" means the City and Valero together.

"**Party**" means either the City or Valero, individually.

"**Person**" means any natural person, firm, trust, partnership, corporation, limited liability company, joint venture, association, joint stock company, enterprise, unincorporated entity, government, governmental agency, or other entity.

"**Point of Delivery**" has the meaning as provided for in clause (i) of Article 6.

"**Refinery**" means the refinery located in the City at 3400 East 2nd Street, Benicia, CA 94510-1097.

"**Renewal Term**" has the meaning as provided for in clause (i) of Article 4.

"**Repayment Schedule**" has the meaning as provided for in clause (v) of Article 4.

"**SCWA**" means the Solano County Water Agency.

"**Term**" means, collectively, both the Initial Term and each Renewal Term, if any.

2. INTERPRETATION.

i. Ambiguities

Ambiguities or uncertainties in the wording of this Agreement will not be construed for or against any Party, but will be construed in the manner that most accurately reflects the Parties' intent as of the date they executed this Agreement.

ii. Common Usage of Word and Phrases

The words used in this Agreement shall have their common meaning unless otherwise specifically defined. In this Agreement, unless a clear contrary intention appears: (a) the singular number includes the plural number and vice-versa; (b) reference to any Person includes such Person's successors and assigns, if applicable, and only if such successors and assigns are permitted by this Agreement; (c) reference to a Person in a particular capacity excludes such Person in any other capacity; (d) reference to any gender includes each other gender; (e) reference to any agreement (including this Agreement), document, or instrument means such agreement, document, or instrument as amended or modified and in effect from time to time in accordance with the terms thereof and, if applicable, the terms hereof, unless otherwise specified; (f) reference to any article, section, schedule, or exhibit means such article, section, schedule, or exhibit that is either attached to this Agreement or specifically incorporated by reference thereto, and references in any article, section, schedule, exhibit, or definition to any clause means such clause of such article, section, schedule, exhibit, or definition; (g) "hereunder", "hereof", "hereto", "herein" and words of similar import are references to this Agreement as a whole and not to any particular section or other provisions hereof, unless specified otherwise; (h) relative to the determination of any period of time, "from" means "from and including", "to" means "to but excluding" and "through" means "through and including"; (i) "including" (and with correlative meaning "include") means "including, without limiting" the generality of any description preceding such term; and (j) reference to any Law means such Law as amended, modified, codified, or reenacted, in whole or in part, and in effect from time to time.

3. HEADINGS.

The headings used for the sections herein are for convenience and reference purposes only and shall in no way affect the meaning or interpretation of the provisions of this Agreement.

4. TERM OF AGREEMENT; TERMINATION OF AGREEMENT.

i. Initial Term; Renewal Term

This Agreement shall be for an initial term of twenty-one years, commencing on February 1, 2009 and expiring January 31, 2030 (the "Initial Term"). If the Parties have not renegotiated a renewal of this Agreement prior to the expiration of the Initial Term, this Agreement will be extended automatically without further action by either of the Parties for such additional years (the "Renewal Term") until, subject to clause (iii) of this Article 4, such time as the contract between CDWR, or any successor thereto, and the several contractors that receive water from the State Water Project ("SWP"), including the "SCWA," or any successor thereto, is renewed on a long-term basis ("SWP Contract"). For purposes of this Agreement only, renewal

of the SWP Contract is deemed to occur once all legal, regulatory, judicial, and administrative challenges to the SWP Contract have been concluded. Upon such occurrence, this Agreement shall then automatically extend for one successive twenty-year term, subject to any new terms and conditions as may be required by the Parties. If the Parties cannot agree on such new terms and conditions, this Agreement will continue without further action by the Parties on a year-to-year basis, unless terminated by the City or Valero. Any party desiring to terminate the Agreement will provide the other Party with at least three years written notice prior to such termination pursuant to this Article.

ii. Valero's Right of Early Termination

In the event that Valero no longer requires Untreated Water from the City for the purposes set forth in this Agreement, and provided however, that this Agreement has not been previously assigned or transferred by Valero, Valero shall have the right to freely terminate this Agreement at any time after the completion of the tenth Contract Year by giving the City at least three years prior notice of its intent to so terminate without being held in breach or default hereof solely as a result of such termination. In the event of such termination, Valero shall continue to make the Minimum Payments to the City as provided in clause (v) of Article 9 until the actual termination date of this Agreement as re-determined in accordance with this clause (ii).

iii. Termination; Cancellation of City's Contracts with CDWR or SCWA

In the event the City's contract(s) with either the CDWR or the SCWA to supply water, certain quantities of which will, in turn, be used to meet the City's delivery obligations under this Agreement, is not renewed or is otherwise abridged such that the City decides, in its sole discretion, to not renew one or more of the contracts, then, following notice of termination from the City to Valero, this Agreement shall terminate upon the sooner of: (a) three years from the date of such notice, or (b) the time at which the City no longer receives a quantity of water from CDWR or SCWA sufficient to supply Valero with its needs as set forth in this Agreement. The City agrees to keep Valero generally and timely informed of the status of any negotiations of a new or renewed State Water Project Contract at a level of information sufficient to inform Valero of the City's judgment of the likelihood of renewal of the State Water Project Contract. The City shall not be required to disclose any privileged or confidential information pursuant to this provision.

iv. Termination after New or Amended State Water Project Contract

In the event the City's contract with the CDWR is renewed and the City has received an entitlement to a quantity of water which includes a volume that could satisfy continued demand by Valero, then in the event that Valero thereafter determines it no longer requires Untreated Water from the City for the purposes set forth in this Agreement, and provided however, that this Agreement has not been previously assigned or transferred by Valero, Valero shall have the right to freely terminate this Agreement at any time after the completion of the tenth Contract Year following renewal of the contract with CDWR by giving the City at least three years prior notice of its intent to so terminate without being held in breach or default hereof solely as a result of such termination. In the event of such termination, Valero shall continue to make the Minimum

Payments to the City as provided in clause (v) of Article 9 until the actual termination date of this Agreement.

v. Termination; Repayment for Newly Dedicated Facilities

In the event that the City has constructed or provided any new or additional facilities after the Effective Date, for the sole purpose of providing Untreated Water to the Refinery under the terms of this Agreement (collectively, the "**Newly Dedicated Facilities**"), the costs of which are being repaid or are to be repaid by Valero under this Agreement, then in the event of termination of this Agreement pursuant to this Article 4, and notwithstanding anything to the contrary elsewhere in this Agreement, Valero shall repay to the City the costs of such Newly Dedicated Facilities upon termination of this Agreement. Repayment for the cost of any such Newly Dedicated Facilities shall be made pursuant to a repayment schedule, a copy of which shall be either attached to this Agreement and made a part thereof at a later date or otherwise specifically incorporated by reference (the "**Repayment Schedule**") without the attachment or incorporation constituting an amendment to this Agreement. Any such Repayment Schedule is subject to the prior written approval of both Parties. The repayment period provided for under the Repayment Schedule shall not extend beyond January 31, 2030, unless otherwise agreed to by the Parties.

5. SALE OF UNTREATED WATER.

i. Sale and Purchase; Restriction on Resale

The City agrees to sell and deliver to Valero, and Valero agrees to purchase and take delivery from the City, such quantities of Untreated Water as provided for under Article 7 for industrial use exclusively at the Refinery. Before making any use of such water provided by the City at or within the Refinery for any reason or purpose whatsoever, Valero shall not resell, exchange, or otherwise transfer the Untreated Water supplied by the City hereunder other than as provided herein.

ii. No Charge for Discharge, Reuse, or Resale.

Following use of any such Untreated Water at or within the Refinery, Valero may freely discharge, reuse, resell, exchange or otherwise transfer the Untreated Water to any other Person. The City will not charge Valero for Valero's discharge, reuse, resale, exchange or other transfer of Untreated Water pursuant to this clause ii, unless Valero makes use of any facilities owned by the City in conjunction with such discharge, reuse, resale, exchange or other transfer. In the event that Valero desires to make use of any facilities owned by the City in conjunction with such discharge, reuse, resale, exchange or other transfer, Valero shall request permission from the City for such use, and if the City in its sole discretion agrees to permit such use, the Parties will negotiate a rate and other conditions for the use of the City's facilities, and the agreed to rate and conditions shall be incorporated into this Agreement without otherwise amending this Agreement unless the Parties so agree.

6. DELIVERY OF UNTREATED WATER.

i. Point of Delivery

The City will deliver all Untreated Water that is required to be supplied under this Agreement to Valero by pipeline at the Interconnection (the "**Point of Delivery**"), which has the following GPS coordinates: 38°04'44.34"N, 122°08'20.21"W. Valero will accept delivery of all Untreated Water from City at this location. If either Party desires additional points of delivery or a different point of delivery, they may request an additional or different point of delivery, provided that all expenses associated with the additional or changed point of delivery will be borne by the requesting Party.

ii. Interconnection and Risk of Loss

The City shall provide, operate, maintain, repair, and replace all of the equipment and facilities necessary in order to deliver Untreated Water to Valero pursuant to this Agreement, up to the Point of Delivery, subject to Valero's payment obligations under this agreement. Valero shall, at its sole cost, risk, and expense, provide, operate, maintain, repair, and replace all of the equipment and facilities necessary in order to take delivery of the Untreated Water at the Point of Delivery. Valero's facilities include such pipes, valves, meters, and other necessary facilities that will be reasonably specified by the City and any other facilities required by Valero.

iii. Rate of Flow

The City will use its best efforts to deliver all Untreated Water to Valero at a rate that is within the range of 2,100 GPM to 4,200 GPM. The City will also use its best efforts to deliver a flow of water to Valero at higher flow rates in times of emergency and lower flow rates during times of shutdown for scheduled or unscheduled maintenance. If, from time to time, notwithstanding the City's best efforts to deliver water in such circumstances, the rate of flow is outside of this range, the City shall not be liable for any such change.

iv. Water Pressure

The City will use its best efforts to deliver all Untreated Water to Valero at the Point of Delivery at a pressure of approximately 10 pounds per square inch. If, from time to time, the pressure is other than 10 pounds per square inch notwithstanding the City's best efforts to maintain pressure, the City shall not be liable for such change in the pressure of water.

v. No Dedication of Public Use

Nothing in this Agreement, nor the connection by Valero of its water lines and facilities to City's distribution mains or the taking by Valero of any other action pursuant to this Agreement, shall be construed as a dedication by Valero to or for the public use of any of its water facilities, including any of the Refinery's Water System.

7. QUANTITY OF UNTREATED WATER.

i. Demand Quantity; Annual Delivery Schedule

The City shall deliver to Valero the amount of Untreated Water demanded by Valero, up to a maximum of 1,890.8 million gallons per year (the "**Maximum Demand Quantity**"). Valero will schedule a minimum of 1,160 million gallons of Untreated Water per year (the "**Base Supply Quantity**").

ii. Daily and Annual Delivery Quantities

The City shall deliver to Valero the amount of Untreated Water scheduled by Valero, in approximately equal, daily amounts, based upon Valero's projected annual demand, up to the Maximum Demand Quantity. As of the Effective Date, Valero's average usage of Untreated Water at the Refinery is between 4.2 MGD and 4.5 MGD.

iii. Changes to Daily or Annual Delivery or Base Supply Quantities

Valero shall give at least 90 days notice to the City in the event Valero desires to schedule water deliveries, for a period of 45 days or more, of either less than the Base Supply Quantity or in excess of the Maximum Demand Quantity. The City shall determine, in its sole discretion, whether it will provide Valero with water deliveries of less than the Base Supply Quantity or in excess of the Maximum Demand Quantity. For purposes of determining whether Valero must notify the City of the specified increase or decrease in its scheduled water deliveries, the Maximum Demand Quantity or the Base Supply Quantity will be the amount of water prorated over that 45-day period. Valero shall provide the City with a minimum of two years notice in the event that Valero desires to decrease its Base Supply Quantity by more than fifteen percent (15%) for a one-year period or longer.

8. QUALITY OF UNTREATED WATER.

The City provides no assurance regarding the quality of any Untreated Water to be delivered to Valero at the Point of Delivery pursuant to this Agreement. However, the City will not intentionally take action to decrease the quality of water that it delivers to Valero and will use reasonable efforts to supply water of sufficient quality for Valero's needs. Nevertheless, the Parties recognize that the City will be receiving water from various sources, including from sources that may be susceptible to degraded water quality, and that the quality of water will vary depending upon the quality of water received from the various sources and the quality resulting from the commingling of these various sources. The City will have no liability to Valero for the quality of any Untreated Water delivered by the City to Valero at the Point of Delivery.

9. CHARGES FOR UNTREATED WATER.

i. Billing and Payment

The City will bill Valero on a monthly basis for any amount due for the provision of Untreated Water pursuant to this Agreement. Other Expenses or costs agreed to by the Parties will be billed for on an as appropriate basis consistent with the City's standard procedures. Valero shall pay all charges within fifteen days of the date of the applicable invoice. Valero may request supporting documentation for any invoice, which documentation shall be provided by the City as promptly as reasonably possible. However, if Valero does request supporting documentation, it shall nevertheless make timely payment of any invoice. All payments to the City shall be by electronic transfer of federal funds to the bank and bank account set forth on each invoice.

ii. Monthly Charges and Initial Monthly Rate

Valero agrees to pay the City a rate that enables the City to recover its cost of supplying Untreated Water to the Point of Delivery as set forth herein. The City's cost of service includes those costs for operation and maintenance, capital outlays and transfers, internal service charges, return on rate base, and operating reserve, as described in the attached Exhibit A. The rate structure shall consist of both (a) a fixed monthly service charge, and (b) a separate variable (volume) charge, with two volume rate tiers, based on monthly metered water usage, as described further in the attached Exhibit A.

Applying the calculation method described in Exhibit A, as of the Effective Date, the initial monthly rate chargeable to Valero for all Untreated Water delivered by the City to the Point of Delivery in accordance with the terms of this Agreement shall be:

$34,626 + $343.62 /mg (up to 107.6 mg) x MGD x days +

$542.40/mg (in excess of 107.6 mg) x MGD x days

iii. Rate Adjustments

The rate determined for Valero pursuant to this Agreement will be adjusted by the City biannually to be effective July 1st pursuant to its then current budget-setting process in accordance with the calculation method described in Exhibit A, which is based on the Cost model established in the Cost of Service Study prepared by Bartle Wells Associates dated January 12, 2009. The first rate adjustment under this Agreement will be implemented on July 1, 2011. Rates adjusted consistent with the calculation method pursuant to the then current bi-annual budget-setting process will not require amendment to this Agreement. Modifications to the calculation methodology described in Exhibit A will require an amendment to this Agreement. In the event a change to the budget setting process from the process in effect as of the date of this Agreement has the effect of amending Valero's payment obligations under this Agreement, then this Agreement will be amended such that Valero's payment obligation will not increase over what it would have been without the change to the budget setting process.

iv. Minimum Annual Charges; Minimum Monthly Payment

Notwithstanding the payment method pursuant to clause (i), if Valero's demand is less than the Base Supply Quantity, then Valero shall, on an annual basis, pay the City a minimum annual charge ("**Minimum Annual Charges**"). The Minimum Annual Charge shall be an amount equivalent to the charge for the Base Supply Quantity. Such amount shall be billed on a monthly basis, with 1/12 of such Minimum Annual Charges due each month (the "**Minimum Monthly Payment**"). Based on the Initiation Rate Calculation set forth in Exhibit A, the initial Minimum Monthly Payment shall be $67,842.60. In the event that the charges for the total amount of Untreated Water delivered to Valero calculated pursuant to clause (ii) during any given calendar month exceeds the Minimum Monthly Payment, Valero shall make a payment equivalent to the greater amount commencing with the first payment that is due on or about the Effective Date.

v. Reduction in Minimum Annual Charges

In the event that Valero schedules a quantity of water below the Base Supply Quantity pursuant to Article 7 clause (iii) or gives notice that it will terminate the Agreement pursuant to Article 4 clause (ii), the Minimum Annual Charges in the next year and each subsequent year following such event shall be the greater of (a) actual usage or (b) 85 percent of the immediately prior year's actual charges, provided that Valero's usage in any subsequent year is below the Base Supply Quantity described in Article 7 clause (i).

vi. Disputed Payment

Valero may dispute, in good faith, the amount of any invoice received under the terms of this Agreement for a period of sixty days from the date of the invoice. After sixty days any invoice that is not timely disputed by Valero is deemed correct unless determined by the City to be incorrect. The City shall have up to ninety days from the date of the invoice to determine whether an invoice is correct, after which time the invoice shall be deemed correct. Regardless of the nature of the dispute, pursuant to clause (i), Valero shall timely pay to the City all amounts set forth in the invoice. If Valero disputes any part of the invoice it shall set forth the nature of its dispute and the amount under dispute in writing to the City within fifteen days of the date of Valero's notification to the City that Valero disputes the invoice, if Valero has determined the amount in dispute, or if Valero has not determined the amount in dispute, then as soon thereafter as possible, but in any case no later than sixty days from the date of the invoice. Valero and the City agree to begin discussions to settle any amount in dispute within ten days of notification by one Party to the other Party of such dispute. Any dispute that remains unresolved after thirty days from a Party's notification pursuant to this clause (vi) shall be resolved pursuant to Article 22. If, as a result of the resolution of a dispute it is determined that Valero owes money to the City and Valero fails to pay any disputed amount within ten days after the date on which the Parties have finally resolved or settled such amount or payment of such disputed amount has been finally adjudicated or otherwise resolved, whichever occurs first, the City, in addition to any other remedies that it may have, may suspend service under this Agreement. No payment by Valero of the amount of a disputed invoice shall prejudice the right of Valero to claim an adjustment of the disputed invoice so long as such invoice is disputed in accordance with the terms of this clause (vi).

vii. Late Payment; Penalties

All charges payable by Valero under this Agreement shall be subject to penalties for late payment in accordance with penalty provisions applicable to water sales generally, as now or hereafter established by Law and enforced by the City.

10. METERING.

The City shall install, operate, maintain, repair, and replace metering equipment in order to measure the volume of Untreated Water being delivered by the City to the Point of Delivery. All such metering equipment, including any additions, alterations, replacements, or extensions thereof or thereto (collectively, the "**Metering Equipment**"), shall remain the property of the City. Throughout the Term, the volume of Untreated Water delivered to Valero pursuant to this Agreement shall be measured by the Metering Equipment. The applicable meter shall be read and maintained by City consistent with the applicable industry standards. The Metering Equipment will be tested periodically by the City (but not less often than once per calendar year throughout the Term) and at such additional times as Valero may request, to assure its continuing accuracy and conformance to the standards of measurement and service consistent with the most current, applicable industry standards. In cases where testing is being conducted at Valero's request, then such testing shall be conducted pursuant to the terms of the City's Municipal Code, Section 13.20.060.

Representatives of Valero may, at Valero's election, be present during the conduct of all tests of Metering Equipment. The City shall use reasonable efforts in order to notify Valero about each such test, in writing, at least ten days before each test is conducted. All Metering Equipment found to be inaccurate shall be adjusted as soon as practicable by the City.

11. SUPPLY INTERRUPTIONS.

i. Supply Interruption

The City will use reasonable efforts in order to avoid, prevent, or stop any act(s) or omission(s) by the City or its agents that would cause a supply interruption of any Untreated Water to Valero at the Point of Delivery, except for any interruption that is reasonably required by the City for the routine operation, maintenance, repair, or replacement to any portion of the City's Water System that delivers Untreated Water to the Point of Delivery or the Metering Equipment. To the extent practical, the City will provide Valero with as much advance notice, by telephone or electronic communication of any such scheduled outages.

ii. No Guarantee

The City is not guaranteeing or providing assurance that there will not be any supply interruption of any Untreated Water as provided in this Agreement due to any cause beyond its control.

iii. Limited Liability

The City will have no liability for any supply interruption of Untreated Water under the terms of this Agreement.

12. SHORTAGE OF SUPPLY.

i. Shortages of Untreated Water

The City will use reasonable means to attempt to avoid shortages in the supply of Untreated Water delivered to Valero hereunder. To the extent practical, the City will rely on its multiple sources of water to supply Valero with Untreated Water.

ii. Prioritization of Supply

The City is under no obligation to augment its supplies to meet Valero's scheduled demand if to do so would cause adverse public health and safety impacts to the City's treated water customers.

iii. No Liability for Shortage of Supply

If a shortage of Untreated Water under the terms of this Agreement does occur during any Contract Year, the City will have no liability for any such shortage.

13. LAKE HERMAN RESERVE.

The City agrees to operate Lake Herman and to reserve in Lake Herman a minimum pool of 230 acre feet of water for use by the Refinery as a water supply for emergency needs.

14. LONG-TERM WATER SUPPLY AND SUSTAINABILITY.

i. Future Actions.

The Parties recognize that the City's water supplies are under ever increasing demands and subject to ever increasing external forces that may, in the long term, render such supplies less reliable. As such, the Parties agree that in order to assure the long-term viability of an Untreated Water supply to Valero in accordance with the terms of this Agreement, that it is in the Parties' mutual best interest to cooperate in the development of various actions and programs that will assist in sustaining the availability of a long-term supply of Untreated Water to Valero. While, at this time, the Parties cannot assure specific outcomes to potential actions, it is their best assessment that actions may be taken that will result in a net benefit to the Parties that will permit the City to continue to provide a long-term reliable supply to Valero in order to meet Valero's needs consistent with the provisions of this Agreement. To that end, Valero agrees to cooperate with the City to undertake projects to enhance the supply and reliability of Untreated Water as the Parties may agree. Such actions or programs may include the acquisition of additional Untreated Water supplies from unaffiliated third parties; the reuse or reclamation of water

supplies within the City or on behalf of the City by others, thereby allowing the transfer or exchange of water; water conservation programs by the City, Valero or others designed to produce Untreated Water for Valero, and such other actions or projects as the Parties may so agree.

ii. Lake Berryessa Supplies

The City intends to purchase a supplemental supply of water from the Solano Irrigation District, which water is available from Lake Berryessa ("SID Water"). The SID Water is of superior quality and reliability than the City's water supplies from CDWR. Valero agrees that the City should purchase the SID Water. The initial cost of the SID Water is $5 million with an annual cost thereafter. The City is agreeable to making forty percent of the SID Water available to Valero with Valero's share of annual costs paid under this agreement provided that Valero pays forty percent of the initial cost, i.e., $2 million, which payment will be made under arrangements separate from this Agreement. The balance of the water will be available to the City's other customers and the remaining initial cost of $3 million will be paid by the City's other customers through the rate-setting process.

15. WATER CONSERVATION; ENERGY CONSERVATION.

On July 10, 2008, Valero entered into a settlement agreement with the Good Neighbor Steering Committee that included a commitment to provide up to $10,000,000 over a five-year period toward water conservation projects in the City of Benicia. In addition to this commitment, the Parties will use reasonable efforts in order to investigate actions that may be undertaken by Valero to implement water use best management practices at the Refinery. Such best management practices shall be those that are reasonably consistent with then-current and applicable industry standards, including those specified by the California Urban Water Conservation Council pursuant to the Memorandum of Understanding Regarding Urban Water Conservation in California, and shall not unreasonably increase Valero's costs of doing business. Any actions implemented shall be demonstrated to have a benefit to the reduction in the use of water, reduction in the discharge of water, improvement of water quality, or other environmentally beneficial results associated with the use of water. Further, the parties agree to jointly explore actions related to energy conservation associated with the use of water. The goal of such actions shall be to reduce the amount of energy consumed related to the use or supply of water.

16. GOOD NEIGHBOR AGREEMENT

The Good Neighbor Agreement, dated September 5, 2000, is hereby satisfied and superseded by this Agreement with respect to those terms and conditions of the Good Neighbor Agreement that pertain to the supply of Untreated Water from the City to Valero. Specifically, Section K of the Good Neighbor Agreement is deemed satisfied and is therefore no longer in force or effect.

17. COOPERATION.

Subject to the terms and conditions of this Agreement, the Parties shall each use reasonable efforts to take, or cause to be taken, all actions and to do, or cause to be done, all

things necessary, proper, and advisable under applicable law to consummate and make effective the transactions contemplated by this Agreement. Neither of the Parties shall take, nor fail to take, any action that reasonably would be expected to prevent or materially impede, interfere with, or delay the actions contemplated by this Agreement, without the prior written consent of the other Party. From time to time after the date hereof, and without further consideration, the Parties shall, each at its own expense, execute and deliver such documents, and provide such information, to the other Party as such Party may reasonably request, in order to accomplish and consummate the transactions contemplated by, and perform their respective obligations under, this Agreement. Nothing herein shall obligate a Party to provide information that is confidential, privileged or proprietary.

18. TIME OF THE ESSENCE.

Time is of the essence in all aspects of this Agreement, except as otherwise specified, and each Party shall act expeditiously to effectuate its responsibilities as set forth herein.

Continued next page

19. NOTICES.

Unless this Agreement specifically requires otherwise, any notice, demand, or request provided for in this Agreement, or served, given, or made in connection with it, shall be in writing and shall be deemed effective and properly served, given, or made if (i) delivered in person to the designated recipient, or (ii) sent by (a) reputable, overnight express delivery service, (b) United States certified or registered mail (postage prepaid), return receipt requested, or (c) fax, to the appropriate individual(s) set forth below, or, if applicable, to their successor. Routine communications between the Parties are not governed by this Notice provision and may occur through any normal or convenient means, including by telephone and email.

To the City:

City Manager
City Hall
250 East L Street
Benicia, CA 94510
If by facsimile: (707) 747-8120

To Valero:

Valero Refining Company-
California
3400 East 2nd Street
Benicia, CA 94510-1097
Attn: Vice President and General
Manager
If by facsimile: (707) 745-7452

20. DEFAULT.

i. Termination for Material Default

Either Party shall have the right to terminate this Agreement for material default by the other Party, if:

a. Such default shall have continued for a period of thirty days after written notice of such default or alleged default and an opportunity to cure in accordance with Article 21, below, has been given by the Party claiming default to the other Party. Such notice shall specify the nature of such default, the onset of such default, and the remedy requested by the claiming Party to remedy such default, and

b. The defaulting Party is not at the time of such termination complying with or performing all of the covenants and conditions of this Agreement on its part to be observed and performed; provided that, if the defaulting Party is not complying with or performing all of the covenants and conditions of this Agreement, that such failure to so comply or perform is not due to a cause beyond its control, including a legal mandate imposed upon it on an involuntary basis.

ii. Right of Termination; Remedy of Last Resort

Termination shall be a remedy of last resort if and when either Party is in material default, or allegedly in material default, under the terms of this Agreement, and all other remedies shall be reasonably exhausted prior to the non-defaulting Party having the right to seek and/or invoke such right of termination provided for under this Article 20.

21. OPPORTUNITY TO CURE.

If there has been a material default or breach by a Party (or an alleged material default or breach) in the due and timely performance of any of such Party's covenants and agreements contained in this Agreement, and such default or breach is not cured either (i) within ten days after notice with respect to any undisputed payment obligations, or (ii) within thirty days after notice in all other cases; provided, however, no right of termination shall arise hereunder if such default or breach is not able to be cured in such thirty-day period, and the defaulting (or allegedly defaulting) Party is both diligently and in good faith taking all reasonable steps or measures in order to cure the default or breach in such thirty-day period and shall have cured the default or breach within ninety days of the notice from the other Party thereof, then the Party providing notice of material default or breach may terminate this Agreement at any time within thirty days following failure by the defaulting or breaching Party to cure said material default or breach. If the Party providing notice does not terminate this Agreement within the applicable thirty-day period, it shall have been deemed to have waived the right to terminate, but may pursue any other remedy available to it.

22. DISPUTE RESOLUTION.

i Dispute Resolution Process

In the event of a dispute between the Parties, the disputing Party shall notify the other Party in writing of the existence of a dispute within thirty days from the time the disputing Party reasonably determines a dispute exists. Within ten business days of notification of a dispute, the disputing Party shall provide the other Party with a written brief detailing the dispute, facts supporting the disputing Party's contentions, and any other information that may be relevant to the dispute. The other Party shall have ten additional business days within which to respond in writing to the brief submitted by the disputing Party. Within ten business days after receipt of the last brief by the disputing Parties, the City Manager and the General Manager of the Refinery ("Management Group") shall meet in an effort to resolve the dispute. If the first meeting does not result in resolution of the dispute, then within twenty days after receipt of the last brief by the disputing Parties the Management Group shall meet a second time in an effort to resolve the dispute. If, after such Management Group meetings, the dispute is not completely resolved,

either Party may seek relief in a court of competent jurisdiction as provided for in this Agreement. The substance of any discussion conducted between the Parties during any such dispute resolution process is not admissible in any action filed to enforce or seek other remedy related to or arising out of this Agreement.

ii. Statute of Limitation; No Waiver

The pursuit of dispute resolution set forth in clause (i) of this Article 22 will not relieve the disputing Party of any statute of limitations. Except as otherwise provided herein, no defenses any Party may have are waived by virtue of the exhaustion of remedies required herein.

23. INDEMNIFICATION.

Each Party (the **"Indemnifying Party"**) shall indemnify, defend (upon the other Party's request), and hold harmless the other Party, its Affiliates, and each of their respective officers, directors, employees, attorneys, agents, and successors and assigns (collectively, the **"Indemnified Parties"**), from and against any and all damages, claims, losses, liabilities, obligations, costs, and expenses, including reasonable legal, accounting, and other expenses, and the costs and expenses of any and all actions, suits, proceedings, demands, assessments, judgments, settlements, and compromises (collectively, the **"Losses"**), which result from or arise out of (i) any material, uncured breach, default, or violation by the Indemnifying Party of any of its respective duties or obligations that are set forth under this Agreement, or (ii) any third party claim which is brought by or on behalf of any Person that is not Affiliated with any of the Indemnified Parties and arises out of the active or passive negligence, gross negligence, or intentional misconduct of the Indemnifying Party.

24. FORCE MAJEURE.

i. No Default or Breach of Agreement

A Party shall not be considered to be in default in the performance of any of its obligations under this Agreement to the extent that the failure or delay of its performance is due to a Force Majeure Event, and the non-affected Party shall be excused from its corresponding performance obligation(s) to the extent due to the affected Party's failure or delay of performance which is caused by such event. For greater certainty, none of the following shall constitute a Force Majeure Event under the terms of this Agreement:

a. a lack of financial resources or available funds or similar financial predicament, unless the financial predicament is such that it has the practical effect of preventing the City from being able to provide Untreated Water to Valero;

b. the availability of a more attractive water supply market;

c. the City's inability to economically supply and deliver any quantity of Untreated Water, unless such inability may be overcome by the payment of funds from Valero to the City; or

d. Valero's inability to economically receive any quantity of Untreated Water.

ii. Notice of Force Majeure

Within a reasonable time after the occurrence of an event the affected Party believes is a Force Majeure Event, but not to exceed fifteen days, the Party desiring to invoke force majeure as an excuse for delay in its performance of, or failure to perform, any of its respective obligations hereunder (the "**Declaring Party**"), shall provide the other Party with written notice reasonably describing the occurrence giving rise to the Force Majeure Event, including the expected duration and effect of such Force Majeure Event on the Declaring Party's ability to perform or continue performing such obligation(s). Failure to provide any such notice as-provided for herein constitutes a waiver of a claim of a Force Majeure Event. Within ten business days, unless otherwise agreed by the Parties, after any such notice has been provided, the Parties shall meet to discuss the basis and terms upon which the arrangements set out in this Agreement shall be continued, taking into account the effects of such Force Majeure Event.

iii. Scope/Duration of Force Majeure Event; Mitigation Efforts; Extension of Term

The suspension of performance by the Declaring Party due to a claim of force majeure under this Article 24 must be of no greater scope and of no longer duration than is required by the Force Majeure Event. Each Party suffering a Force Majeure Event in connection with this Agreement shall take, or cause to be taken, such reasonable action as may be necessary to void, or nullify, or otherwise to mitigate, in all material respects, the effects of such Force Majeure Event. The Parties shall take all reasonable steps to ensure resumption of normal performance under this Agreement after the cessation of any Force Majeure Event. Notwithstanding the foregoing, nothing contained herein shall be construed to require a Declaring Party to settle any strike or labor dispute in which it may be involved.

25. NO CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES.

REGARDLESS OF THE THEORY OF LIABILITY (INCLUDING TORT AND CONTRACT LAW) OR BASIS FOR RECOVERY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY LOST OR PROSPECTIVE PROFITS OR ANY OTHER CONSEQUENTIAL, PUNITIVE, EXEMPLARY, INCIDENTAL, DIRECT LOSSES, OR INDIRECT LOSSES OR DAMAGES UNDER, IN RESPECT OF, OR IN CONNECTION WITH THIS AGREEMENT OR FOR ANY BREACH OR FAILURE OF PERFORMANCE RELATED HERETO HOWSOEVER CAUSED.

26. REMEDIES.

The Parties understand and agree that the subject matter of this Agreement is unique, and for that reason, among others, the Parties will be irreparably damaged in the event that this Agreement is not specifically enforced. Accordingly, in the event of any breach or material default hereof by a Party, each non-breaching or non-defaulting Party shall have as their sole remedy, the right to demand and have specific performance of this Agreement. Such specific performance shall include the right to receive payment of sums owed and interest or penalties

thereon, as provided in this Agreement. Unless otherwise provided for herein, neither Party shall be liable to the other for monetary damages of any nature or kind.

27. CHOICE OF LAWS.

This Agreement shall be governed by, and construed, interpreted, and enforced in accordance with the substantive Law of the State of California, except to the extent such California Laws may be preempted by Laws of the United States.

28. JURISDICTION AND VENUE.

Any disputes concerning, relating to, or arising out of this Agreement are within the jurisdiction of the state courts of the State of California, unless the matter involves a question of action or interpretation by a federal agency. With respect to any proceeding between the Parties, the Parties submit to the jurisdiction of the courts of California with venue proper only in Solano County, California, and the Parties waive any objections they may have with respect to venue. In the event such court determines that the subject matter of the proceeding does not fall within the statutory jurisdiction of such state courts, then the dispute shall be resolved by judicial proceedings in U.S. District Court with venue proper in Sacramento, CA.

29. SEVERABILITY.

If any provision of this Agreement is held to be illegal, invalid, or unenforceable under any present or future Law, and if the rights or obligations of any Party hereto under this Agreement shall not be materially and adversely affected thereby, (i) said provision will be fully severable, (ii) disagreements shall be construed and enforced as if such illegal, invalid, or unenforceable provision had never been comprised a part hereof, (iii) the remaining provisions of this Agreement shall remain in full force and effect and will not be affected by the illegal, invalid or unenforceable provision or by its severance herefrom, and (iv) in lieu of such illegal, invalid or unenforceable provision, the Parties shall use best efforts to add as a part of this Agreement a legal, valid and enforceable provision as similar in terms as such illegal, invalid or unenforceable provision.

30. ASSIGNMENTS AND TRANSFERS.

i. Restrictions on Assignments and Transfers

Neither this Agreement nor any right, interest, or obligation hereunder may be assigned, sold, transferred, or conveyed by either Party without the prior written consent of the other, which other Party may withhold its consent in its sole discretion, and any attempted assignment not in compliance therewith shall be void, except the following assignments and transfers which shall not require such consent:

(1) Assignments or transfers that occur by operation of Law;

(2) Assignments or transfers that occur by virtue of either of the Parties ceasing to exist in its entirety or.

(3) Assignment and transfers by a Party to one of its Affiliates.

Assignments and transfers shall not relieve either of the Parties of any obligation hereunder which was incurred or deemed to have occurred prior to the effective date of such assignment or transfer, unless and except to the extent agreed in writing by the other Party.

31. MODIFICATIONS MUST BE IN WRITING.

No provisions hereof may be amended or modified in any manner whatsoever except by an agreement in writing signed by duly authorized representatives of each of the Parties.

32. WAIVER.

Except as otherwise provided herein, no provision of this Agreement may be waived except in writing. No failure by any Party to exercise, and no delay in exercising, short of the statutory period, any right, power, or remedy under this Agreement shall operate as a waiver thereof. Any waiver at any time by a Party of its right with respect to a default under this Agreement, or with respect to any other matter arising in connection therewith, shall not be deemed a waiver with respect to any subsequent default or matter.

33. NO THIRD PARTY BENEFICIARIES.

None of the promises, rights, or obligations contained in this Agreement shall inure to the benefit of any Person who or which is not a party to this Agreement; and no action may be commenced or prosecuted against any Party by any third party claiming to be a third party beneficiary of this Agreement or the transactions contemplated hereby.

34. WAIVER OF DEFENSES.

The Parties release each other from any and all claims related to the formation and negotiation of this Agreement, including reformation, rescission, mistake of fact, or mistake of Law.

35. AGREEMENT BINDING ON HEIRS AND ASSIGNS.

The terms, covenants and conditions hereof shall be binding upon and shall inure to the benefit of the heirs, executors, administrators, and assigns of the respective Parties.

36. NO RELIANCE.

Each Party acknowledges that entering into this Agreement, it has not relied on any statement, representation, or promise of the other Party or any other person or entity, except as expressly stated in this Agreement.

37. INDEPENDENT COUNSEL.

The Parties acknowledge that they have been represented by legal counsel in connection with this Agreement, they fully understand the terms of this Agreement, and they voluntarily agree to those terms for the purposes of making and entering into this Agreement.

38. EXPENSES OF THE PARTIES.

Each Party shall pay its own legal fees and other costs incurred in connection with the preparation and negotiation of this Agreement.

39. ATTORNEYS' FEES.

If any Party brings suit or other legal action (including dispute resolution or arbitration) to interpret, compel performance of, or to recover for breach of any term or condition herein contained, neither Party shall be entitled to collect attorneys' fees or costs which may result from said suit or legal action.

40. ENTIRE AGREEMENT.

This Agreement, along with each attachment, exhibit, or schedule which is attached hereto and/or specifically incorporated by reference herein, constitutes the complete and entire expression of agreement between the Parties and supersedes all prior and contemporaneous agreements, contracts, offers, promises, representations, negotiations, discussions, and communications, whether written or oral, which may have been made in connection with the subject matter of this Agreement, unless otherwise provided herein. Any other such representations or claims are hereby disclaimed.

41. COUNTERPARTS.

This Agreement may be signed by the Parties in counterparts, each of which shall be fully effective as an original and together shall constitute one and the same agreement. The signature pages shall be combined in order to create a single document that is binding on all Parties. Facsimile signatures shall be binding; provided, however, upon request of either Party, the Parties shall endeavor to promptly exchange copies of this Agreement containing original signatures of their respective authorized representatives.

Continued next page

42. AUTHORITY TO EXECUTE AGREEMENT.

Each of the individuals signing this Agreement on behalf of a Party hereby represents and warrants such individual has the authority to execute this Agreement on behalf of such Party and that the governing body of such Party has duly approved the execution of this Agreement on behalf of that Party.

BY SIGNATURE BELOW, THE PARTIES AGREE TO BE BOUND BY THE TERMS AND CONDITIONS OF THIS AGREEMENT.

Dated: April 22, 2009

City of Benicia

By: _____
Printed Name: Elizabeth Patterson
Title: Mayor

Attest: _____
Title: City Clerk

Approved as to form

By: _____
Printed Name: Heather McLaughlin
Title: City Attorney

Dated: April 22, 2009

Valero Refining Company-California

By: _____
Printed Name: Richard J. Marcogliese
Title: Exec VP and COO

DM2\1883627.2

EXHIBIT A

Methodology for Calculating Charges for Untreated Water and Initial Rate Calculation [Including Initial Rate Calculation Spreadsheet (with appropriate explanatory footnotes)]

Pursuant to Article 9 of the Agreement, Valero will pay a rate that recovers the City's cost of supplying Untreated Water ("cost of service") to Valero as provided therein. The rate structure will consist of a fixed monthly service charge and a variable (volume) charge, with two volume rate tiers, based on monthly metered Untreated Water usage. The fixed monthly charge will consist of 1/12 (one-twelfth) of the annual cost of 50% of allocated fixed costs. The variable charge shall consist of the following components: (1) 100% of allocated variable costs and (2) 50% of allocated fixed costs. The variable charge shall be expressed in terms of a rate per million gallons ($/mg) per tier multiplied by the quantity of water delivered in million gallons per day, multiplied by the number of days in the billing month.

The components of the City's cost of service to be recovered through the rate charged to Valero are expenditures for operation and maintenance, capital outlays, internal service charges, return on rate base, and operating reserve. A brief description of these components is provided below:

Operation and Maintenance Expenses: These expenditures cover the costs incurred to conduct, operate and maintain the water utility operations. Costs include salaries and benefits; training; uniforms; supplies; utilities; small hand tools; fittings and hardware; vehicle fuel and parts; instrument calibration; regulatory fees; and water purchases.

- Pursuant to the Methodology for Calculating Charges for Untreated Water, Valero's share of the cost for water purchases will be based on an average of City's actual water purchase costs for the previous five-years. Valero's allocation will be based on the previous five-year average of the actual percentage that Valero's water use bears to total water delivered to the City.

Capital Outlays and Transfers: Expenses for minor capital outlays include furniture for workstations; larger tools with a life cycle of at least 10 years; and computers, monitors, printers, and facsimile machines.

- Interfund Transfers – System and Equipment Replacement – the funds are set aside in a "sinking fund" to cover the cost of replacing old, worn facilities, equipment, and vehicles. These are non-capitalized, minor assets that are expensed.

- Interfund Transfer – Water Supply – the funds are set aside in a "sinking fund" for the purchase of additional untreated water supplies.

- Interfund Transfer – General Fund – covers the administrative and overhead expenses borne by the General Fund, specifically for the City Manager and City Attorney offices.

Internal Service Fund (ISF) Charges: ISF charges recover expenses borne by the General Fund.

- Administrative Service charge - pays Water Operations share of the salaries and benefits for staff of, and supplies and services for, the Finance Department, including Management Information Systems (MIS), and Human Resources Department; liability and property insurance, postage and freight; utility billing and audit services. The City's Finance Department determines this budget amount.
- Equipment Services charge – pays Water Operations share of the salaries, benefits and other direct costs of the Equipment Services Division. The budget amounts are based on a 3-year average of the actual equipment (fleet) service hours provided to the Water Operations division and apportioned on the Water Operations Division's percentage of total service hours against the proposed budget for the Equipment Services Division. The City's Public Works Maintenance Division determines this budget amount.
- Workers' Compensation Services charge – pays for Workers' Compensation monthly premium rates for staff paid from the Water Operations budget. The rates are based on employee classification. The City's Finance Department determines this budget amount.

Return on Rate Base: Recovers the cost of the City's past investments in major, long-term water assets. The components of the rate base are property, plant, and equipment, less construction in progress, less accumulated depreciation, plus working capital. The water facilities allocated to Valero represent the portion of the water system used to convey raw water to Valero. The resulting "rate base" is multiplied by a rate of return. The rate of return established in the Methodology for Calculating Charges for Untreated Water is the City's average of the previous five years' City portfolio earnings. The rate of return will be recalculated every five years, commencing in 2014. For the first five years of this Agreement the rate of return will be 4.5%, based upon the City's average of the previous five years' portfolio earnings.

Note: The City water utility's major infrastructure improvements are capitalized in accordance with the City's Capital Asset Policy. Since major assets are capitalized regardless of funding source, Valero will not be charged debt service.

Operating Reserve Requirement: City policy requires the apportionment of twenty percent of operating and maintenance expenses as an operating reserve.

RATE CALCULATION SHEET

[Note: This rate calculation sheet is for exemplar purposes only. It reflects the applicable values at the time the Agreement was executed, but the Parties agree the values will change over time without constituting an amendment to the Agreement. The methodology will not change unless agreed to by the Parties.]

Calculation

Base Fiscal Year – 2008/2009

Operations and Maintenance	**Allocated Total**	**Fixed**	**Variable**
Salary and Wages	$ 159,400	$ 127,520	$ 31,880
Benefits	$ 62,900	$ 50,320	$ 12,580
Services and Supplies	$ 109,987	$ 87,990	$ 21,997
Lake Herman Dam Utilities	$ 700		$ 700
Water Purchases	$ 194,939	$ 194,939	
Total O& M Expenses	$ 527,926	$ 460,769	$ 67,157
Capital Outlays and Transfers	$ 200,500	$ 160,400	$ 40,100
Internal Service Fund Charges	$ 36,800	$ 29,440	$ 7,360
Return on Rate Base	$ 130,412	$ 108,242	$ 22,170
Operating Reserve	$ 105,585	$ 84,468	$ 21,117
TOTAL REVENUE REQUIREMENT	$ 1,001,223	$ 831,015	$ 170,208
Amount to be collected through monthly service charge (50% of fixed cost allocation)		$ 415,508	
Amount to be collected through monthly variable charge (50% of fixed cost allocation plus 100% of variable costs)		$ 585,715	
Monthly Service Charge		**$ 34,626**	

Variable Charge	
Estimated annual metered consumption for 2008-09	1,553 MG
Tier 1 = 107.6 per month x 12	1,291 MG
Tier 2 = > 107.6 per month x 12	262 MG
Peaking Factor	1.5785
Monthly Volume Rates per Million Gallon (MG)	
Tier 1	**343.62**
Tier 2	**542.40**

Return on Rate Base

Projected for 2008/09

Property, plant, and equipment	$	67,806,225
Construction in progress	$	(1,351,250)
Accumulated depreciation	$	(32,430,028)
Working capital	$	649,000
Total Rate Base	$	34,673,947
Allocated share		8.4%
Total Allocated Rate Base	$	2,898,045
Rate of Return		4.5%
Return on Rate Base	**$**	**130,412**

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Appendix D-1: CUWCC Report

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CUWCC BMP Coverage Report 2014

6291 City of Benicia

GPCD in 2006: 176.68

GPCD in 2014

GPCD Target for 2018: 183.00

Biennial GPCD Compliance Table

ON TRACK

		Target		Highest Acceptable Bound	
Year	Report	% Base	GPCD	% Base	GPCD
2010	1	96.4%	**186.50**	100%	**193.50**
2012	2	92.8%	**179.50**	96.4%	**186.50**
2014	3	89.2%	**172.60**	92.8%	**179.50**
2016	4	85.6%	**165.60**	89.2%	**172.60**
2018	5	82.0%	**183.00**	82.0%	**158.60**

WMP 2.2 School Education Programs
2014

School Education Programs

6291 City of Benicia

Retail Only

Does a wholesale Agency implement School Education Programs? Yes

List of wholesale Agencies

Please provide the name of Agency if not FORTECH Group1 members

V Materials meet state education framework requirements? Description: topographical map of the delta, replica of San Francisco Bay, Wetland plants, Posters and game cards, water quality testing supplies and microscopes, water cycle poster, rainfall data, timeline of historical water use

V Materials distributed to K-6 Students? Description: learn how to keep our creeks and our bay clean and healthy, , further adventures of captain hydro, california waterworks, water conservation themed student activity pages, workbooks, book marks, book covers, pencils, erasers, rulers, stickers

Number of students reached: 416

V Materials distributed to 7-12 Students? (optional) Description: water conservation themed student activity pages, workbooks, book marks, book covers, pencils, erasers, rulers, stickers

Annual budget for school education program: 20000.00

Description of all other water supplier educationprograms:

School Programs Activities

Classroom Presentation:

Number of presentation: 26 Number of attendees: 416

Describe the topics covered in your classroom presentations: water pollution prevention, water cycle, where our water comes from, how much fresh water, california water system, water conservation, albatross tracking

Large group assemblies:

Number of presentation: 6 Number of attendees: 1631

Children's water festivals or other events:

Number of presentation: 1 Number of attendees: 251

Cooperative efforts with existing science/water education programs (various workshops, science fair awardsor judging) and follow-up:

Number of presentation: Number of attendees:

Other methods of disseminating information (i.e. themed age-appropriate classroom loaner kits):

Description: Number distributed:

Staffing children's booths at events & festivals:

Number of booths: Number of attendees:

Water conservation contests such as poster and photo:

WMP 2.2 School Education Programs

2014

Description | Number of participants

Offer monetary awards/funding or scholarships to students:

Number offered | Total funding

Teacher training workshops:

Number of presentation: 1 | Number of attendees: 0

Fund and/or staff student field trips to treatment facilities, recycling facilities, water conservation gardens,etc.:

Number of tours or fieldtrips | Number of participants

College internships in water conservation offered:

Number of internship | Total funding

Career Fairs / Workshops:

Number of presentation | Number of attendees

Additional program(s) supported by agency but not mentioned above:

Description	Number of events	Number of participants

Comments

CUWCC BMP Coverage Report 2014

Foundational Best Manegemant Practices for Urban Water Efficiency

Foundational BMPs

BMP 2.2 School Education Programs

6291 City of Benicia — Retail Only

Does a wholesale Agency implement School Education Programs? Yes

List of wholesale Agencies

Materials meet state education framework requirements and are grade-level appropriate? Yes

Curriculum materials developed and/or provided by Agency:

topographical map of the delta, replica of San Francisco Bay, Wetland plants, Posters and game cards, water quality testing supplies and microscopes, water cycle poster, rainfall data, timeline of historical water use

Materials Distributed to K-6? Yes

Describe K-6 Materials

learn how to keep our creeks and our bay clean and healthy, , further adventures of captain hydro, california waterworks, water conservation themed student activity pages, workbooks, book marks, book covers, pencils, erasers, rulers, stickers

Materials distributed to 7-12 students? Yes (Info Only)

Annual budget for school education program: 20000.00

Description of all other water supplier education programs

topographical map of the delta, replica of San Francisco Bay, Wetland plants, Posters and game cards, water quality testing supplies and microscopes, water cycle poster, rainfall data, timeline of historical water use learn how to keep our creeks and our bay clean and healthy, , further adventures of captain hydro, california waterworks, water conservation themed student activity pages, workbooks, book marks, book covers, pencils, erasers, rulers, stickers

On Track

At Least As Effective As **No**

BMP 2.1 Public Outreach

2014

Agency name: City of Benicia

Reporting unit # 6291

Reporting unit name (District name) City of Benicia / Retail Only

Does a wholesale Agency implement Public Outreach Programs? Yes

List of wholesale Agencies

Please provide the name of Agency if not CUWCC Group1 members

Solano County Water Agency

Is your agency performing public outreach?

Report a minimum of 4 water conservation related contacts your agency had with the public during the year.

Did at least one contact take place duringeach quarter of the reporting year? Yes

Public Information Programs List

Number of Public Contacts	Public Information Programs Name	
1	Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	
1	Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	
2	Website	

Contact with the Media

Does a wholesale Agency implement Public Outreach Programs? Yes

List of wholesale Agencies

Please provide the name of Agency if not CUWCC Group1 members

Solano County Water Agency

OR Retail Agency (Contacts with the Media)

Did at least one contact take place during each quarter of the reporting year? Yes

Media Contacts List

Does a wholesale Agency implement Public Outreach Programs? No

List of wholesale Agencies

Please provide the name of Agency if not CUWCC Group1 members

Solano County Water Agency

Is Your Agency Performing Website Updates?

Enter your agency's URL (website address): solanosaveswater.org

Describe a minimum of four water conservationrelated updates to your agency's website thattook place during the year: Solano county water agency maintains the website

Did at least one Website Update take place duringeach quarter of the reporting year? Yes

Public Outreach Annual Budget

Enter budget for public outreach programs. You may enter total budget in a single line or brake the budget into discretecategories by entering many rows. Please indicate if personnel costs are included in the entry.

BMP 2.1 Public Outreach

2014

Annual Budget Category	Annual Budget Amount	Personal Cost Included?	Comments	
outreach	6000			

Public Outreach Expenses

Enter expenses for public outreach programs. Please include the same kind of expenses you included in the question relatedto your budget (Section 2.1.7, above). For example, if you included personnel costs in the budget entered above, be sure to include them here as well.

Public Outreach Expense Category	Expense Amount	Personal Cost Included?	
outreach	5000		

Additional Public Information Program

Please report additional public information contacts. List these additional contacts in order of howyour agency views their importance / effectiveness with respect to conserving water, with the mostimportant/ effective listed first (where 1 = most important).

Were there additional Public Outreach efforts? Yes

Public Outreach Additional Information

Public Information Additional Programs	Importance	
booth at farmers market	1	

Social Marketing Programs

Branding

Does your agency have a water conservation"brand," "theme" or mascot? Yes

Describe the brand, theme or mascot. Be Green Save Blue

Market Research

Have you sponsored or participated inmarket research to refine your message? No

Market Research Topic

Brand Message

Brand Mission Statement

Community Committees

Do you have a community conservationcommittee? Yes

Enter the names of the community committees: Solano county urban water conservation committee

Training

BMP 2.1 Public Outreach

2014

Training Type	Number of Trainings	Number of Attendees	Description of Other	
1	3			

Social Marketing Expenditures

Public Outreach Social Marketing Expenses

Partnering Programs - Partners

Name	Type of Program
CLCA?	
Green Building Programs?	
Master Gardeners?	
Cooperative Extension?	
Local Colleges?	
Other	

Retail and wholesale outlet; name(s) and type(s) of programs:

Partnering Programs - Newsletters

Number of newsletters per year

Number of customers per year

Partnering with Other Utilities

Describe other utilities your agency partners with, including electrical utilities

Partner with Solano county Water Agency, City of vallejo, City of Fairfield, City of vacaville

Conservation Gardens

Describe water conservation gardens at your agency or other high traffic areas or new homes

Help sponser a water conservation garden at Six Flags discovery Kingdom

Landscape contests or awards

Describe water wise landscape contest or awards program conducted by your agency

Additional Programs supported by Agency but not mentioned above:

Comments

CUWCC BMP Coverage Report 2014

Foundational Best Manegemant Practices for Urban Water Efficiency

Foundational BMPs

BMP 2.1 Public Outreach

6291 City of Benicia Retail Only

Does a wholesale Agency implement Public Outreach Programs? Yes

List of wholesale Agencies

	Agency Name	ID number
	Solano County Water Agency	207

	Public Outreach Program List	Number
	Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	1
	Flyers and/or brochures (total copies), bill stuffers, messages printed on bill, information packets	1
	Website	2
	Total	**4**
		On Track

An actively maintained website that is updated regularly (minimum = 4 times per year, i.e., at least quarterly) Yes

	Annual Budget Category	Annual Budget Amount
	outreach	6000
	Total Amount:	**6000**
		On Track

Description of all other Public Outreach programs

Solano county water agency maintains the website

On Track

Public Outreah Additional Programs
booth at farmers market

At Least As Effective As **No**

BMP 1.4 Retail Conservation Pricing

2014

Agency name: City of Benicia

Reporting unit number: 6291

Reporting unit name (District name): City of Benicia

Implementation (Water Rate Structure)

Enter the Water Rate Structures that are assigned to the majority of your customers, by customer class

Water Rate Name	Customer Class Name	Total Revenue Commodity Charges	Total Revenue Customer Meter/Service (Fixed Charges)	
Increasing Block	Single-Family	1519892	1719174	
Increasing Block	Multi-Family	296760	330077	
Increasing Block	Commercial	773623	347367	
Increasing Block	Industrial	86722	61572	
Increasing Block	Institutional	212153	141063	

Implementation (Conservation Pricing Option)

- [V] Use Annual Revenue As Reported
- [ ] Use CWWA Rate Design Model
- [ ] Use 3 years average instead of most recent year

Retail Waste Water (Sewer) Rate Structure by Customer Class

Agency Provide Sewer Service: Yes

Select the Retail Waste Water (Sewer) Rate Structure assigned to the majority of your customers within a specific customer class.

Sewer Rate Name	Customer Class Name	Sewer Total Revenue Commodity Charges	Sewer Total Revenue Customer Meter/Service (Fixed Charges)	
Uniform	Single-Family		4529224.00	
Uniform	Multi-Family		1545293.00	
Increasing Block	Commercial	895661.00		
Increasing Block	Industrial	109044.00		
Increasing Block	Institutional	39381.00		

Comments:

CUWCC BMP Coverage Report 2014

Foundational Best Manegemant Practices for Urban Water Efficiency

Foundational BMPs

BMP 1.4 Retail Consrvation Pricing

CUWCC BMP Coverage Report 2014

Foundational Best Manegemant Practices for Urban Water Efficiency

Foundational BMPs

BMP 1.4 Retail Consrvation Pricing

6291 City of Benicia

Implementation (Water Rate Structure)

Customer Class	Water Rate Type	Conserving Rate?
Single-Family	Increasing Block	Yes
Multi-Family	Increasing Block	Yes
Commercial	Increasing Block	Yes
Industrial	Increasing Block	Yes
Institutional	Increasing Block	Yes

On Track

	Customer Class	Water Rate Type	(V) Total Revenue Comodity Charges	(M) Total Revenue Fixed Carges
	Single-Family	Increasing Block	1519892	1719174
	Multi-Family	Increasing Block	296760	330077
	Commercial	Increasing Block	773623	347367
	Industrial	Increasing Block	86722	61572
	Institutional	Increasing Block	212153	141063
			2889150	**2599253**

Calculate: V / (V + M) **53 %**

Implementation Option: Use Annual Revenue As Reported

Agency Provide Sewer Service: Yes

Customer Class	Rate Type	Conserving Rate?
Single-Family	Uniform	Yes
Multi-Family	Uniform	Yes
Commercial	Increasing Block	Yes
Industrial	Increasing Block	Yes
Institutional	Increasing Block	Yes

On Track

At Least As Effective As **No**

BMP 1.3 Metering With Commodity

2014

Agency name: City of Benicia

Reporting unit number: 6291

Reporting unit name (District name): City of Benicia

Implementation

Does your agency have any unmetered service connections? No

If YES, has your agency completed a meter retrofit plan? No

Enter the number of previously unmetered accounts fitted with meters during reporting year:

Are all new service connections being metered? Yes

Are all new service connections being billed volumetrically? Yes

Has your agency completed and submitted electronically to the Council a written plan, policy or program to test, repair and replace meters? Yes

Meters Matrix

Error: Subreport could not be shown.

Number of CII Accounts with Mixed-use Meters: 26

Number of CII Accounts with Mixed-use Meters Retrofitted with Dedicated Irrigation Meters during Reporting Period: 0

Feasibility Study

Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? No

If YES, please fill in the following information:

A. When was the Feasibility Study conducted: 12/2/2013 12:00:00 AM

B. Describe,

upload or provide an electronic link to the Feasibility Study Upload File

Comments:

CUWCC BMP Coverage Report 2014

Foundational Best Manegemant Practices for Urban Water Efficiency

Foundational BMPs

BMP 1.3 Metering With Commodity

6291	City of Benicia

Numbered Unmetered Accounts	No	**On Track**
Metered Accounts billed by volume of use	Yes	**On Track**
Number of CII Accounts with Mixed Use Meters	26	
Conducted a feasibility study to assess merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	No	**Not On Track**
Feasibility Study provided to CUWCC?	No	**Not On Track**
Completed a written plan, policy or program to test, repair and replace meters	Yes	**On Track**

At Least As Effective As **No**

BMP 1.2 Water Loss Control

2014

Agency name: City of Benicia

Reporting unit number: 6291

Reporting unit name (District name): City of Benicia

AWWA Water Audit

Agency to complete a Water Audit & Balance Using The AWWA Software: Yes

Water Audit Validity Score from AWWA spreadsheet:

Email to office@cuwcc.org - Worksheets (AWWA Water Audit). Enter the name of the file below:

Agency Completed Training In The AWWA Water Audit Method: Yes

Agency Completed Training In The Component Analysis Process: Yes

Completed/Updated the Component Analysis (at least every 4 years)? No

Component Analysis Completed/Updated Date

Water Loss Performance

Agency Repaired All Reported Leaks & Breaks To The Extent Cost Effective: No

Recording Keeping Requirements:

- Date/Time Leak Reported
- Type of Leaking Pipe Segment or Fitting
- Leak Volume Estimate
- Leak Location
- Leak Running Time From Report to Repair
- Cost of Repair

Agency Located and Repaired Unreported Leaks to the Extent Cost Effective: Yes

Type of Program Activities Used to Detect Unreported Leaks

Does your agency maintain in-house records of audit results or the completed AWWA worksheet for the completed audit which could be forwarded to CUWCC? No

Does your agency keeps records of each component analysis performed, and incorporates results into future annual standard water balances? Yes

Annual Summary Information

Complete the following table with annual summary information (required for reporting years 2-5 only)

Total Leak Repaired	Economic Value Of Real Loss	Economic Value Of Apparent Loss	Miles Of System Surveyed For Leaks	Pressure Reduction Undertaken For Loss Reduction	Cost Of Interventions	Water Saved (AF/Year)
80				V		

Comments:

CUWCC BMP Coverage Report 2014

Foundational Best Management Practices For Urban Water Efficiency

Foundational BMPs

BMP 1.2 Water Loss Control

6291 City of Benicia

Completed Standard Water Audit Using AWWA Software?	**Yes**	**On Track**
AWWA File provided to CUWCC?	**No**	

City of Benicia BMP1.2 FY14

AWWA Water Audit Validity Score?

Complete Training in AWWA Audit Method

Complete Training in Component Analysis Process?

CompComponent Analysis?

Repaired all leaks and breaks to the extent cost effective?

Locate and Repar unreported leaks to the extent cost effective?

Maintain a record keeping system for the repair of reported leaks, including time of report, leak location, type of leaking pipe segment or fitting, and leak running time from report to repair.

Provided 7 Types of Water Loss Control Info

Leaks Repars	Value Real Losses	Value Apparent Losses	Miles Surveyed	Press Reduction	Cost Of Interventions	Water Saved (AF)
80						

On Track

At Least As Effective As

In lieau of an active leak detection program, the City has opted to replace 1% of distribution system lines each year. Lines are replaced based on age and other asset management factors. Attached documentation shows the reduction in main breaks due to 6291 City of Benicia BMP 1.2 Results from Main Replacement Program.

We encourage them every year to join.

BMP1.1 Operation Practices - Retail Only 2014

Agency name: City of Benicia

Reporting unit name (District name): City of Benicia

Reporting unit number: 6291

Conservation Coordinator: **Yes**

Contact Information

First Name: David

Last Name: Wenslawski

Title: Water Quality Technician

Phone: 707-746-4792

Email: david@ci.benicia.ca.us

Water Waste Prevention

Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP.

File Name:

URL: http://www.codepublishing.com/ca/benicia/

Description:

Comments:

BMP1.1 Operation Practices - Retail Only 2014

Agency name:	City of Benicia	Reporting unit number:	
Reporting unit name (District name)	City of Benicia		6291

Conservation Coordinator: **Yes**

Contact Information

First Name:	David
Last Name:	Wenslawski
Title:	Water Quality Technician
Phone:	707-746-4792
Email:	david@ci.benicia.ca.us

Water Waste Prevention

Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area.

File Name:	
URL:	

Description:

Comments:

BMP1.1 Operation Practices - Retail Only 2014

Agency name:	City of Benicia	Reporting unit number:	
Reporting unit name (District name)	City of Benicia		6291

Conservation Coordinator: **Yes**

Contact Information

First Name:	David
Last Name:	Wenslawski
Title:	Water Quality Technician
Phone:	707-746-4792
Email:	david@ci.benicia.ca.us

Water Waste Prevention

Option C Describe any documentation of support for legislation or regulations that prohibit water waste.

File Name:	
URL:	

Description:

Comments:

BMP1.1 Operation Practices - Retail Only 2014

Agency name:	City of Benicia	Reporting unit number:	
Reporting unit name (District name)	City of Benicia		6291

Conservation Coordinator: **Yes**

Contact Information

First Name:	David
Last Name:	Wenslawski
Title:	Water Quality Technician
Phone:	707-746-4792
Email:	david@ci.benicia.ca.us

Water Waste Prevention

Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP.

File Name:	
URL:	

Description:

Comments:

BMP1.1 Operation Practices - Retail Only 2014

Agency name:	City of Benicia	Reporting unit number:	
Reporting unit name (District name)	City of Benicia		6291

Conservation Coordinator: **Yes**

Contact Information

First Name:	David
Last Name:	Wenslawski
Title:	Water Quality Technician
Phone:	707-746-4792
Email:	david@ci.benicia.ca.us

Water Waste Prevention

Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP.

File Name:	
URL:	

Description:

Comments:

BMP1.1 Operation Practices - Retail Only 2014

Agency name:	City of Benicia	Reporting unit number:	
Reporting unit name (District name)	City of Benicia		6291

Conservation Coordinator: **Yes**

Contact Information

First Name:	David
Last Name:	Wenslawski
Title:	Water Quality Technician
Phone:	707-746-4792
Email:	david@ci.benicia.ca.us

Water Waste Prevention

Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development.

File Name:	
URL:	

Description:

Comments:

CUWCC BMP Retail Coverage Report **2014**

Foundational Best Manegemant Practices for Urban Water Efficiency

Foundational BMPs

BMP 1.1 Operation Practices

6291 City of Benicia

1. Conservation Coordinator provided with necessary resources to implement BMPs?

Name:	David Wenslawski
Title:	Water Quality Technician
Email:	david@ci.benicia.ca.us

On Track

2. Water Waste Prevention Documents

WW Document Name	WWP File Name	WW Prevention URL	WW Prevention Ordinance Terms Description
Option A Describe the ordinances or terms of service adopted by your agency to meet the water waste prevention requirements of this BMP.		http://www.codepublishing.com/ca/benicia/	
Option B Describe any water waste prevention ordinances or requirements adopted by your local jurisdiction or regulatory agencies within your service area.			
Option C Describe any documentation of support for legislation or regulations that prohibit water waste.			
Option D Describe your agency efforts to cooperate with other entities in the adoption or enforcement of local requirements consistent with this BMP.			
Option E Describe your agency support positions with respect to adoption of legislation or regulations that are consistent with this BMP.			
Option F Describe your agency efforts to support local ordinances that establish permits requirements for water efficient design in new development.			

On Track

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Appendix D-2: Water Shortage Contingency Plan

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Chapter 13.35
EMERGENCY WATER CONSERVATION PLAN

Sections:

13.35.010 Scope.
13.35.020 Purpose.
13.35.030 Definitions.
13.35.040 Authorization.
13.35.050 Application.
13.35.060 Water conservation stages.
13.35.070 Mandatory conservation phase implementation.
13.35.080 Duration of conservation stages.
13.35.090 Drought penalty.
13.35.100 Drought surcharge.
13.35.110 Exceptions and application procedures for exceptions.
13.35.120 Violation – Enforcement.
13.35.130 Violation – Additional remedy.

13.35.010 Scope.

There is established a city emergency water conservation plan. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

13.35.020 Purpose.

The purpose of this chapter is:

During periods of water shortages, the public health and welfare requires that the water resources available to the city be put to maximum beneficial use to the extent to which they are capable, and that the waste or unreasonable use, or unreasonable method of use of water be prevented, and the conservation of such water is to be extended with a view to the reasonable and beneficial use thereof in the interests of the people of the city and for the public welfare. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

13.35.030 Definitions.

“Base year” means a water year selected by the city manager for purposes of calculating the baseline amount.

Baseline Amount.

– For residential customers, the average gallons per day of water used by that customer class during the base year.

– For industrial, commercial or municipal customers, the average amount of water used by that customer during the corresponding bimonthly billing period of the base year.

“City” means the city of Benicia acting by and through the public works and community development department as operator of the city water system.

“Customer” means any person, whether within or without the geographic boundaries of the city of Benicia, who uses water supplied by the city.

“Director” means the director of public works and community development for the city or designee.

“GPD” means gallons per day.

“HCF” means 100 cubic feet, where a cubic foot is 7.48 gallons.

“Person” means any person, firm, partnership, association, corporation, company, organization, or governmental entity. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

13.35.040 Authorization.

The city manager or his designee, upon the recommendation of the director, is authorized and directed to implement the applicable provisions of this chapter upon their determination that such implementation is necessary to protect the public welfare and safety. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

13.35.050 Application.

The provisions of this chapter shall apply to all persons, customers, and property served by the city. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

13.35.060 Water conservation stages.

No customer of the city shall knowingly make, cause, use, or permit the use of water from the city for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this chapter, or in an amount in excess of that use permitted by the conservation stage in effect pursuant to action taken by the city manager, or his designee, in accordance with the provisions of this chapter. When a conservation stage is declared, the city manager shall select the appropriate base year based on the recommendation of the director. Baseline water use amounts for all conservation stages are listed in the table below for ease of reference.

Baseline Amounts for Water Use Penalties			
			Landscape

Conservation Stage	Residential	Commercial/Industrial/ Municipal	Irrigation (dedicated meter)
1-Voluntary	Voluntary conservation	Voluntary conservation	Voluntary conservation
2-Water Alert	10% reduction from base year use (Penalty assessed when customer uses >90% of base year use.) (City manager to select appropriate base year.)	10% reduction from base year use (Penalty assessed when customer uses >90% of base year use.) (City manager to select base year.)	25% reduction from base year use (Penalty assessed when customer uses >75% of base year use.) (City manager to select base year.)
3-Water Warning	25% reduction from base year use (>75% of base year use)	15% reduction from base year use (>85% of base use)	30% reduction from base year use (>70% of base use)
4-Water Emergency	35% reduction from base year use (>65% of base year use)	30% reduction from base year use (>70% of base use)	40% reduction from base year use (>60% of base use)
5-Water Crisis	50% reduction from base year use (>50% of base year use)	50% reduction from base year use (>50% of base use)	50% reduction from base year use (>50% of base use)

A. Stage 1 – Voluntary Conservation.

1. Customers of the city are requested to voluntarily limit the amount of water used to that amount absolutely necessary for health, business, and irrigation.

2. In addition to the voluntary water use reductions of subsection (A)(1) of this section, and in compliance with BMC 13.35.070, the following restrictions shall apply to all persons:

a. The following uses of water are defined as “waste of water” and are absolutely prohibited:

i. Allowing water to run off unused to a gutter, ditch, or drain;

ii. Failing to repair a controllable leak;

iii. Washing sidewalks, driveways, parking areas, tennis courts, patios, or other paved areas, unless the concrete foundation is in the process of curing during construction, and except to alleviate immediate fire hazards, or for the protection of health and safety;

iv. Utilizing a hand-held hose without an automatic shut-off nozzle;

v. Irrigating during rain.

b. The following water use prohibitions apply to new development only:

i. Single pass-through cooling water systems;

ii. Commercial car washes and laundries without recirculating water systems;

iii. Decorative fountains without recirculating water systems.

B. Stage 2 – Mandatory Compliance – Water Alert.

1. No residential customer shall make, cause, use, or commence the use of water received from the city for any purpose in an amount in excess of 90 percent of the baseline amount. Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

2. No industrial, commercial or municipal customer shall make, cause, use, or permit the use of water received for any purpose in an amount in excess of 90 percent of the baseline amount. In addition to the above allotment, for meters that strictly serve landscaping the allotment shall be 75 percent of the baseline amount. New services or services without a base year history shall be allotted on comparable customer usage.

Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

3. In addition to the above mandatory water use reductions of subsections (B)(1) and (2) of this section, and in compliance with BMC 13.35.070, the following restrictions shall apply to all persons:

a. Use of water from hydrants shall be limited to fire fighting and other activities necessary to maintain the health, safety, and welfare of the citizens of Benicia;

b. Lawn watering and landscape irrigation restricted to only when necessary and only between 6:00 p.m. and 9:00 a.m.;

c. Vehicle washing must be done using a bucket or hand-held hose with an automatic shut-off nozzle, or take place at a commercial car wash;

d. Restaurant drinking water shall be served only upon request;

e. Non-potable water shall be used for construction purposes unless the user presents a reasonable health and safety issue to the public works and community development director;

f. All “waste of water” elements as defined in Stage 1 shall remain in effect in Stage 2.

C. Stage 3 – Mandatory Compliance – Water Warning.

1. No residential customer shall make, cause, use, or commence the use of water received from the city for any purpose in an amount in excess of 75 percent of the baseline amount. Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

2. No industrial, commercial or municipal customer shall make, cause, use, or permit the use of water received for any purpose in an amount in excess of 85 percent of the baseline amount. In addition to the above allotment, for meters that strictly serve landscaping the allotment shall be 70 percent of the baseline amount. New services or services without a base year history shall be allotted on comparable customer usage.

Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

3. In addition to the mandatory water use reductions of subsections (C)(1) and (2) of this section, and in compliance with BMC 13.35.070, the following restrictions shall apply to all persons:

a. Landscape watering shall be limited to Mondays, Wednesdays and Fridays for odd numbered addresses; and Tuesdays, Thursdays and Saturdays for even numbered addresses; with no watering on Sundays; and

b. All elements of Stage 2 shall remain in effect in Stage 3.

D. Stage 4 – Mandatory Compliance – Water Emergency.

1. No residential customer shall make, cause, or commence the use of water received from the city for any purpose in an amount in excess of 65 percent of the baseline amount. Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

2. No industrial, commercial or municipal customer shall make, cause, use, or permit the use of water received for any purpose in an amount in excess of 70 percent of the baseline amount. In addition to the above allotment, for meters that strictly serve landscaping the allotment shall be 60 percent of the baseline amount. New services or services without a base year history shall be allotted on comparable customer usage.

Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

3. In addition to the mandatory water use reductions of subsections (D)(1) and (2) of this section, and in compliance with BMC 13.35.070, the following restrictions shall apply to all persons:

a. Automatic timers shall be turned “off” on automatic sprinkler systems and watering shall occur manually on designated days except where provided for in subsection (D)(3)(b) of this section. Micro irrigation systems (i.e., drip systems) may be used;

b. Use of automatic sprinkler systems with timers in use shall be restricted to areas actively used by the public, e.g., park and school grounds; and

c. All elements of Stage 3 shall be in effect in Stage 4.

E. Stage 5 – Mandatory Compliance – Water Crisis.

1. No residential customer shall make, cause, use, or commence the use of water received from the city for any purpose in an amount in excess of 50 percent of the baseline amount. Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

2. No industrial, commercial or municipal customer shall make, cause, use, or permit the use of

water received for any purpose in an amount in excess of 50 percent of the baseline amount. In addition to the above allotment, for meters that strictly serve landscaping, the allotment shall be 50 percent of the baseline amount. New services or services without a base year history shall be allotted on comparable customer usage.

Water used in excess of this amount shall be subject to a drought penalty as set forth in BMC 13.35.090. The customer of record may request an increase in the baseline amount as set forth in BMC 13.35.110.

3. In addition to the mandatory water use reductions of subsections (E)(1) and (2) of this section, and in compliance with BMC 13.35.070, all elements of Stage 4 shall remain in effect in Stage 5 except that BMC 13.35.110(A) does not apply in this stage. The customer of record may still apply for exceptions as outlined in BMC 13.35.110, but the reason for applying for an exception cannot be based on economic hardship. (Ord. 12-02 § 1, 2012; Ord. 91-5 N.S. §§ 1, 3, 1991; Ord. 91-2 N.S. §§ 1, 2, 1991; Ord. 90-19 N.S. § 1, 1990).

13.35.070 Mandatory conservation phase implementation.

A. The public works and community development department shall monitor the projected supply and demand for water by its customers and shall recommend to the city manager the extent of the conservation required in order for the department to prudently plan for and supply water to its customers. Thereafter, the city manager may order that the appropriate phase of water conservation be implemented in accordance with the applicable provisions of this section. Said order shall be made by public announcement and shall be published a minimum of one time in a daily newspaper of general circulation and shall continue to be published on a weekly basis until such time as all restrictions are removed. Said order shall become effective immediately upon the first publication.

B. Conservation Stages. The various stages of water conservation shall be implemented upon authorization by the city manager. (Ord. 12-02 § 1, 2012; Ord. 91-5 N.S. § 2, 1991; Ord 91-2 N.S. § 3, 1991; Ord. 90-19 N.S. § 1, 1990).

13.35.080 Duration of conservation stages.

Stage 1 shall be effective upon the effective date of the ordinance codified in this chapter, and the restrictive provisions of Stage 1 as set forth in BMC 13.35.060 shall apply to all water consumption on and after said date. Stage 1 will be rescinded at such time that conditions, as set forth in BMC 13.35.070, indicate a more restrictive stage is necessary. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

13.35.090 Drought penalty.

A. Customers will receive prior individual notification of the baseline amount, applicable rates, and the opportunity to request exceptions.

B. Water use beyond the maximum allowed for each water conservation stage shall be subject to a drought penalty pursuant to the schedule set forth in subsection (C) of this section. The customer of record may request an increase in this baseline amount as set forth in BMC 13.35.110. Application forms and instructions will be provided to customers and will also be available at the city water billing office.

C. In addition to the general water service rates, each customer shall pay, during each billing period, a drought penalty for water used in excess of the baseline amount for the declared conservation stage. The drought penalty is as follows:

Excess Water Use Penalties

Amount of Excess Water Use	Increased Rate for Use in Excess
<=10% higher than baseline for conservation stage	2 times the regular rate
10.01% to 20% higher than baseline for conservation stage	3 times the regular rate
>20% higher than the baseline for conservation stage	4 times the regular rate

For water used up to 10 percent in excess of the baseline amount there shall be a drought penalty equal to two times the applicable volume charge, in addition to the applicable service charge and volume charge;

For water used from 10.01 percent to 20 percent in excess of the baseline amount there shall be a drought penalty of three times the applicable volume charge levied on this excess only, in addition to the drought penalty on the first 10 percent and the applicable service charge and volume charge; and

For water used over 20 percent in excess of the baseline amount, there shall be a drought penalty of four times the applicable volume charge levied only on this excess over 20 percent, in addition to the drought penalties on the first 20 percent and the applicable service charge and volume charge.

D. In addition to the drought penalty, if water usage exceeds the allowed baseline amount, a warning will be issued and enforcement actions may be taken as described in BMC 13.35.120. (Ord. 12-02

§ 1, 2012; Ord. 91-5 N.S. § 4, 1991; Ord. 91-2 N.S. § 1, 1991; Ord. 90-19 N.S. § 1, 1990).

13.35.100 Drought surcharge.

A. A drought surcharge may be imposed by the city council, upon the recommendation of the director, to compensate for a loss of water revenue, and to pay drought-related costs such as the purchase of water incurred by the city as a result of the drought.

B. The drought surcharge amount shall be established by a resolution adopted by the city council at the time of imposition. The drought surcharge is temporary and will be in effect until drought-related costs are recovered and water supply conditions have stabilized and the council terminates the surcharge by adoption of a resolution. (Ord. 14-08 § 1; Ord. 14-07 § 2; Ord. 12-02 § 1, 2012; Ord. 91-5 N.S. § 5, 1991; Ord. 91-2 N.S. § 5, 1991; Ord. 90-19 N.S. § 1, 1990. Formerly 13.35.095).

13.35.110 Exceptions and application procedures for exceptions.

A. Any customer of record may apply to the director to increase the amount of water that may be used without exceeding the baseline amount for any one or more of the following reasons:

1. Medical requirements;

2. More than four residents in a single-family residential household. The additional amount allotted shall be 50 gpd per person;

3. Incorrect customer classification based on predominant use;

4. When failure to do so would cause severe economic hardship to the applicant, including, but not limited to, threat of imminent insolvency;

5. When failure to do so would cause an emergency condition affecting the health, sanitation, fire protection, or safety of the applicant or the public;

6. To protect mature trees providing a community benefit.

B. Written applications for such exceptions may be granted by the director based upon clear and convincing evidence that any one or more of the foregoing conditions has been satisfied and it is in the public interest to grant such application.

C. The quantity of water allowed in addition to the baseline amount shall be determined by the director, and shall not exceed that quantity necessary to alleviate the condition which justified granting the application for an exception. (Ord. 12-02 § 1, 2012; Ord. 91-2 § 4, 1991; Ord. 90-19 N.S. § 1, 1990. Formerly 13.35.100).

13.35.120 Violation – Enforcement.

It shall be a violation of this chapter for any water customer or account holder to violate any of the provisions of this chapter or of the administrative rules and regulations promulgated hereunder or to waste any water obtained from or through the distribution facilities of the city, or from any person to engage in wasting water as defined herein. The violation of each specific provision of this chapter, and each separate violation thereof, shall be deemed a separate offense, and shall be enforced accordingly.

A. Violations.

1. For the first violation within the preceding 12 calendar months, the director shall issue a written notice of the fact of such violation.

2. For the second violation within the preceding 12 calendar months, the director shall impose a surcharge of $50.00 against the account holder for the property where the violation occurred.

3. For the third violation within the preceding 12 calendar months, the director shall impose a surcharge of $100.00 against the account holder for the property where the violation occurred.

4. For a fourth and any subsequent violation within the preceding 12 calendar months, the director or his designee shall impose a surcharge of $250.00 against the account holder for the property where the violation occurred.

Further, the director may:

a. Install a flow restrictor on the property where the violation occurred or is occurring, for a length of time to be determined by the director, but in no event for more than one year; or

b. Disconnect service on the property where the violation occurred or is occurring, for a length of time not to exceed 60 days in length.

5. As an additional remedy, the violation of any provision of this chapter by any person who has received more than one written warning pursuant to subsection (A)(1) of this section or against whom the director has imposed a second violation in one consecutive 12-month period is deemed to be and is hereby declared a public nuisance and may be subject to abatement by restraining order or injunction issued by a court of competent jurisdiction.

B. Time Period for Accounting Violations. Accrued violations will be based on acts of noncompliance occurring within a consecutive 12-month period. Each successive 24-hour period of any violation or failure to comply shall be a separate and distinct violation.

C. Notice of Violation. For each violation, the director shall give notice as follows:

1. Written notice of violation will be sent through the U.S. mail, first-class prepaid, to the address

of the account holder as shown on current water billing records or personally served on the account holder. The notice will be considered to have been served upon the account holder either upon depositing the notice in the U.S. mail or when personally served, whichever methodology is utilized.

2. Written notice of violation shall include the date, time, and location of the violation; a description of the violation; provisions of the ordinance violated; a statement of the assessed surcharge or other enforcement action; and the appeal procedures.

D. Right of Appeal. Any account holder provided a notice of violation in accordance with the provisions of this chapter shall have the right of appeal. A request for hearing must be made in writing and must be received by the director within 10 calendar days from the date of personal or mailed service of the notice of violation. Upon receipt of an appeal and request for hearing, all applicable surcharges and enforcement actions will be suspended until such hearing has been completed and a final determination made.

E. Determination of Appeal. The appeal will be heard and determined by city manager or the designee of the city manager. The city manager shall consider whether the account holder knew or should have known of the violation at the time it occurred and whether the account holder took reasonable action to correct the violation upon notification of said violation. The determination of the city manager will be final and conclusive.

F. Payment of Penalties and Charges. Any surcharge imposed pursuant to this section, or reimbursement of city expenses, shall be added to the account of the account holder for the property where the violation occurred and shall be due and payable on the same terms and subject to the same conditions as any other charge for regular water service.

G. Reimbursement of City Expenses. If violations result in either installation of a flow restrictor, discontinuation of water service, or injunctive relief sought and obtained by the city pursuant to this chapter, the account holder whose service is affected shall reimburse the city for all costs incurred, including attorney's fees.

H. Reimbursement from Tenants. Nothing in this chapter shall limit or be construed to limit the right of an account holder to seek reimbursement of a surcharge or other costs from a tenant or other consumer. (Ord. 12-02 § 1, 2012; Ord. 91-5 N.S. § 6, 1991; Ord. 90-19 N.S. § 1, 1990. Formerly 13.35.110).

13.35.130 Violation – Additional remedy.

As an additional remedy, the violation of any provision of this chapter by any person who has received more than one written warning pursuant to BMC 13.35.120 to refrain from the same or any other violation under this chapter in one calendar year shall be deemed, and is declared to be, a public

nuisance and may be subject to abatement by a restraining order or injunction issued by a court of competent jurisdiction. (Ord. 12-02 § 1, 2012; Ord. 90-19 N.S. § 1, 1990).

Appendix D-3: Administrative Preliminary Draft Design Report for the Benicia Water Reuse Project

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One Walnut Creek Center
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April 4, 2008

Ms. Chris Tomasik
Assistant Director of Public Works
City of Benicia
250 East "L" Street
Benicia, CA 94510

Subject: Water Reuse Project – Administrative Preliminary Draft Design Report

Dear Ms. Tomasik:

CDM is pleased to submit the Administrative Preliminary Draft Design Report for the Benicia Water Reuse Project. The report summarizes the findings from the project's engineering studies, pilot-scale tests, and concentrate toxicity tests. Based upon this work, the report presents recommended design criteria, preliminary drawings, and cost estimates for a 2.0 million gallon per day Water Reuse facility.

We sincerely appreciate the assistance and support provided by you and your staff during this project. Thank you for the opportunity of working with the City on this important project.

Very truly yours,

T. Gerald Cole, P.E.
Senior Project Manager
Camp Dresser & McKee Inc.

Paul F. Meyerhofer
Senior Vice President
Camp Dresser & McKee Inc.

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Section 1
Introduction

1.1 Project Background and Objectives

The City of Benicia is located in the southeast corner of Solano County. The City and the nearby Valero Refinery have entered into a partnership to develop a project to supply water recycled from the City's wastewater treatment plant for use as cooling tower make-up water at the refinery. The proposed use of recycled water would offset a commensurate amount of raw water, thus increasing the reliability of the City's potable supply.

The City's wastewater facility provides secondary level treatment. Treatment processes consist of screening, grit removal, primary sedimentation, activated sludge, secondary clarification and disinfection. The plant has a design dry weather flow capacity of 4.5 million gallons per day (mgd) and currently treats an average dry weather flow of 2.36 mgd. Treated wastewater or effluent is discharged into the Carquinez Strait of the San Francisco Bay via a deep water outfall. Minimum standards of treatment or limits of pollutants discharged are regulated by the City's National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit is issued and administered by the San Francisco Bay Regional Water Quality Control Board.

The project is planned to deliver ~~up to 2 mgd of~~ recycled water to the refinery, which is approximately three miles north of the City's wastewater treatment plant (WWTP). Figure 1-1 presents a project location map. The minimum design capacity of the facilities would be 1.0 mgd and the maximum design capacity would be 2.0 mgd.

The overall project objectives as established by the City and Valero are as follows:

- Meet water quality and quantity requirements for the cooling towers.
- Meet discharge requirements for disposal of demineralized reject stream.
- Comply with State Title 22 requirements for recycled water for cooling towers.

1.2 Project Authorization

On July 7, 2004, in accordance with Task Order No. 1 to the Consultant Agreement between the City and Camp Dresser & McKee Inc. (CDM), the City of Benicia authorized CDM to provide Phase One Engineering Services for the development of the proposed Water Reuse Project. In June 2007, the City authorized CDM to proceed with preparation of the preliminary design for the proposed project.

1.3 Conceptual Design Report and Technical Memoranda

In October 2006, CDM submitted the Conceptual Design Report (CDR) for the Project to City staff. The CDR includes background information on process evaluations and selection, recommended processes and design criteria and estimated project construction costs. In the development of the conceptual design, CDM prepared five Technical Memoranda (TM) each for various components of the Project. The technical memoranda were prepared in draft form and were submitted to the City and its steering committee (described below) for review, comment and approval of CDM's recommendations. The technical memoranda produced in the development of the project concept are as follow:

- TM 1 – Evaluation of Alternative Reuse Treatment Systems and Ammonia Removal Options (Sept. 7, 2004)
- Supplement to TM 1 – Biological Nitrification Alternatives (Nov. 30, 2005)
- TM 2 – Evaluation of Alternative Disinfection Processes (Nov. 4, 2004)
- TM 3 – Recycled Water Conveyance System (Nov. 9, 2004)
- TM 4 – Analysis of Facilities Siting Alternatives (Feb. 2, 2005)

The CDR compiled and summarized these technical memoranda. The technical memoranda are included in the Appendix to the CDR.

1.4 Purpose of the Preliminary Design Report

The purpose of this Preliminary Design Report (PDR) is to refine and amplify the project components developed during the conceptual design phase and to serve as a road map for the development of the final design. The preliminary design builds on the background and criteria established in the conceptual design phase. The PDR is intended to be a stand alone document, providing brief summaries of decisions made during the conceptual design phase. Should the reader desire more information on process evaluations and other studies conducted during the CDR phase, the TMs referred to above will provide such information.

1.5 Project Team

The Project is being developed under the direction of Chris Tomasik, Assistant Director of Public Works for the City.

The City has an ad hoc steering committee for the Project, known as PURE (People Using Resources Efficiently). CDM is also very appreciative of the guidance, insight and direction provided from the committee as a whole and individually. The PURE committee is comprised of Benicia residents appointed by the City Council. The

members are: Robert Craft, Chair; Donald Basso; Dennis Lund; Brad MacLane; and Elizabeth Patterson, Council member. The Valero Refinery representative to PURE is Guy Young.

In addition to CDM, the City retained ~~EOA, Inc~~ Eisenberg, Olivieri and Associates Inc. (EOA) to provide consultation and direction for permitting and regulatory compliance issues. To ensure that the project meets the requirements of the California Environmental Quality Act (CEQA), the City retained Environmental Science Associates (ESA) to perform environmental assessment of the project and to develop a draft Initial Study/Mitigated Negative Declaration.

1.6 Acknowledgements

CDM wishes to acknowledge the valuable guidance and expert advice received from the City, and in particular, Chris Tomasik, John Bailey (retired WWTP Superintendent), Jerry Gall, WWTP Superintendent, and Jeff Gregory, WWTP Supervisor.

1.7 List of Acronyms

BFP	belt filter press
BOD	biochemical oxygen demand
$CaCO_3$	Calcium Carbonate
CDM	Camp Dresser & McKee Inc.
CDR	Conceptual Design Report
CEQA	California Environmental Quality Act
CIP	clean-in-place
CML	Cement Mortar Lined
CMLC	Cement Mortar Lined and Coated
CMUs	cement masonry units
Cn	cyanide
Cu	copper
DB	dry bulb
DIP	Ductile Iron Pipe Coated and Lined
DIPPL	Ductile Iron Pipe Polyethylene Fusion Lining
DOPH	State of California Department of Public Health
EDR	Electrodialysis Reversal
ft	foot
gal	gallons
GFD	gallons per square foot per day
gpm	gallons per minute
H2SO4	sulfuric acid
Harza	Harza Consulting Engineers and Scientists
HMI	Human Machine Interface
hp	horsepower
hr	hour

HVAC	Heating, Ventilation & Air Conditioning
Hz	Hertz
IS/MND	Initial Study/Mitigated Negative Declaration
kVA	KiloVolt Amperes
kW	KiloWatt (1000 Watts)
I/O	input/output
LPHI	Low Pressure, High Intensity
MBR	membrane bioreactor
MF	microfiltration
mg	milligram
mg/L	milligram per liter
mgd	million gallons per day
mL	milliliter
MPBs	Multi-Purpose Basins
MPN	Most Probable Number
MSDS	material safety data sheets
NaOCI	sodium hypochlorite
NaOH	caustic soda
NEC	National Electrical Code
NF	nanofiltration
Ni	nickel
NPDES	National Pollutant Discharge Elimination System
NTF	nitrifying trickling filters
NTU	Nephelometric Turbidity Unit
NWRI	National Water Research Institute
OSHA	Occupational Safety and Health Administration
PD	Project Description
PDR	Preliminary Design Report
PG&E	Pacific Gas & Electric Company
PLC	programmable logic controller
psi	pounds per square inch
PURE	People Using Resources Efficiently
PVC	polyvinyl chloride
pvdf	polyvinyldene fluoride
RBC	rotating biological contactors
RO	reverse osmosis
RWQCB	Regional Water Quality Control Board – San Francisco Bay Region
RWSPS	recycled water supply pump station
SCH	schedule
SETPS	Secondary Effluent Transfer Pump Station
sf	square feet
SSTL	stainless steel
STL	steel
SWPS	stormwater pump station
TDS	Total Dissolved Solids

TEFC	totally enclosed fan cooled
Title 22	California Code of Regulations, Title 22 (Water Recycling Criteria)
TM	technical memorandum, technical memoranda
TRE	Toxicity Reduction Evaluation
TSS	Total Suspended Solids
TUc	chronic toxicity units
µg/L	micrograms per liter
UV	ultraviolet
VAC	volts alternating current
VFD	variable frequency drives
WWTP	Wastewater Treatment Plant

Section 2
Basic Criteria for Project Development

2.1 Recycled Water Mineral Quality Objectives for Cooling Water

For this project, strict water quality objectives have been established by Valero relating to ammonia, silica, chloride and total dissolved solids (TDS). The bases for setting strict limits for these constituents are as follows:

- Corrosion of admiralty metals, e.g., copper-zinc alloys from chloride and ammonia.
- Plating out of deposits, e.g., calcium carbonate ($CaCO_3$).
- Build-up of slimes in cooling towers.
- TDS build up affects the number of cycles of concentration, which directly affects operating costs.

Table 2-1 presents a listing of secondary effluent constituents of concern and the limits required for the recycled water to meet the water quality criteria.

Table 2-1
Comparison of Key Secondary Effluent Quality Parameters and Recycled Water Quality Limits

Parameter	*Units*	*Benicia Effluent Water Quality*	*Cooling Water Quality Limits*
ammonia	mg/L	30	<0.2
bicarbonate	mg/L	190	104
chloride	mg/L	120	20
phosphate	mg/L	2	3
silica	mg/L	22	17
hardness	mg/L	130	<200
TDS	mg/L	650	250

2.2 Title 22 Recycled Water Quality Requirements for Cooling Towers

Recycled water from the proposed Water Reuse Treatment System must meet disinfection requirements for tertiary recycled water, proposed for use as cooling water supply, as contained in Title 22, Division 4, Chapter 3 of the California Code of Regulations (Title 22).

For either chlorination or ultraviolet (UV) disinfection, Title 22 requires that the median concentration of total coliform bacteria measured in the disinfected effluent shall not exceed 2.2 per 100 milliliters (mL) over the prior seven-day test period, not

exceed 23 per 100 mL in more than one sample in any 30-day period, and never exceed 240 total coliform bacteria per 100 mL. Title 22 requires demonstration that alternative disinfection systems, such as UV, when combined with the filtration process, inactivate and/or remove 99.999 percent (5 log inactivation or removal) of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. In addition, the micro-filtration process must meet the Title 22 turbidity performance requirements for micro-filtration, which require that the filtered water does not exceed 0.2 Nephelometric Turbidity Unit (NTU) more than 5% of the time within a 24-hour period, and 0.5 NTU at any time.

The California Department of Public Health (DOPH) is responsible for approving UV disinfection systems. All UV disinfection systems proposed for water reuse in California must be validated under the 2003 NWRI/AWWARF Guidelines, which contain extensive design criteria.

2.3 Overview of Process Selection

Process evaluations and selections were made based on meeting Valero's water quality objectives shown in Table 2-1 and using Benicia secondary effluent quality as the feed water to the Water Reuse Treatment System. Benicia secondary effluent quality is also shown in Table 2-1. During the conceptual design phase, it was determined that biological nitrification using nitrifying trickling filters (NTF) would be the most cost-effective solution for ammonia reduction for the Benicia project.

In the application of secondary effluent to reverse osmosis (RO) membranes, pretreatment using microfiltration (MF) or ultra-filtration is typically used to prevent RO membrane fouling and to extend the lives of the membranes. Several recycled water projects employ MF for pretreatment to the RO process.

To meet the other mineral water quality objectives it was determined that RO would be required. For disinfection, UV was selected as the preferred method of disinfection to meet the Title 22 recycled water quality requirements for cooling towers.

After UV disinfection, breakpoint chlorination will be provided to reduce the ammonia level resulting from the NTF MF/RO processes to meet the strict product recycled water limit of < 0.2 mg/L.

Additional discussion of process selection is contained in Section 3.

2.4 Project Output Capacity and Flow Equalization

During dry weather periods, flow rates at the Benicia WWTP vary from about 1 mgd to peaks of nearly 4 mgd. During wet weather periods, peak flow rates can reach 24 mgd. The Water Reuse Project design must take these flow variations into account since one of the overall project objectives is to supply recycled water at a more or less constant rate of 2 mgd throughout the day.

To meet the design output capacity of the project, the input secondary effluent flow to the recycled water treatment system needs to be higher than 2.0 mgd to account for the reject (waste) flows from both the MF and the RO processes. The MF process will reject about 10% of its output and the RO will reject approximately 15% of its output flow. The MF reject will be recycled to the headworks of the plant for reprocessing; the RO concentrate will be sent to the outfall for disposal. Regulatory issues associated with RO concentrate disposal are discussed in Section 4.

Based on the preliminary flow balance performed by CDM, the input flow to a 2 mgd water reuse facility will need to be approximately 2.55 mgd to account for the reject flows. Hence, a constant flow of secondary effluent must be made available at the rate of 2.55 mgd, which would include approximately 0.25 mgd of MF backwash flow which is recycled to the headworks of the WWTP.

The MF and RO processes perform best when operated at nearly a constant flow rate. It is more cost-effective to equalize secondary effluent supply to the water reuse treatment system, than to equalize the product recycled water. Operating the water reuse treatment system at a constant flow rate also provides for stable operating conditions with less variation in process performance.

The secondary effluent will be equalized using a portion of the existing multi-purpose basins (MPBs) at the WWTP. These basins are generally used to equalize high, wet-weather flows to maintain the plant's performance during high flow periods. They are also used during dry periods to store wastewater when a process unit is taken out of service.

In 2004, City provided CDM with typical dry weather flow information including diurnal flow curves. Dry weather flow was approximately 2.7 mgd. This value was used in the development of the conceptual and preliminary designs. Figure 2-1 is based on average dry weather flow (ADWF) of 2.7 mgd. It graphically shows the variation in plant flow rate during dry weather periods and the estimated amount of equalization storage required to deliver approximately 2.55 mgd on a continuous basis. Approximately 400,000 gallons of storage is required, which is approximately the volume of MPBs Nos. 3, 4 & 5. During high wet weather flow periods, equalizing flow will not be necessary.

2.4.1 Project Design Output Capacity versus Available Secondary Effluent

Wastewater flow within the City's WWTP is metered at two locations. The first meter in the flow line is called the Influent Flow Meter (M-1) and is located just after the Influent Pump Station, which receives most of the in-plant returned flows. The second meter is called the Mid-Plant Flow Meter (M-2) and is located between the primary clarifiers and the activated sludge aeration basins. (The City also calls this meter its "Effluent Flow Meter.")

In conjunction with its review of the draft PDR, the City provided CDM with updated flow data for meter M-2 for total daily flow for year 2007. A review and brief analysis of the data set from April through October found that the mean (average) daily dry weather flow during this period was 2.38 mgd. Statistical analysis of the data set finds that the average dry weather flow (ADWF) can be expected to be 2.3 mgd at least 85% of the time.

Assuming that the ADWF to the plant is actually about 2.4 mgd, there is sufficient flow to meet a recycled water output design flow rate of 2.0 mgd during dry weather conditions, were it not for the in-plant water needs provided by the Number 3 Water System. This system pumps a continuous flow of approximately 450 gpm or 0.64 mgd. Some of this water is recycled within the plant downstream of the two flow meters, discussed above.

Also of concern would be the lack of secondary effluent remaining to provide dilution water for the RO concentrate prior to discharge during dry weather flow periods. Toxicity dilution studies (please refer to Section 4) were performed with a dilution ratio of 43%, based on a worst case scenario for very low ADWF of 2.7 mgd. Based on the latest data, there would be no secondary effluent dilution water available. The impact of such limitations on permit requirements would need to be evaluated.

For both of the reasons stated above, there currently is not sufficient dry weather flow to support a recycled water output of 2.0 mgd.

The City is in the process of conducting an in-plant flow study, which will recommend specific types of meters to be installed at appropriate locations to aid in plant operations and control. Until such study is completed and the new meters are installed and adequate flow data are collected, the revised maximum design capacity of the Water Reuse Project cannot be determined. Hence, this matter should be revisited in Final Design, when additional data are available.

2.5 Location of Project Facilities

During the conceptual design phase, it was determined that all project treatment facilities would be located at the City's WWTP.

2.6 System and Process Reliability Criteria

During development of the conceptual design, project reliability issues were discussed with the City, Valero, and the PURE Committee. It was agreed that providing 100% project reliability (24/7/365) would be too costly. Hence, interruption in the delivery of recycled water could be tolerated by Valero. A 500,000 gallon product water storage "break tank" will be provided at the refinery to supply water when there is a process upset that effects the recycled water quality, and also during limited power outage durations. The break tank storage would allow time to switch from recycled water to fresh water, and if necessary process the fresh water for

use as cooling water. The City agreed that fresh water backup would remain available.

Based on the decisions, cited above, the following criteria were developed:

- Early in the project concept development phase it was decided that standby power would not be provided. However, upon further analysis of this criteria during PDR development, it was determined by City staff that standby power will be required for some critical loads for process considerations and for building safety reasons. Please refer to discussions in Sections 6 and 11.
- All main line pump systems will have a standby pump.
- There will be two nitrifying trickling filters, each designed for one-half the total flow.
- MF system will be designed with multiple skids (minimum of 3).
- RO system will not be designed with a redundant skid, since there are no mechanical components associated with the system that are prone to fail.
- UV will be designed in compliance with the redundancy requirements of the DOPH.
- Recycled water will meet Title 22 requirements before leaving the City's WWTP site.

2.7 Planning Criteria Resulting from Environmental Review Process

The City retained environmental consulting firm, ESA, to prepare the appropriate environmental compliance document required under CEQA in order to implement the project. Using the CDR and Project Description (PD) prepared by CDM, ESA prepared a draft Benicia Water Reuse Project, Initial Study/Mitigated Negative Declaration, May 2007, *Preliminary-Subject to Revision* (IS/MND). In the draft IS/MND, ESA recommended several mitigation measures, most of which relate to issues associated with construction activities, such as noise, hours of operation, dust control, emissions from gas driven equipment, disruption to nesting birds, traffic control and the like. The reader is referred to the IS/MND for additional details. The primary mitigation measures that affect the preliminary design of the project facilities are presented below with discussion.

- Mitigation Measure GEO-1: Conduct a design level geotechnical investigation.

  A detailed geotechnical investigation was conducted by Harza in 1998 for the 1999 WWTP Improvements Project. The information contained in that report is

considered adequate for development of this PDR. During the final design phase, new borings will be taken at appropriate locations within the project site to confirm the soil conditions and geotechnical recommendations contained in the Harza report. More discussion of geotechnical design considerations is presented in Sections 8 and 9, herein.

- Mitigation Measure NOI-2: Include noise reduction features to ensure that operating noise levels associated with proposed pumping systems will conform to applicable City standards, codes and ordinances.

  Based on the City's Ordinance 8.20.140, no project equipment would be allowed to "…cause the noise level at the property line of any property to exceed the ambient base noise level by more than five decibels." (Refer to Appendix B.) Background noise levels should be taken under varying conditions (day time, night time, weekends, etc.) to determine background conditions.

  The motors that will drive the pumps of the Recycled Water Supply Pump Station that will pump the product water to the refinery will have special sound enclosures around them to meet the City's noise requirements. Similarly, the pump motors of the NTF Recycle Pump Station will also be fitted with sound enclosures.

  Other pump systems will either be submersible type, which have their motors submerged in a covered wetwell, or will be enclosed in the MF/RO Building.

2.8 Other Design Criteria

Other design criteria that emerged from planning and conceptual design efforts include:

- The facades of new buildings and structures should conform to those of the existing plant structures.

Section 3
Recycled Water Treatment Process Selection

3.1 Evaluation of Biological Nitrification Treatment Alternatives for Ammonia Removal

In order to meet the ammonia criterion set by Valero as stated in Section 2 above, six alternative biological nitrification alternatives were evaluated for cost-effectiveness and reliability. NTFs were selected as the best system for the City's Water Reuse Project. NTFs are attached growth biological treatment processes that allow the nitrifying bacteria to grow on the surface of solid media, as the wastewater flows over the media. The NTFs will oxidize the ammonia to nitrate, leaving approximately 2 mg/L remaining to be removed by the reverse osmosis process and finally by break point chlorination. (Details on the development and evaluation of nitrification alternatives can be found in Section 3 of the October 2006 CDR.)

There will be two NTFs units for Benicia and each will be 42-ft in diameter with 12 feet of media. Total height, not including the top of the distribution mechanism will be approximately 15-ft high. Overall design criteria are shown in Table 3-1.

Table 3-1
Summary of Process Design Criteria for Tertiary Nitrifying Trickling Filters

Item	*Description/Criteria*
Design Flow, mgd	2.55
Influent Ammonia Concentration, mg/L	30
NTF Effluent Ammonia Concentration, mg/L	2 to 3
Kinetic Temperature, degrees C	17
Recycle Ratio, %	50 to 100
Media Type	Polyvinyl chloride (PVC), Cross Flow
Nitrifying Trickling Filter Units (2)	42 ft diameter x 12 ft media depth
Feed pumps, including recycle, mgd	2.55 each (2 duty, 1 standby)

Figure 3-1 shows a typical dual set of trickling filters, similar to the ones proposed for the Water Reuse Project. As noted in the previous section, the NTFs for the Benicia project will be constructed of facades that match or blend with the architectural finishes of the existing plant's facilities.

Figure 3-1
Typical Nitrifying Trickling Filters

3.2 Advanced Treatment Systems

3.2.1 Evaluation of Partial Demineralization Systems

Computer simulation models of alternative partial demineralization schemes were run to determine the most cost-effective system that could process the City's effluent to meet the cooling water quality objectives. Technologies investigated in various combinations, included: granular media filtration, MF, nanofiltration (NF), RO and electrodialysis reversal (EDR). As input to the demineralization analysis, it was assumed that ammonia would be biologically removed by nitrification down to approximately 2 mg/L, as discussed earlier.

MF followed by RO was determined by computer simulations to meet all the requirements except for ammonia. The RO system will reduce the ammonia to approximately 0.2 mg/L. Approximately 15% of the plant flow after MF will be routed around the RO system and blended with the RO permeate. Providing a 15% blend around reduces the cost of the RO system, and also provides the benefit of producing a more stable, less corrosive product water than if 100% RO treatment is used. However, it will also raise the ammonia level in the blend to about 0.3 mg/L. Reducing the ammonia in the blended flow from about 0.3 mg/L to less than 0.2 mg/L will be met by breakpoint chlorination after UV disinfection. Figure 3-2 shows a process schematic of the MF/RO System.

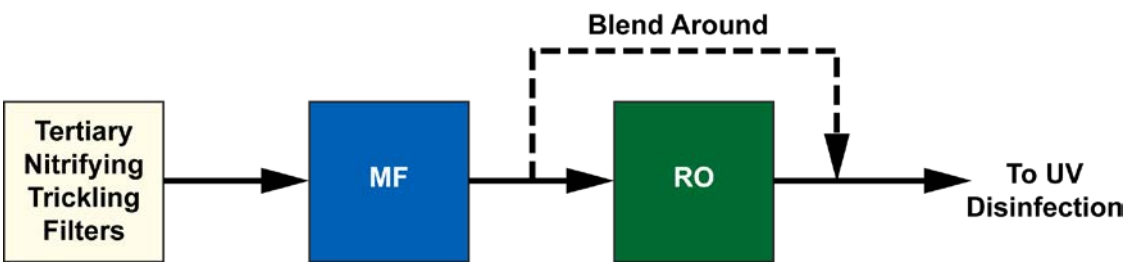

Figure 3-2
Process Schematic of the MF/RO System

Based on the above schematic the recycled water quality was projected to meet the water quality objectives as shown in Table 3-2.

Table 3-2
Comparison of Key Secondary Effluent Quality Parameters and Recycled Water Quality Limits and Projected Recycled Water Quality

Parameter	*Units*	*Benicia Secondary Effluent Water Quality*	*Cooling Water Quality Limits*	*Projected Recycled Water Quality*[1]
ammonia	mg/L	30	<0.2	<0.2
bicarbonate	mg/L	190	104	37
chloride	mg/L	120	20	<20
phosphate	mg/L	2	3	0.5
silica	mg/L	22	17	4
hardness	mg/L	130	<200	23
TDS	mg/L	650	250	120

[1] Based on 15 % blend around the RO system and breakpoint chlorination

3.2.2 Pre-Treatment for Demineralization - Micro-Filtration System

Micro-filtration will be provided before the RO membranes to reduce fouling and thus increase the cleaning interval. Typical MF systems processing secondary effluent will reject approximately 10% of the output flow, or filtrate. Hence, the output capacity of the MF system will be approximately 2.3 mgd. Motor operated strainers will be placed upstream of the MF's to protect them from residual particulates from the NTFs. MF systems are available in either the pressurized-type or the submerged, vacuum type. A pressurized MF system is recommended since it is more cost effective at the 2 mgd capacity. Table 3-3 presents a summary of the design criteria for the micro-filtration system. Figure 3-3 shows a typical pressure, micro-filtration system housed in a building.

Table 3-3
Summary of Micro-Filtration System Design Criteria

MF System Component	***Description/Criteria***
Design Output Flow Rate, mgd	2.3
Turbidity Process Performance, NTU	0.2 no > 5% in 24-hr
Membrane Type	Polyvinylidene fluoride (pvdf)
Reject Rate and Average Flow, %/mgd	10/0.25
Design Flux Rate, gallons per square foot per day (GFD)	25 to 40 (average)
MF Banks	Minimum of 3
MF Feed Pumps	3 at 900 gpm, 50 pounds per square inch (psi) & 35 horsepower (hp)

Figure 3-3
Typical Micro-Filtration System
(courtesy of Siemens Water Technologies Corp.)

3.2.3 Partial Demineralization System - Reverse Osmosis

The reverse osmosis system will be designed for an output capacity of 1.7 mgd. When the RO treated water (known as permeate) is combined with the 15% "blend around" flow from the MF process, the total output will be 2.0 mgd. The RO system is estimated to have a recovery rate of approximately 85% of the influent flow. Hence, the reject or concentrate stream will be approximately 300,000 gpd. The RO system will include cartridge filters to protect the RO membranes from any solids carry over from the MF process and would also allow short periods of MF bypass for emergency operation. The RO system will be fed by two horizontal, dry pit pumps. Flow is boosted in a recycle step, internal to the RO system, by two booster pumps. Table 3-4 below presents a summary of the RO System components. Figure 3-4 shows a photograph of a typical RO system.

Figure 3-4
Typical RO System

Table 3-4
Summary of Reverse Osmosis Process Design Criteria

RO System Component	***Description/Criteria***
Design Output Flow Rate, mgd	1.7
Membrane Type	Polyamide
Reject Rate and Flow, %/mgd	15/0.3
Reject Flow Disposition	Disposal to Existing Plant Outfall
Design Flux Rate, GFD	8 (average)
Cartridge Filters	40 inch
Low Pressure (35 psi) Supply Pumps (horizontal, dry-pit type)	2 at 35 hp each
High Pressure (125 psi) Booster Pumps (horizontal, dry-pit type)	2 at 125 hp each

3.3 Evaluation of Alternative Disinfection Systems

Alternative disinfection systems evaluated for the Benicia reuse project included chlorination using sodium hypochlorite and ultraviolet light disinfection. Recycled water from the proposed Water Reuse Treatment System must meet disinfection requirements for tertiary recycled water, proposed for use as cooling water supply, as contained in Title 22, Division 4, Chapter 3 of the California Code of Regulations (Title 22), as discussed in Section 2. In addition to chlorination, three types of UV systems were reviewed for applicability to the Benicia water reuse project. Low Pressure, High Intensity (LPHI) was selected owing to energy efficiency and applicability to the size of this project. Chlorination and LPHI UV were evaluated from economic and

reliability perspectives. Other qualitative factors, in particular water quality impacts, site impacts (owing to limited available space and allowances for future plant modifications) and ease of process control, favor UV over chlorination. Hence, UV was selected as the process alternative for disinfection.

Table 3-5 presents a summary of the process design criteria for the UV disinfection system for the project. Figure 3-5 shows a typical low pressure, high intensity UV module.

Figure 3-5
Typical In-Channel UV Disinfection System
(*Courtesy of Trojan Technologies)*

Table 3-5
Summary of UV Disinfection System Process Design Criteria

Item Description	***Criteria***
Title 22 Requirements for Cooling Tower Makeup Water	5 log poliovirus inactivation and 7-day median total coliform of 2.2 MPN/100 mL
Design UV Dose for MF Filtrate	80 mJ/cm^2
UV influent MF Filtrate Turbidity	0.2 ntu 95% of time, NTE 0.5 ntu
UV Transmittance	65% or greater at 254 nm
Reliability Requirements	Meet Design Dose with 1 Reactor Bank out of Service
Number of Trains (Channels)	One
Total Number of Banks, duty/standby	2/1
No. of Design Dose Lamps	80

Table 4-3 Pilot Testing Trace Metal Results and NPDES Permit Limits				
Pollutant	***Secondary Effluent (RO Feed)***	***RO Concentrate***	***Blended Effluent***	***NPDES Limit***
	ug/l	**ug/l**	**ug/l**	**ug/l**
Cadmium	0.015	0.10	**0.05**	5.7
Copper	2.8	17.7	**9.2**	32
Lead	0.20	1.0	**0.54**	17.3
Mercury	0.0051	0.021	**0.012**	0.087
Nickel	2.2	16.6	**8.3**	30.2
Selenium	0.36	1.6	**0.88**	31.0

4.4.1 Acute Toxicity

Acute toxicity describes the adverse effect that a substance has on a living organism, and which results either from a single exposure or from multiple exposures in a short space of time (usually less than 24 hours). Three sets of acute toxicity tests were performed using blends of the RO concentrate and effluent; one during the first round of pilot-scale testing and two during the third round. The acute toxicity tests consisted of parallel sets of static renewal tests, using the City's normal NPDES permit compliance test species: the freshwater Fathead Minnow, an estuarine fish species *Menidia beryllina* (Inland Silversides Minnow), and rainbow trout. The majority of tests showed 100% survival (i.e. no measurable toxicity). Survival results in the 43% RO concentrate blend were nearly identical to those in the 100% effluent for all three species tested. Based on these results, the blended discharge should meet all acute toxicity requirements.

4.4.2 Chronic Toxicity

Chronic toxicity describes the adverse effect that a substance has on a living organism, and which results when that organism is exposed to the substance continuously or repeatedly. ~~Two series of chronic toxicity tests were performed using blends of the RO concentrate and effluent.~~

The Benicia NPDES permit does not have enforceable effluent limits for chronic toxicity but instead has two "trigger values." Accelerated monitoring is required after exceeding either a three sample median trigger value of 10 chronic toxicity units (TUc) or a single sample maximum trigger of 20 TUc or greater. Further toxicity reduction evaluation (TRE) studies are required if the triggers continue to be exceeded during the accelerated monitoring.

Two series of chronic toxicity tests were performed using blends of the RO concentrate and effluent. The first round of pilot testing used the Benicia NPDES permit compliance test species, *Mytilus*. Three additional species (*Opossum Shrimp*, *Inland Silversides Minnow*, and *Giant Kelp*) were added in the third round of testing to

confirm the results and to determine whether other species might be more sensitive to the RO concentrate/effluent blend than *Mytilus*.

The majority of tests showed < 1 TUc results (i.e. no measurable chronic toxicity). Results in the 43% RO concentrate blend were nearly identical to those in the 100% effluent for all four species tested. Based on these results, the blended discharge should meet all chronic toxicity requirements.

4.5 Conclusions

Conventional pollutants such as BOD and TSS in the effluent discharged to the Carquinez Strait should remain at current levels and may even show improvement as the Nitrifying Trickling Filter and Micro Filtration components associated with the project could provide an overall reduction of conventional pollutants when the final RO concentrate is blended with the secondary effluent.

Based on the results of the toxicity tests performed and the analytical results of the minerals, metals and other priority pollutants analyzed, the projected maximum blend of 43% RO concentrate with 57% secondary effluent should not result in any exceedances of the City's current or likely future NPDES permit requirements.

Blended effluent trace metals concentrations will increase due to the addition of the RO concentrate; however, the total mass of metals (and organics) discharged to the Bay will remain the same. Blended effluent concentrations will typically be lower for most months of the year than shown by the mass balance calculations, given that effluent flows will be higher (i.e. more blending volume) than the conservative value used in the calculations.

It should be noted that the RO concentrate will be continuously discharged at a rate of approximately 0.3 mgd (for a project design output flow of 2.0 mgd with a WWTP average dry weather influent flow of 2.7 mgd). During all 24-hour periods the instantaneous blend ratio of concentrate to total flow will exhibit considerable variation due to the normal diurnal variation in WWTP flows. (Please refer to Figure 2.1 in Section 2, which shows the variation in total plant influent flow rate throughout the day.) The 24-hour composite samples collected for NPDES permit compliance analyses for conventional pollutants and metals will contain less than the conservatively projected 43% RO concentrate whenever WWTP average daily flows exceed 2.7 mgd.

Continuous, flow-through bioassays are currently required for acute toxicity monitoring. Given the diurnal variability in effluent/RO concentrate blends, it is recommended the City request a minor NPDES permit self-monitoring program modification, prior to RO project implementation, to allow it to use the 24-hour static renewal acute toxicity testing method in place of the flow-through method when operating in RO recycled water production mode.

Results of the pilot studies were presented to the Regional Water Quality Control Board – San Francisco Bay Region (RWQCB) staff. It is anticipated that only minor

Section 5
Project Interface with Existing Facilities

5.1 Description of City's Existing WWTP

To understand how the Water Reuse Project will interface with the City's existing WWTP, it is necessary to understand the existing facilities. The plant has two separate biological treatment systems. The conventional activated sludge system, which was added in the late 1990's, has a capacity of 4 mgd, but can handle up to 8 mgd peak flows during wet weather periods. It also has a rotating biological contactor (RBCs) system that was constructed in the 1970's. The RBC system is used during wet weather, when peak flows exceed 12 mgd. Flows above 12 mgd are stored in the multi-purpose basins for equalization up to 18 mgd. Waste activated sludge is thickened by dissolved air floatation and anaerobically digested. Digested sludge is dewatered on a belt filter press and the cake is hauled to a landfill. The filtrate is routed back to the headworks of the plant. Figure 5-1 presents a process block diagram of the liquid stream of the plant. Figure 5-2 shows the existing site plan of the City's WWTP with the major components of the Water Reuse Project superimposed on it.

5.2 Overview of Interface Requirements

Operation of the Water Reuse Plant is closely linked to the City's existing wastewater treatment plant. Chlorinated secondary effluent will be taken for the supply to the Water Reuse Plant, secondary effluent will be stored for equalization in three of the existing multipurpose basins, return flows (such as MF backwash water) will be returned to the plant headworks, RO reject (also called brine or concentrate) will be returned to the City's outfall, electrical supply will come through the plant's main electrical switchgear, as well as other points of interface. Hence, it is appropriate to describe these interface points and requirements and how they are proposed to jointly function.

5.3 Diversion of Chlorinated Secondary Effluent

Pumping will be required to transfer chlorinated secondary effluent to the multipurpose basins and take full advantage of the storage volume in the basins. The pumps utilized will need to operate at varying flows, responding to the average dry weather diurnal flow pattern and ensuring that sufficient flow is transferred to the recycled water treatment system on a daily basis. Figure 2-1 illustrates the diurnal flow pattern for the plant, and average daily flow rate that is required for the Water Reuse Treatment system (2.55 mgd).

Several options were investigated for pumping of chlorinated secondary effluent, including use of existing facilities and construction of a new transfer pump station. These options are discussed briefly below.

5.3.1 Utilize the Existing Effluent Pumps

The existing effluent pump station contains 4 variable speed pumps, two low range and two high range pumps. Pumps are utilized during high tide conditions to pump to the outfall, with secondary effluent flowing by gravity under low tide conditions. After review of the existing low range pumps, it was determined that the pump capacity is too large to be utilized effectively to transfer secondary effluent to the multipurpose basins, even when operating at reduced speeds. Utilizing the pumps would also add control complexity, as it would be required to split flows with modulating valves when it is required to pump simultaneously to both the outfall and the recycled water treatment system.

5.3.2 Adding New Pumps to Existing Effluent Pump Station

Review of design drawings reveals there is insufficient space in the effluent pump station wet well to add new pumps without potentially adversely impacting intake hydraulics to the existing pumps. Expansion of the wet well is also not considered feasible due to the proximity of existing facilities including the outfall pipeline, control valve and structure to the south; sodium bisulfite storage facilities to the south; the chlorine contact basin to the east; and existing duct banks and pull box to the west.

5.3.3 Adding New Pump Station Adjacent to Effluent Pump Station

Another possible location for siting a new pump station is west of the existing effluent pump station. A pump station at this location would require a new suction pipeline routed from the either the effluent pump station wet well, the sodium bisulfite mixing chamber, or further upstream in the chlorinated secondary effluent channel. Installation of the pipeline in the effluent pump station wet well is challenging as a location will need to be selected that would not adversely impact intake hydraulics to the existing pump bays. Installation and routing of the pipeline to the west from the wet well, sodium bisulfite mixing chamber or further upstream in the chlorinated secondary effluent channel is also challenging due to the proximity of existing facilities including the outfall pipeline, control valve and structure to the south; sodium bisulfite storage facilities to the south; chlorine contact basin to the east; existing duct bank and pull box to the west; and the existing primary effluent channel to the west. Also the volume of the effluent pump station wet well and sodium bisulfite mixing chamber is relatively small and a minimum volume will need to be maintained during low flow conditions to provide flows to the 3 water pumps (which draw suction from the effluent pump station wet well). This will require careful and precise control of both wet well level and rate of flow to the new pumps. Metering of flow upstream is recommended for control purposes, and it is considered difficult to install a flow meter in the existing chlorinated secondary effluent channel. Because of these reasons, it is not recommended that the pump station be installed in this location.

5.3.4 Adding New Pump Station East of Chlorine Contact Basin

There is space available to site a new pump station east of the chlorine contact basins. Suction pipelines for the pump station will be installed from the chlorine contact basins to a new wet well. This location is considered preferable to the other locations described above. Also, a large wet well volume is available for the pumps. A magnetic flow meter for control of the rate of flow of the pumps will be installed in the existing secondary effluent pipeline that feeds the existing chlorine mixing chamber. This new flow meter will be used to ensure that the secondary effluent transfer pumps are operated at the minimum flow rate that maintains sufficient flow to the No. 3 Water System under low average dry weather flow conditions. (The No. 3 water pumps draw suction from the effluent pump station wet well further downstream). This new pump station is called Secondary Effluent Transfer Pump Station (SETPS) No. 1, and its location is shown on Figure C-1 in Appendix A. The pump station will have 3 pumps (2 duty and 1 standby) to meet variable flow conditions. More details on the design of this pump station are presented in Section 6.

5.4 Utilization of Multi-Purpose Basins 3, 4 & 5 for Equalization of Secondary Effluent Flow

During dry weather periods, variable plant flow will be equalized in multi-purpose basins 3, 4 & 5. Secondary effluent will be pumped into the basins from SETPS No. 1. Basin volume will vary throughout the day as the basins are filling and also continuously drawing as feed water to the nitrifying trickling filters. In order to provide the required volume of approximately 400,000 gallons, the full depth of the basins must be available. Since the invert of the MPBs is at Elevation 92, a second pump station, SETPS No. 2, will be constructed to deliver water to the wetwell of the NTFs recycle pump station.

During wet weather periods when minimum flow is at or above 2 mgd, the diverted secondary effluent will by-pass the MPBs and will be conveyed directly to the NTFs recycle pump station. This will free all the MPBs to store wet weather flows that cannot be directly accommodated by the process systems of the plant.

5.4.1 Conveyance of Secondary Effluent from MPBs to NTFs

City staff expressed concerns regarding the additional operation and maintenance and energy requirements for SETPS No. 2. It was requested that CDM evaluate lowering the NTF Recycle Pump Station and flow by gravity from the MPBs to the NTF RPS wet well.

Construction costs as well as O&M costs were estimated for the two alternatives. The results of the analysis are presented below.

Alternative No. 1 – Use SETPS No. 2 to Convey Secondary Effluent at a constant rate to the NTFs Pump Station Wet Well.

- Advantages: Reliable flow control; makes full use of depth of MPBs.

- Disadvantages: Higher O&M cost, primarily from maintenance, and equipment replacement & repair.

Alternative No. 2 – Eliminate SETPS No. 2 and flow by Gravity to NTF Recycle Pump Station Wet Well. Lower the operating levels of the NTF RWPS Wet Well five (5) feet to accommodate gravity flow from the MPBs. Install a flow meter and flow control valve in a vault to control flow to constant rate. Lower the pipeline from the NTF Recycle Pump Station to the MF influent pump station and increase MF PS pumping head by 5 feet.

- Advantages: Less mechanical equipment to maintain, resulting in lower O&M costs.

- Disadvantages: Deeper piping; higher power consumption; not able to use full basin depth (storage).

Table 5-1 presents a summary of the cost analysis, which shows that the construction cost of Alternative No. 1 is estimated to be less expensive than Alternative No. 2. However, the total O&M costs for Alternative No. 1 are estimated to be more expensive that Alternative No. 2. Estimated annual power cost for Alternative No. 2 is approximately 40% more than Alternative No. 1, due to additional pumping at both the NTF Recycle PS and the MF Feed Water Pump Station. CDM recommends Alternative No. 1 be the method of conveyance, owing to better reliability and control. However, it is also recommended that the secondary transfer method should be re-evaluated in final design after the reliable project design capacity is determined and the amount of equalization storage is determined.

Table 5-1
Summary of Economic Analysis - Flow Transfer Alternatives from MPBs to NTFs

	Alt No. 1: SETPS#2	***Alt No. 2: Gravity Flow***
Estimated Construction Cost	$233,000	$253,000
Estimated Annual Operation & Maintenance Cost	$12,000	$1,000
Estimated Annual Power Cost	$3,300	$4,700

5.5 Equalization of Ammonia Return Flow from Existing Sludge Processing System

Sludge removed from the primary and secondary treatment processes is anaerobically digested and dewatered on a belt filter press (BFP). The City operates the BFP approximately 5 to 6 hours per day, 6 days per week. During this operational period the BFP filtrate is returned to the headworks of the plant for reprocessing. As a result of the anaerobic digestion process, this filtrate is very high in ammonia and causes large fluctuations in the ammonia load within the secondary processes, which makes for challenges in operating the secondary effluent chlorination system.

Large fluctuations in ammonia load will also pose operational problems for the NTFs, which will provide more consistent process performance if the ammonia loading is relatively consistent.

The filtrate flow rate is approximately 170 gallons per minute (gpm), which is estimated to be comprised of about 120 gpm of actual filtrate and about 50 gpm of washwater, which cleans the belt during processing.

The combined filtrate/washwater discharges into a sump in the Solids Treatment Building where it is combined with grit washer flow. Downstream these two flow streams are combined with surface drainage; from there they all flow to the headworks.

Plant staff report that the filtrate discharge pipe in the sump protrudes into the sump, so that a connection could be made to intercept the flow.

Nearby the sludge dewatering system is a sludge gravity thickener, which is no longer in use. It is covered and has an approximate capacity of 80,000 gallons. The amount of storage required to equalize the filtrate over a typical week is estimated to be approximately 50,000 gallons. Hence, this gravity thickener has sufficient capacity to store the filtrate for equalization. Filtrate flow would be metered back to the headworks at a constant flow rate ranging between 30 to 40 gpm. The filtrate would be pumped into the thickener and possibly could be gravity fed out of it. The details of making these modifications would be developed during final design.

5.6 Micro-Filtration Backwash Flow Reprocessing

City Operations staff expressed concern regarding CDM's recommended point of recycle of the MF backwash (MF BW or reject), that is to the Industrial Influent Sewer (IIS) and eventually to the headworks. The estimated flow rate of the MF BW is approximately 200,000 gpd, or about 140 gpm. CDM's understanding is that City's concerns relate to potential process impacts to the secondary treatment process and hydraulic impacts to the IIS.

Regarding hydraulic concerns, City provided an excerpt from a sewer study by Brown and Caldwell ("Benicia Business Park Sewer Collection System Analysis," prepared for City of Benicia, 16 Oct 06), which projects a build-out, peak wet-weather flow in the industrial influent sewer of approximately 7 mgd. B&C based its projections on certain flow factors that are documented in said report. Build out is projected over a 20 year period. Current Peak Wet Weather Flows (PWWF) were calculated at approximately 5 mgd. (Ref, Tables 8 & 9 from B&C report.)

CDM performed preliminary hydraulic calculations for the industrial influent sewer (IIS) within the plant boundary to determine flow capacity at maximum depth, while still maintaining open channel flow characteristics. Calculations indicate that the IIS has a maximum open-channel flow capacity of about 6.8 mgd. Flows above 6.8 mgd will cause the pipe to flow full with the resultant potential surcharging in the manholes.

Discharging the MF backwash flow (approximately 200,000 to 250,000 gpd) into the IIS during PWWF would cause the IIS to flow full and cause minor surcharging in the manholes. That is, there would be minor rises (approximately 3 to 6 inches) in the hydraulic grade line for these flow conditions. Given that this is a condition (i.e., PWWF) that would occur infrequently, it is believed that this surcharging condition should not cause hydraulic problems within the plant, and there would be no overflows from the in-plant manholes. It is unknown what effect, if any, this additional MF BW flow would have on backwater conditions in the upstream collection system. These hydraulic conditions will be fully evaluated during final design to ensure that there would not be any overflows.

Concerning process impacts, other plants (Orange County Water District's GWR Project and Dublin San Ramon Services District's [DSRSD] DERWA Project) discharge their MF backwash to their plant headworks. Memcor (formerly by U.S. Filter and now a Siemens Company) recommends MF BW be returned to the headworks for recycled water projects. Concerning the quality of the MF backwash, CDM contacted DSRSD regarding the quality of its MF BW. The BOD and suspended solids of the backwash were found to average about 30 and 50 mg/L, respectively for the two months (Nov/Dec 2007) when the MF system was in operation. It should be noted that for the larger DERWA sand filtration backwash plant, the filter backwash is also returned to the main plant headworks.

However, there are other approaches that could be taken in handling the MF backwash return flows. For example, the Carmel Area Wastewater District returns its MF backwash to a lamella plate settler. The clarified water is then returned to flow equalization for return to the MF process. (This system is under construction and not yet operating.)

A separate MF system could be included in the Water Reuse Project facilities to further concentrate the MF backwash. Under this process scheme, the MF filtrate (from the MF BW concentrator) would be returned to the MPBs, rather than the head works. The solids (a flow of approximately 40,000 gpd (approximately 30 gpm) could be pumped to the DAF for further thickening. This would save reprocessing of about 200,000 gpd through the secondary treatment system. The cost-effectiveness of this option would need to be determined during final design.

Operations staff suggested that the MF backwash could be sent directly to the DAF for concentrating of the solids. The MF BW flow rate (140-175 gpm) would be large in comparison to the WAS flow rate (40-50 gpm) and much more dilute (50 mg/L SS) compared with the WAS concentration (~5,000 mg/L SS). Hence, this excess, dilute flow may impair the performance of the DAF to adequately thicken the combined WAS and MF BW. Also, a separate pump system with 175 gpm capacity would be required to convey the MF BW to the DAF.

This issue of where to return the MF backwash will be more fully evaluated during final design to ensure that reprocessing the MF backwash does not disrupt or impair the operation of the City's wastewater treatment plant.

5.7 Storm Drainage

The area in which the Water Reuse Treatment Plant will be constructed currently has a pervious surface; therefore, the project will result in additional stormwater runoff. Rainfall collected from the MF/RO Building and other impervious services will be conveyed to the existing Storm Water Pump Station, discussed above and shown in Figure 5-3 and Figure C-1 in Appendix A.

Figure 5-3
Existing Stormwater Pump Station

5.8 Electrical Power Supply

Electrical power supply for the new Water Reuse facilities will be provided through the existing plant switchgear. Electrical power will be served from a new 2000 Amp frame power circuit breaker installed within the Plant's existing main switchboard, located in the Blower Building. New underground 480 volts alternating current (VAC) electrical feeders cable and conduit will exit the Blower Building and be routed easterly along the existing roadway to the new Water Reuse facilities. During final design the locations of existing underground piping and conduits along the proposed general alignment will be investigated to determine the exact conduit alignment.

5.9 Rerouting of Existing Buried Facilities

There are a few buried utilities that will have to be relocated in order to accommodate the Water Reuse Project. These utilities and the proposed relocations are described in the paragraphs below.

5.9.1 Ductbank, Cable and Wiring to Wet Weather Control Structure

There is a ductbank that traverses the area just east of the MPBs that will interfere with construction of the NTFs. This ductbank will be rerouted as shown on Figures C-1 & C-2 in Appendix A. A new pull box will be required as part of the relocation. The work should be done outside of wet weather periods.

5.9.2 Sewer Serving the Administrative Building

Similar to the electrical ductbank described above there is a 6-inch sewer line that runs north to south across about 40 feet east of the MPBs and that will interfere with construction of the NTFs. This sewer line will be rerouted as shown on Figure C-1.

5.9.3 Foul Air Duct Serving the Industrial Flow Monitoring Structure

A 12-inch FRP pipe (duct) traverses east to west on a slight northerly diagonal about 30 feet north of the access road. The duct will conflict with the UV channel. Hence, the western portion of this line will be rerouted closer to the existing 24-inch industrial sewer line as shown on Figure C-1.

5.9.4 Industrial Sewer Line

As shown on Figure C-1 in Appendix A, a 24-inch diameter sewer line traverses the project site area about 25 feet north of the access road. The project will not impact the alignment of this line, but recycle flows are proposed to be tied into this line as described above. Hence, one or two additional manholes may be constructed on this line to make the necessary connections. Flows in this line return by gravity to the plant headworks.

5.10 Disposal of RO Concentrate through the Existing Outfall

As discussed in Section 4, the RO concentrate will be discharged through the existing outfall. A 6-inch diameter pipe will be connected to the existing 30-inch diameter outfall at a location to be determined during final design. The most probable location will be south of the plant road. The connection will include a check valve and plug valve to prevent backflow of seawater and secondary effluent and to isolate the concentrate line, if necessary. Because the RO concentrate will have residual pressure of approximately 20 psi, pumping of it will not be required.

Since the nitrification process consumes about 7 mg of alkalinity per mg of ammonia converted to nitrate, sodium hydroxide will be fed at the inlet to the NTF's to maintain alkalinity at the proper level. Sodium hydroxide will be stored in a fiberglass tank, mounted on a concrete pad outside. Full secondary containment will be provided as discussed in Section 8.

ESA evaluated whether the NTFs would be a potential source of odor (*Benicia Water Reuse Project, Initial Study/Mitigated Negative Declaration, 2008*). ESA concluded that the NTFs would not be a significant source of odor:

> "In order to assess the potential for the proposed NTF units to result in odor impacts, an assessment of odor complaints and impacts associated with a facility that uses similar technology was conducted. The facility that uses similar filtration technology is the recycling facility at the City of Sunnyvale's water recycling plant. The BAAQMD has not received an odor complaint associated with the Sunnyvale plant in recent years (BAAQMD, 2006c); however, there are no residences in the immediate vicinity of the plant. In order to characterize the odor impact potential of the proposed filter system, the City of Sunnyvale was contacted regarding its filtration system. According to Sunnyvale's Senior Water Pollution Control Plant Operator, the Sunnyvale filtration devices do not release odors detectable at the plant and only a slight odor can be detected at the top of the open air filtration devices (Anima, 2006).
>
> Therefore, the filter system associated with the proposed project would not be expected to result in odors affecting a substantial number of people. Impacts related to odors would be less than significant."

Table 6-2 contains a summary of the design criteria for the NTFs including the mechanical equipment required for the process. Figure PD-2 in Appendix A contains a process block diagram for the NTF system.

Table 6-2
Nitrifying Trickling Filters Design Criteria and Mechanical Equipment

Biological Nitrification System	
Design Flow, mgd	2.55
Process Units	
Nitrifying Trickling Filters, number	2
Size, diameter x media depth, ft/ft	42/12
Media Type	Cross Flow
Media Specific Surface Area, sf/cf	45
Rotary Distributors	
Pneumatic Driven, variable speed	
Flow Range, gpm	900 to 1,800

Chemical feed pressurized piping will be corrosion-resistant, double containment type. Outdoor, exposed piping for caustic and hypochlorite will be heat traced to prevent "freezing" (crystallization). Heating tracing is provided for existing piping for these chemicals at the City's WWTP.

Flexible hoses as the chemical carrier pipes is an option to consider during final design. This approach, used at a few treatment plants, consists of installing flexible hose as the carrier pipe inside a rigid pipe that provides double containment. The flexible hose is pulled in/out of the containment pipes in a similar fashion to electrical wires inside conduits. Bends in this type of double contained piping system need to have a long radius so that the flexible hoses can be pulled. This type of piping system is generally simpler to install and maintain as there are no joints in the hose within a piping run. The ends of the flexible hose can be provided with compression-by-threaded fittings for connecting to the rest of the feed system.

6.8 Process Implications of Power Supply Interruption, Resultant Operating Procedures and Need for Standby Power

This issue was evaluated at the request of City staff. Should there be a power interruption resulting from PG&E failure and/or other causes, certain portions of the Water Reuse Facilities (WRF) could be negatively affected depending on the length of the outage. As noted in Paragraph 11.2.3, although infrequent, some outages have lasted several hours.

Initially, secondary effluent supply to the WRF will cease. The first system to be impacted would be the NTFs. If the NTFs are not functioning for several hours, the biological growth on the media will dry out and die, making for a long restart and recovery period for this unit process. Therefore, the media should be kept wet by recycling the water over the media at minimum flow. This will require that the NTF Recycle Pumps need to be operational during an outage lasting more than about 30 minutes. The ventilation fans would not need to be operational.

The next process potentially impacted by power outage would be the MF System. Upon power failure, MF systems are typically designed to go into backwash. Hence, the MF backwash pumps would need to be operational for one backwash sequence.

If feed water to the RO system sits static in the membranes too long, precipitates could form on the membranes, which, if severe enough, would require that they be replaced. To avoid this condition and cost, RO membranes are typically flushed upon power failure. Since antiscalants will be used in the feed water, such precipitation is not likely for durations of a couple of hours. However, to be safe, the RO membranes should be flushed. Supply water will be from the MF/RO Blend Tank.

Section 7
Recycled Water Conveyance System

7.1 Introduction

The conveyance system that will deliver recycled water from the Benicia WWTP site to the Valero Refinery will consist of a pump station at the WWTP, a pipeline approximately 14,000 feet in length and a "break tank" storage facility at the Refinery. Beginning at the WWTP the pipeline will travel from a new, high-lift recycled water supply pump station (RWSPS) to the Valero "off site" dock line right-of-way in the vicinity of East 7th Street and "H" Street. The pipeline will follow the abandoned Valero dock lines northerly for about 9,000 feet to the refinery property line. Within the refinery the pipeline will follow Avenue "E" South, then up a vertical rise (known as a "waterfall") to Avenue "F" to the cooling towers.

The existing Valero dock lines are attached to above-grade structural steel frames, known as "sleepers." An evaluation compared the cost of rehabilitating existing dock lines versus constructing new piping and it was determined that it was more cost-effective and reliable to install a new, 14-inch pipeline, rather than rehab portions of the existing dock lines. Within the refinery, new pipeline will be constructed on vertical extensions to the existing pipeline "sleepers" that parallel Avenues "E" and "F." The break tank would be located near the cooling towers. The capacity of the break tank is 500,000 gallons, which is equal to 6 hours of recycled water flow.

7.1.1 Overview of Conveyance Pipeline Profile

Valero provided CDM with copies of plan and profile drawings of the "off-site" dock lines as well as information about the pipe material, pressure class and wall thickness. Valero also provided information on the elevation of the existing pipeline sleepers within the refinery. Using this information, CDM developed a preliminary plan and profile of the pipeline from the City's WWTP to the cooling towers. The profile begins at the City's WWTP near elevation zero and reaches a high point approximately one mile northerly along the alignment at approximate elevation 201. The pump station at the WWTP will be located at approximate elevation zero. Hence the static lift will be about 200 ft. The terminal point of the pipeline will be at the break tank near the cooling water recirculation channel, which is located adjacent to the refinery cooling towers at elevation 95.

7.2 Recycled Water Supply Pump Station

The RWSPS will consist of three (2 duty/1 standby), vertical turbine pumps mounted over a clearwell. The clearwell will be constructed of reinforced concrete and the pumps will not be housed in a building but will have individual sound enclosures over each pump and motor. Table 7-1 presents the major components and design criteria for the pump station.

Table 7-1 ***Recycled Water Supply Pump Station*** ***Preliminary Design Criteria***		
Component	***Units***	***Criteria***
System Pumping Requirements		
Design Capacity	mgd	2.0
Design Capacity	gpm	1,400
Design Total Dynamic Head	ft	250
Static Head	ft	200
Pump Units		
Type		Vertical Turbine
Number, Total/Duty/Standby		3/2/1
Design Capacity per Pump		700
Design TDH per Pump	ft	255
Min. Efficiency at Design Point	%	82
Stages per Pump	No.	4
Pump Operation		Variable
Minimum Speed	rpm	TBD
Pump Motors		
Type		TEFC, w/ sound control enclosures
Size, each unit	hp	60
Drive Type		VFD
Synchronous Speed	rpm	1,800
Power Supply		480-V/3-phase/60Hz
Pump Discharge Piping		
Diameter	inch	8
Velocity at Design Flow	fps	4.43
Pumps Discharge Header Piping		
Diameter	inch	14
Velocity at Design Flow	fps	2.90
Discharge Flow Metering		
Type		Magnetic or Sonic
Size	inch	10
Velocity at Design Flow Rate	fps	5.67
Surge Tank for Hydraulic Transients		
Preliminary Tank Size	gallons	2,000

Based on a conceptual level review of the hydraulic profile, it is anticipated that a surge tank will be required on the discharge side of the pump station to control transient surge pressures in the transmission pipeline under power failure. The size of the tank will be confirmed during final design. This preliminary design assumes a nominal surge tank size volume of 2,000 gallons.

7.2.1 Instrumentation, Control, Monitoring and Sampling

7.2.1.1 Pump System Control

The RWSPS pumps will be automatically controlled by a programmable logic controller (PLC), based on water level in the clearwell. In that way, RWSPS will match the production rates of the water reuse treatment plant, which will be controlled to match daily demand. The pumps can also be controlled to pump at a selected flow

rate by setting a specific rate through a PLC. Manual pump start and stop and speed control will also be provided at the PLC.

Control interlocks with other systems will be as follows:

- All of the RWSPS pumps will be automatically stopped on high level in the break tank at Valero to avoid overfilling the tank.
- All of the RWSPS pumps will be automatically stopped on high micro-filtration effluent turbidity conditions.
- All of the RWSPS pumps will be automatically stopped on detection of critical alarm conditions at any of the upstream treatment processes.
- Under any of the hydraulic or process performance alarm conditions that would shut down the pumps, the recycled water would be routed to the City's outfall, or to the MPBs depending on water quality matters, until the alarm conditions have been addressed and cleared.

7.2.1.2 Monitoring

The following monitoring provisions will be incorporated into the pump station design:

- Water level in the clearwell will be continuously monitored using an ultrasonic level sensor, with separate float switches for high and low level alarms in the event of failure of the level sensor. The water level signal will be used for pump control as described above.
- A magnetic flow meter will be provided on the pump discharge header to measure pump flow rate. The flow signal will be used for regulatory and recycled water inventory recordkeeping, for RWSPS monitoring and for pump control as described above.
- A pressure transducer will be provided on the recycled water discharge header to continuously measure header pressure for the purposes of monitoring pump operation and head conditions in the transmission system.
- A locally indicating pressure gauge will be provided on the discharge header and on each pump discharge.

7.2.1.3 Sampling

A refrigerated automatic composite sampler may be required for regulatory sampling. The RWQCB may require the City to sample and report the quality of recycled water leaving the City's property. The sampler would draw from the recycled water discharge header and would be flow paced from the RWSPS flow meter. An on-line

ammonia analyzer will be provided to warn of ammonia concentrations exceeding the water quality requirements.

7.3 Recycled Water Supply Pipeline

Figure 7-1 presents a map of the recycled water transmission pipeline and Figure 7-2 show the preliminary hydraulic profile. Table 7-2 presents the details of the pipeline for each segment from the City's WWTP to the Valero Refinery. The pipe would be constructed of cement mortar lined steel pipe. Where the pipe is buried, it will be cement mortar coated and taped. The coating system for pipe installed on sleepers is to be determined. Joints will be welded.

Table 7-2
14-Inch Recycled Water Supply Pipeline from Benicia WWTP To Valero Cooling Towers

System Component	From Sta	To Sta	Estimated Quantities, ft
Segment No. 1: Sta 0+0 @ Benicia WWTP to Sta 14+24 @ connection to sleepers. Construct new buried pipeline	0	14+24	1775
Segment No. 2: Sta 7+92 @ start of sleepers to Sta 24+60 @ start of existing, buried 12-in lines. Construct new pipe on existing sleepers. Construct small stretch of buried pipeline near STA 11+00	11+45	24+60	1315
Remove Dock Line No. 3 from sleepers in Segment No. 2			1315
Segment No. 3: Sta 24+60 to Sta 30+00 end of existing, buried 12-in lines. Rehabilitate and connect to 2, existing 12-in lines	24+60	30+00	540
Segment No. 4: Sta 30+00 to Sta 32+20 at the "Y" plus additional 30 ft. Construct new, 14-in pipe on existing sleepers	30+00	32+20	220
Remove Dock Line No. 3 from sleepers in Segment No. 4			220
Segment No. 5: Sta 34+68 at the "Y" to Sta 42+15, end of where existing 12-in DL has been removed. Construct new, 14-in pipe on existing sleepers	34+68	42+15	747
Segment No. 6: Sta 42+15 to Sta 85+20, end of existing, abandoned 12-in DL. Construct new, 14-in pipe on existing sleepers. Bore and jack pipeline under Park road near STA 67+50.	42+15	85+20	4305
Remove abandoned pipe from sleepers in Segment No. 6			4305
Segment No. 7: Sta 85+20 to Sta 105+00, approximate Valero PL. Construct new, 14-in pipe on existing sleepers. Bore and jack pipeline under access roadway near STA 91+60.	85+20	105+00	1980
Segment No. 8: Sta 105+00 to Sta 140+00, approximate location of cooling towers. Construction new, 14-in pipe on extensions to existing sleepers.	105+00	140+00	3500
6-inch Air Inlet and Vacuum Release Valves Located at High Points			6
2-inch Air Inlet and Vacuum Release Valves			4
6-inch Blow Down Valves (BV's) Located at Low Points			7
In-Line Isolation Valves (BV's) Located at 2,000 ft intervals			7

Line isolation valves will be installed about every 2,000 feet to isolate sections for maintenance and/or repairs. Blow down valves will be located at low points to either drain the line or to "blow down" residual solids, which are unlikely to occur given the

high level of treatment. Air inlet and vacuum relief valves will be installed at critical high points to control the potential effects of high pressure and hydraulic transients.

Appendix A contains plan and profile drawings of the pipeline**.** Figures 7-3 and 7-4 provide example photos of Valero off-site dock lines and on-site pipelines, along with photos of the cooling towers.

7.4 Impacts of Recycled Water Supply Interruptions at Valero Refinery

There are four basic assumptions regarding the recycled water supply to Valero, as follows:

- City and Valero have agreed that recycled water will be an interruptible supply (refer to Paragraph 2.4)
- City has agreed to make available fresh water during interruptions.
- City has agreed to produce recycled water that meets the established water quality objectives (refer to Paragraph 2.1), which are similar to the quality of the fresh water currently being used.
- There will be break tank provided at the refinery that will have adequate capacity to allow switch over from recycled water to fresh water in the event of an interruption, resulting from power failure or out of spec water quality.

The time to make the switch over to fresh water may require treating the fresh water (at the refinery's on-site water treatment system) to meet water quality objectives. The time for this transition needs to be factored into the final sizing of the break tank.

In addition to automatic alarms sent to Valero (method and location to be determined), City should notify appropriate party(ies) at Valero via phone (or email) and provide an estimation of the duration of the outage. The projected duration could affect the steps that Valero chooses to implement. For instance, Valero might take a different course of action for a brief (10-15 minutes) power outage as compared to a severe process upset, which is likely to have an extended duration.

Section 8
Civil Design Criteria

8.1 Project Datum

In 1978, the WWTP datum was arbitrarily set at approximately 100 feet above the NGVD 29 (Mean Sea Level 1929) datum. The WWTP Bench Mark FC#3 is located on the concrete deck of the existing primary clarifiers. Recent survey by Cullen-Sherry & Associates (CSA, previously Cullen Engineering Associates [CES]) places FC#3 at 10.93 ft (NGVD29) and 110.26 ft (Plant Datum 1995). For the 1999 WWTP Improvements Project, Carollo directed CEA in 1995 to lower the datum by 0.70 feet "…to better match the 1978 datum." A detailed discussion of the history of adjustments to the plant datum can be found in the letter report prepared for the City of Benicia by CSA, dated 20 September 2006, and included in Appendix C.

Also in September 2006, CSA did topographic mapping of the area within the WWTP site dedicated to the Water Reuse Project. Referenced datum on the survey shows NVGD29 datum. Spot elevations taken by CSA on existing structures and shown on the Sept '06 topographic drawing were compared with elevations shown on Carollo's 1999 plans and 2003 Wet Weather Improvement Plans. In both cases the recent spot elevations based on the NGVD 29 datum were low by approximately 99.3 feet. In other words, the elevations were low by 99.3 feet (which was added back in 1978) and high by 0.7 feet (which was the lowering done in 1995).

For development of the preliminary design, CDM has used WWTP Datum and the elevations shown on the Carollo plans for work within the plant. The conveyance pipeline plan and profile drawings were based on GS Mean Sea Level for consistency with the existing plan and profile drawings of the Valero "off-site" dock lines which are based on this datum.

8.2 Existing Surface and Subsurface Conditions

A geotechnical investigation of the City's WWTP site was conducted by Harza Consulting Engineers and Scientists (Harza). The results of Harza's investigation were reported in its report, "Geotechnical Engineering and Environmental Services Benicia Wastewater Treatment Plant Benicia, California Project No. L592-G," dated 15 July 1997 and prepared for Carollo Engineers (Harza Geotech Report). The Harza Geotech Report contains site information obtained from several borings, and it makes recommended criteria for earth loads and foundation design. No exploratory borings were taken in the immediate vicinity of the proposed Water Reuse Project structures. However, two borings were taken by Harza at the eastern boundary of the site, just inside the flood wall. Harza reports three relevant borings taken by others in approximately 1977 along the eastern walls of the existing secondary clarifiers and multi-purpose basins.

The information contained in the Harza Geotech Report is determined adequate for preliminary design of the Water Reuse Project. For final design, 3 or 4 confirmatory borings may be required.

The elevation of the existing site allocated for the Water Reuse Project ranges from about Elevation 7.0 on the north to Elevation 5.0 at the southern boundary. There project site slopes downward from both north and south toward Storm Water Pump Station No. 2 (SWPS2) which is at about Elevation 0.0. (Refer to Drawing C-1 and C-2 in Appendix A).

Borings indicate the proposed area for the Water Reuse Project facilities is underlain by about 7 feet of fill, a few feet of sand, about 10 feet of peat and then clay generally described as "Bay Mud." Depth to bedrock varies from about 50 feet in the northern part of the project area to 100 feet in the southern portion. Groundwater could be anticipated at depths from 2 or 3 feet in the area around SWPS2, to 5 or 6 feet in other locations. Also, groundwater levels could vary based on tidal conditions, seasons and weather conditions. Hence, the need to provide dewatering of below-grade structures during construction should be anticipated.

Harza found very high soluble concentrations of sulfate and chloride ions at depths from 5 to 10 feet. Also, pH ranged between 5.4 and 7.1. These analyses indicate a corrosive environment for both concrete and steel materials. Special consideration will be given to corrosion control during final design. A licensed Corrosion Engineer will conduct an investigation and will make recommendations for protection of below grade structures. Such protection will include special type cement and concrete additives for concrete and a passive or active anode system for buried ferrous pipe and conduits. Poly-vinylchloride and other corrosion resistant material for pipe and conduits will be used to the greatest extent possible.

For structures deeper than five feet below grade, shoring will be required owing to OSHA standards as well as basically unstable near-surface soil conditions.

8.3 Pile Foundations

The deep soils described above are subject to seismic liquefaction, differential settlement and long-term settlement. For this reason, most of the existing structures are founded on piles. New structures should be supported on piles driven to bedrock as described in the Harza report. Piles will also require corrosion protection as described above.

8.4 Disposal of Groundwater During Construction

Groundwater, extracted during construction, will be discharged to the City's WWTP. This was the groundwater disposal method used for construction of the wet weather improvements in 2006.

8.5 Paving and Access Roads

No new access roads are required for the project. Existing access roads along the south, east and north of the site may be damaged during construction. The back access road to "G" Street also may be damaged from construction of the Recycled Water Pipeline to Valero Refinery. Road damage that occurs during the project will be repaired.

Pavement replacement over new pipe trenches and other disturbed paved areas will match existing thickness for AC pavement and aggregate base, except if those thicknesses would be insufficient to safely distribute the design wheel loads over the buried facilities. In such cases, pavement sections would need to be increased.

8.6 Storm Drainage

The area in which the Water Reuse Treatment Plant will be constructed currently has a pervious surface; therefore, the project will result in additional stormwater runoff. Currently, rainfall collected from buildings and other impervious services as well as surface run off is conveyed to Stormwater Pump Station No. 2 (SWPS2) located just south of the east-west access road. SWPS2, which has a two pumps (lead/lag) with name plate capacities of 800 gpm each for a pumping capacity of approximately 1,600 gpm, pumps collected stormwater into the existing 24-inch industrial line, which conveys the flow to the Industrial Diversion Structure. Depending on the amount of wastewater flow entering the WWTP headworks, water in the industrial line either flows by gravity to the headworks or is diverted into the Industrial Flow Box, from which it is pumped into the MPBs by the Storm Flow Return Pumps, which each have a reported capacity of approximately 350 gpm.

Rainfall collected from the roof of the new MF/RO Building and other new impervious surfaces, such as decking around the NTFs and new driveways, will be conveyed directly to the existing SWPS.

During final design a study should be undertaken to determine the most cost-effective means to handle both storm flows and the return flows from the Water Reuse Treatment System.

8.7 Site Regrading

Regrading of the site will be required to provide good drainage control, to set the elevation of new facilities to minimize visual impacts, and to avoid depressions of stormwater ponding. The deck surrounding the NTFs is proposed to be set at Elevation 101.0. Significant regarding of the site will be required on the north side, where the existing grade slopes from approximately El 106.5 down to about El 104. It is likely that the dirt removed for the NTF facilities will not be suitable for reuse on site and will need to be hauled off for disposal. Figure C-1 in Appendix A shows the location and existing contours in this area.

The finish floor for the MF/RO Building is proposed to be set at El 103.0. Some imported backfill may be required to bring the building pad up to grade because the existing grade at the northern area of the building site is at approximately El 101.5 to 102.0. Since the building will be supported on a pile foundation, perhaps some of the dirt from excavating for the NTFs can be used, since bearing capacity of the soil will not be a design issue.

8.8 Landscaping

There are no plants or vegetation within the allocated area for the proposed Project. Landscaping for the Project within the WWTP Property will blend with existing conditions. Tall trees and view-obstructing plants will not be included. Drought tolerant ground cover and low shrubs will be considered for unpaved areas, particularly on the north side of the NTF pad where the ground will be re-graded down to El 101.

Although not anticipated, existing landscaping disturbed as a result of the construction of the 14-inch, buried RW pipeline, constructed outside the fence from the WWTP to the Valero pipeline sleepers, will be replaced in kind.

8.9 Recycled Water Pipeline

The recycled water pipeline within the plant boundary will be buried and constructed of cement mortar-lined and coated steel pipe. It will be bedded with control density fill and buried with a minimum of four feet of cover. The pipe and trench will be designed for the largest wheel load of chemical transport trucks that deliver to the plant. For more detail on the recycled water pipeline outside the plant fence line, please refer to Section 7.

Section 9
Structural and Architectural Design Criteria

This section presents an outline of the structural and architectural design criteria. Code citations throughout this Section shall be the most recently adopted editions of each code.

9.1 Structural Design Criteria

9.1.1 General

General structural design criteria are discussed below. Detailed structural design criteria are provided in Table 9-1.

9.1.2 Dead Loads

Dead loads shall consist of gravity loads induced by all structural elements, equipment, piping, and contained liquids.

9.1.3 Live Loads

1. Roof Live Loads shall be as specified in California Building Code (CBC), including allowable reductions for area and shape.

2. Wind Loads shall be as specified in CBC.

3. Stairs, walkways and platforms shall be designed for a minimum live load of 100 psf.

4. Floor Loads in equipment rooms, shops areas, and platforms used for equipment removal shall conform to CBC, but shall be a minimum live load of 150 psf.

9.1.4 Seismic Loads

The design loads recommended in the California Building Code and importance factor 1 shall be used as a design minimum. Site specific response spectra and soil forces on buried structures and retaining walls shall be in accordance with the geotechnical study and report that should be conducted during final design. Preliminary values from the 1997 Harza Report are stated in Section 8.

9.1.5 Wind Loads

Wind loads shall be as specified in CBC.

9.1.6 Foundation Design

As noted in Section 8 there are poor soil conditions at the site and all structures of significant load will be founded on piles.

9.1.7 Flood Conditions

All hydraulic structures shall be designed to withstand the uplift resulting from the 100 year flood. EL 105 (plant datum).

Table 9-1 ***Detailed Structural Design Criteria***	
General	
GOVERNING CODE:	• California Building Code.
Concrete	
CODES:	• ACI 318-05, Building Code Requirements for Reinforced Concrete. • ACI 301-99, Specifications for Structural Concrete for Buildings. • ACI 350-01, Environmental Engineering Concrete Structures.
Concrete Masonry Units	
SPECIFICATIONS:	• National Concrete Masonry Association (NCMA) Specifications for the Design and Construction of Load Bearing Concrete Masonry, Publication No. TR75-B. • California Building Code
Structural Steel	
SPECIFICATIONS:	• AISC Allowable Stress Design Specifications for Structural Steel Building
Aluminum	
SPECIFICATIONS:	• Specifications for Aluminum Structures, Published by Aluminum Association, Current Edition.
Concrete	
Strength	• F'c = 4000 psi and psi for concrete fill pipe/conduit encasement.
Reinforcing	• ASTM A185
Prestressing Strand	• ASTM A416
Welded Steel Wire Fabric	• ASTM A185
Design	• Strength Design Method or Alternate Method
Detailing	• ACI SP-66(00) Manual of Standard Practice for Detailing Reinforced Concrete Structures
Reinforced Masonry	
Concrete Masonry Units	• ASTM C90, Grade N, Type I (Unit Compressive Strength F'm = 1,500 psi
Mortar for Unit Masonry	• ASTM C270, Type M or S
Reinforcing	• ASTM A615, Grade 60
Cold-Drawn Steel Wire	• ASTM A82
Mortar and Grout	• ASTM C476
Structural Steel	
Structural Shapes	• ASTM A36
Structural Tubing	• ASTM A500
Steel Pipes	• ASTM A53, Grade B
Welding	• AWS E70 Electrodes
High Strength Bolts	• ASTM A325F, Min. ¾ " Diameter
Other Bolts	• ASTM A307, Grade A
Anchor Bolts	• ASTM 307
Stainless Steel	
Structural Shapes	• AISI Type 316
Plates	• AISI Type 304, 316 or 317
Anchor Bolts	• AISI Type 316
Aluminum	
Structural Shapes and Pipes	• 6061-T6

Table 9-1 cont. ***Detailed Structural Design Criteria***	
Steel Decking (Non-Composite Roof Deck):	
Nominal Depth	• 1 ½ inches
Width of Rib	• Intermediate
Gage	• Minimum 20
Number of Spans	• Two (2)
Minimum Section Properties	• +S = 0.159 inch – Unit per ft. width • -S = 0.170 inch – Units per ft. width • I = 0.163 inch – Units per ft. width
Timber:	
Surface dry or surface green	• Used at 19% maximum moisture content
Douglas Fir-Larch - No. 1	• 2" to 4" thick, 5" and wider
Douglas Fir Larch – No. 2	• 2" to 4" thick, 2" to 4" wide
Douglas Fir Larch – Select Structural	• Beams and Stringer
Douglas Fir Plywood	• Structural Type I
Fiberglass Reinforced Plastic (FRP) for Grating and Miscellaneous Items	
Tensile Strength	14,000 psi, ASTM D636
Flexural Strength	25,000 psi, ASTM D790
Coefficient of Thermal Expansion	16 x 10^{-6} inch per inch per degree F
Water Absorption	0.02% in 24 hours

9.2 Architectural Design Criteria

9.2.1 General

The structures that require architectural treatment are the MF/RO Building and the Nitrifying Trickling Filters. Generally, architectural treatment will conform to the existing plant facilities. Figure 9-1 shows an example of existing building architectural treatment at the City's WWTP.

Figure 9-1
Photo of Existing Equipment Bldg

9.2.2 MF/RO Building

9.2.2.1 Structural Support System

The exterior walls and roof of the building will be supported by the steel ridged frames, roof purlins and girt system.

9.2.2.2 Wall and Roof Construction

The exterior walls will be constructed from ribbed-faced block (cement masonry units, CMUs), blanket insulation, and interior sheet rock liner.

The roof will be constructed from metal roof deck with interior liner, rigid insulation and prefinished metal standing seam roof panels. Insulation will be provided to meet Heating, Ventilation and Air Conditioning (HVAC) design criteria. Roof access hatches and ridge skylights will be provided for adequate access and natural light respectively. Exterior gutters and downspouts will be provided to collect and dispose of rain water.

9.2.2.3 Doors, Windows and Louvers

Steel hollow metal doors will be provided. Height of doors will be adequate for equipment installation. Minimum size of equipment doors shall be 6′-0 x 8′-0 high and main doors shall be 3′-0 x 7′-0 high. Louvers will be provided to meet HVAC design criteria. Windows will be provided as required.

9.2.2.4 Equipment Removal

Monorail cranes will be provided to remove pumps and motors, strainers and cartridge filters. MF and RO modules can be removed manually from their respective skids.

9.2.2.5 Floors

Floors shall have concrete monolithic trowel finish.

9.2.3 Nitrifying Trickling Filters

9.2.3.1 Structural Support System

As described in Section 6, the NTFs will be designed with an under-drain plenum, constructed of reinforced concrete. The plenum will have a clear space of approximately 3 feet under each filter. The floor of the plenum will be founded on piles.

9.2.3.2 Walls

The NTF walls will NOT be designed to be water bearing (or floodable). However, to meet the architectural requirements of the project, the walls of the two structural cylinders will be constructed of ribbed-face block to match existing structures. The filters will be open at the top and hence the walls must withstand the structural loads, discussed above in this section.

Section 10
Mechanical Design Criteria

This section contains schedules and design criteria covering piping, noise, HVAC, fire protection and plumbing.

10.1 Process Piping

Table 10-1 presents the preliminary Pipe Material Schedule for the tertiary treatment facilities.

Table 10-1
Preliminary Pipe Material Schedule

Pipe Service	*Symbol*	*Diameter (Inches)*	*A/U[a]*	*Material*
Air Supply	AS		A	Galv STL, Copper
Sodium Hypochlorite Solution	NaOCl		A U	CPVC (SCH 80) CPVC (SCH 80)
Citric Acid	CA			PVC (SCH 80)
Chlorinated Secondary Effluent	CLSE		A U	DIP PVC (C900). DIP
Sodium Hydroxide	NaOH			PVC (SCH 80)
MF Feed	MFFD		S	PVC (SCH 80)
MF Reject Water	MFR		S	SSTL 316, DIP, STL w/CML
MF Filtrate	MFFL		A	PVC (C900). DIP
Nitrifying Trickling Filter (NTF) Recycle	NTFR		A U	DIP PVC (C900). DIP
NTF Effluent	NTFE		A U	DIP PVC (C900). DIP
Floor Drain	FD		A U	DIP PVC, DIP
Overflow Return	OR		U	PVC (sewer), DIP
Potable Water	W		A U	Gal STL, Copper PVC (SCH 80)
Recycled Water	RW		A U	STL w/CML (200 psi), DIP (200 psi), STL w/CMLC (200 psi)
RO Feed	ROF		A	SSTL 316
RO Permeate	ROP		A	PVC (SCH 80)
RO Reject	ROR		A U	High Press-316 SSTL; Low Press-PVC PVC (SCH 80)
Roof Drain	RD		A	DIP, PVC
Sample	SP		A	PVC (SCH 80)

a A – Aboveground S – Submerged U – Underground
b STL – Steel PVC – Polyvinyl Chloride SCH – Schedule
DIP – Ductile Iron Pipe Coated and Lined DIPPL – Ductile Iron Pipe Polyethylene Fusion Lining
CML – Cement Mortar Lined CMLC – Cement Mortar Lined and Coated SSTL – Stainless Steel

10.2 Noise Criteria

Noise reducing enclosures and insulation will be used throughout the facilities to reduce equipment noise to less than 55 dB at the property line as required by City ordinance and General Plan criteria.

10.3 HVAC Design Criteria

10.3.1 General

HVAC systems will be designed in conformance with the most recently adopted editions of the following codes and regulations:

- California Building Code
- California Building Code Standards
- California Mechanical Code
- California Mechanical Code Standards
- California Plumbing Code
- California Plumbing Code Standards
- California Fire Code
- California Fire Code Standards
- California Building Energy Efficiency Standards For Non-Residential Buildings (Title 24)
- California Building Energy Efficiency Standards For Non-Residential Buildings (Title 24), Joint Appendix II, Reference Weather / Climate Data
- California Occupational Safety and Health Commission Orders
- National Fire Protection Associations Applicable Standards

General HVAC Design Criteria are presented in Table10-2**.**

Table 10-2
General HVAC Design Criteria for Benicia, CA

Criteria	***Design Parameter***	
Site elevation	55	Ft above sea level
Outdoor Summer Design Temperature(1)	ASHRAE 0.1%(2)	99°F DB 69°F MCWB
Outdoor Winter Design Temperature(1)	ASHRAE 0.2% (3)	33°F DB
Indoor Design Temperature Occupied Areas	Cooling: Heating:	78°F DB 72°F DB
Indoor Design Temperature Electrical Rooms	Cooling: Heating:	85°F DB 65°F DB
Indoor Design Temperature – Process Areas	Cooling: Heating:	85°F DB None

(1) California Building Energy Efficiency Standards For Non-Residential Buildings (Title 24), Joint Appendix II, Reference Weather / Climate Data.
(2) Based on average weather data, outdoor temperature will be above design basis 0.1% of the time. (9 hours/year).
(3) Based on average weather data, outdoor temperature will be below design basis 0.2% of the time. (18 hours/year).

10.3.2 Air Conditioning Design of MF/RO Building

The occupied portions of the MF and RO buildings will be provided with heating and cooling to maintain the design temperatures of 78°F dry bulb (DB) and 72°F DB. Heating units will be wall mounted heat pump units. Cooling units over 5 tons in size will be equipped with an economizer.

The electrical room will be provided with heating and cooling to maintain the design temperatures of 85°F DB and 65°F DB. Air conditioning unit(s) will be mounted on an external pad at grade; electric unit heater will be wall mounted electric unit heaters. The unit heaters will prevent condensation in the switchgear in case of extended shutdown.

The process areas will be provided with cooling only to maintain the design temperature of 85°F DB. The units will be roof mounted air conditioning units. Heating will not be provided, since freeze protection is not required.

10.4 Fire Protection Design Criteria

The fire protection system will be designed in conformance with the current adopted editions of the following codes and regulations:

- California Building Code
- California Building Code Standards
- California Mechanical Code
- California Mechanical Code Standards
- California Plumbing Code
- California Plumbing Code Standards
- California Fire Code
- California Fire Code Standards
- National Fire Protection Association 10, Standard for Portable Fire Extinguishers
- National Fire Protection Association 24, Standard for the Installation of Private Fire Service Mains and their Appurtenances
- National Fire Protection Association 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities
- California Occupational Safety and Health Commission Orders

The MF/RO Building is unclassified, as described by NFPA 820, Table 3-2, line 19. Hence, only fire hydrants for fire protection are required. No fire and explosion hazard, materials of construction and ventilation requirements are listed in NFPA 820 for the Buildings.

New hydrants, as required, will be located approximately 25 ft (minimum) from the MF/RO Building. Portable fire extinguishers will be mounted inside the building, near personal exit doors. Portable fire extinguishers will be ABC multipurpose dry chemical type UL-rated 20A:120B:C.

10.5 Plumbing Design Criteria

The plumbing system will be designed in conformance with the most current adopted editions of the following codes and regulations:

- California Plumbing Code
- California Plumbing Code Standards

The plumbing system will include rainwater scuppers, overflow scuppers and downspouts with spillout fittings to outside splash blocks for surface runoff, potable water emergency eyewash and shower stations, and plant No. 3 Water piping with wash-down hose bibs and connections for flushing of the chemical feed system.

Emergency eyewash and shower stations will be located in the immediate vicinity of the chemicals storage/feed area.

Wash down hose bibs will be provided at appropriate location requiring housekeeping (To be determined in final design).

Section 11
Electrical Power Supply and Design Criteria

11.1 General

The electrical design will conform to the most recent edition of the generally accepted electrical and building codes including:

- NFPA 70 – National Electrical Code (NEC)
- State of California – Division of Industrial Safety, Electrical Safety Orders
- State of California – Energy Commission, Energy Efficiency Standards
- Occupational Safety and Health Act (OSHA)

All electrical equipment will have Underwriters Laboratory approval where applicable. Areas of the electrical installation will be classified in accordance with the environment in which the equipment is installed. In general, the areas will be classified as unclassified (non-hazardous), hazardous (by Class, Division and Group), non-corrosive, corrosive, wet or dry.

11.2 Power Service

11.2.1 Existing PG&E Electrical Service

Electrical power is provided to the existing Benicia WWTP from the Pacific Gas & Electric Company (PG&E) overhead pole line which runs along East 5th Street at the west side of the treatment plant property. An underground conduit extends the PG&E primary cables from the riser pole to the single PG&E transformer located adjacent to the Blower Building. The transformer provides power at 480/277 VAC to the Main Switchboard located inside the Blower Building. A review of the record drawings for the Wastewater Treatment Plant Improvement Project (dated May 2001) and a preliminary site inspection indicate that the Main Switchboard is rated for a maximum of 4,000 amps, has two spare breakers (400 A and 800 A) and several spaces available for future expansion.

The PG&E pole line in East "G" Street, along the northern plant property line appears to be only a single phase circuit serving residential customers on the adjacent street. This line presently extends only part of the distance to the eastern property line of the WWTP.

11.2.2 On-Site Emergency Electric Power Generation

On-site backup power generation consists of a nominally-rated 1,000 kW, 480/277 VAC standby power generator set located near the Blower Building main switchboard. This natural gas powered generator installation includes a small on-site

propane storage tank, which can provide approximately 24 hours of operation, if the natural gas supply is interrupted. City staff advised that the generator was designed to operate several hours a day when required to remove the entire plant load from the PG&E service.

The PG&E service transformer and the standby generator are connected to the plant's main automatic transfer switch (located within the Main Switchboard) in a manner that allows any load within the plant to be connected to the electrical distribution system. Thus dual sources of power are provided to all components. The standby generator (1,000 kW) is connected to the emergency source side of the plant's automatic transfer switch. Preliminary discussions with plant staff indicate that the 1,000 kW generator has adequate capacity to allow full normal operation of the plant. The generator's 1,000 kW rating is equivalent to approximately 1,500 amps at 480 volts. Since the main switchboard has a full load capacity of 4,000 amps, the switchboard can supply more load through the normal PG&E transformer than can be served during a PG&E outage by the 1,000 kW generator.

11.2.3 History of Utility Power Outages

PG&E supplied CDM with its records of power outages over the three years from 2002 through 2004. PG&E reports five "momentary interruptions" and six sustained interruptions. Five of the sustained interruptions ranged between 50 and 80 minutes. One lasted nearly seven hours. Although the data set is too small for statistical analysis, still it appears that PG&E power supply to the WWTP has been highly reliable.

Regardless of high historical reliability or the potential capacity of the plant emergency power system to serve the new Water Reuse Project, it was determined, as noted in Section 2, that standby power will not be provided for the project. See Section 11.4 for a more detailed discussion of power distribution for the Water Reuse facilities during power outages.

11.2.4 Electrical Service for Water Reuse Project

The two alternatives for supplying power to the new Water Reuse Facilities were investigated, namely: provide power through the existing plant service; or, provide power though a new service dedicated to the Reuse Plant.

A preliminary calculation indicates that the existing 4,000 amp electrical service has adequate capacity to supply both the existing plant (approximately 960 connected load amps, including the 25% contingency/overload factor as required by the NEC) and the Water Reuse Facility (approximately 1,650 connected load amps also including a similar NEC 25% factor). Based on these conservative calculations, there would be approximately 1,390 amps (approximately 1,000 horsepower) of future expansion capacity through the existing service after the reuse facility is added.

PG&E indicated that either of the two alternatives (existing WWTP service or new service dedicated to the Reuse Plant would be feasible). The existing PG&E service

transformer, bus and switchgear is adequately sized for the new load additions. If the dedicated service approach is desired, an overhead pole line could be routed along East G Street to a service drop pole on the north side of the plant and then underground to a new transformer located in the vicinity of the Reclamation facilities.

Disadvantages:

- Requires convincing PG&E that a new (second) service is required at this location which already has an existing service with adequate capacity.
- May be higher in capital cost, depending on PG&E estimate.
- If PG&E requires that the new service must be overhead, visual impacts would become an issue.
- Potential design scheduling issues to coordinate with PG&E.

11.2.5 Required Additional Investigations

Before a final electrical service recommendation can be made, the following issue require additional investigation and resolution:

- Explore the viability and costs associated with a second PG&E service located on the northeast corner of the WWTP property and dedicated to the Water Reuse Plant. PG&E's preliminary estimate for this new (second) service was approximately $83,000 in 2005 dollars.

11.2.6 Preliminary Recommendation

At this stage of the project, it would appear that utilizing the existing plant service switchgear, installing a new 480 volt feeder circuit breaker and installing new underground conduit and wire would be the preferred approach to serving the new Reuse Facility.

11.3 Power Demands

11.3.1 Existing Plant Power Demands

City records indicate that the maximum electrical demand was 520 kiloWatt (kW) occurring in December 2003 and a low maximum demand of 420 kW occurring in June 2004. This maximum demand remained relatively constant over the period for which records were reviewed (January 2002 through October 2004).

Other than the power requirements of the proposed Water Reuse Project, it is anticipated that additional future demands on the plant's electrical service will be relatively low due to site constraint limitations.

11.3.2 Estimated Electrical Power Loads and Demands for the Water Reuse Project

Estimated electrical power demands were made based on preliminary process equipment selection and sizing. Table 11-1 contains a summary of estimated electrical power demands for the Water Reuse process equipment. This indicates that the new water reuse facility would add approximately 1,260 additional kilovolt Amperes (kVAs) (horsepower) of connected load to the existing plant. Although the actual demand load will be less (preliminary calculations indicate a normal operational load of approximately 845 horsepower would be anticipated), the connected load has been used to provide a conservative basis of analyzing the electrical service capacity at the Benicia WWTP.

Table 11-1
New Water Reuse Treatment Facilities
Summary of Estimated Electrical Power Demand

New Process Area	*Connected kVA*	*Demand kVA*
Secondary Effluent Transfer PS No. 1 Pumps	30	20
Secondary Effluent Transfer PS No. 2 Pumps	15	10
Trickling Filter Recirculation PS Pumps	90	65
Micro Filtration System	275	235
Reverse Osmosis System	450	235
Building Systems (lighting, HVAC, etc)	125	100
UV Systems	85	55
Chlorination System	10	5
Recycled Water Supply PS Pumps	180	120
Totals (kVA)	**1,260**	**845**

11.4 Power Distribution for the New Water Reuse Treatment Facilities

Electrical power for the new Water Reuse facilities will be served from a new 2000 Amp frame power circuit breaker installed within the existing Blower Building main switchboard. Further investigation will be required to determine whether the new circuit breaker will fit into one of the existing spare cubicles or whether a new cubicle and bussing would be required. If new cubicle and bussing are determined to be required, they would be located in the existing Blower Building electrical room. The new breaker would be located on the load side of the existing 4000 amp Automatic Transfer Switch, so the new Water Reuse facilities would have the option of being fed from the existing standby generator. As noted in Paragraph 2.6, the project design is not intended to have standby power for the entire Water Reuse Project. However, as discussed in Paragraph 6.8, certain critical loads will require standby power. PLCs and SCADA would be connected to Uninterruptible Power Supply Units (UPSs). During final design a load analysis should be performed to determine if the City's existing generator has adequate capacity to supply power to both the existing and new standby loads. If it is found not to have sufficient capacity, then alternative means of providing emergency power include: (a) load shedding of non-priority loads

of both the City's WWTP and the Water Reuse Project; (b) furnishing a separate standby generator for the critical equipment and loads of the Water Reuse Project.

New underground 480 VAC electrical feeder cable and conduit will exit the Blower Building and be routed easterly along the existing roadway to the new Water Reuse facilities. Due to extensive existing underground piping and conduits in the area, additional investigation will be required to determine the exact conduit alignment.

A new Motor Control Center (or switchboard) will be installed in a dedicated electrical room of the MF/RO Building. This MCC will include all motor starters, feeder circuit breakers and variable speed drives for the new Water Reuse facilities and process and related building equipment.

Figure E-1 in Appendix A shows a preliminary Single Line Diagram for the proposed project.

11.5 Metering and Monitoring

The new Water Reuse facilities will receive power through the existing plant PG&E revenue metering equipment. To account separately for the electrical operating cost of the project, separate City-owned, sub-metering devices will be installed to monitor and record the energy use of the Project.

11.6 Energy Efficiency

The City of Benicia is committed to reducing energy consumption and its carbon footprint while improving the community's air quality. These goals are a strategic plan priority and increasing energy efficiency is Benicia General Plan Goal 3.27. The City is currently a member of ICLEI, Local Governments for Sustainability, and is a partner in the Cities for Climate Protection campaign. As a campaign participant, the City will, amongst other things, establish a greenhouse gas emissions reduction target.

Electrical equipment will be selected to support these local goals and the national energy efficiency policies. Lighting and other systems will be designed to be energy efficient. Premium efficiency motors will be used to take advantage of PG&E's rebate program (currently called "Savings-by-Design") , that may be available during the final design period.

11.7 Branch Circuiting

Lighting will generally operate on 120 V, single phase circuits. 120 V, general purpose convenience receptacles will be located within the facility per the requirements of the National Electrical Code. Minimum conduit size will be ¾"and typically of galvanized steel for exposed locations, PVC for concrete encased locations and liquid tight type for flexible connections to motors and similar equipment. Wiring will be insulated copper for all power, control, lighting, and instrumentation circuits. Conduits in non-finished areas will be installed either on the surface of the structure

or concealed in concrete floor slabs or below grade. Conduits below grade will be non-metal (PVC) and encased with three inches of red dyed concrete. PVC coated rigid steel conduit will be provide for all exposed installation in corrosive areas. Spare conduits and wiring will be provided as appropriate.

11.8 Motors

Motors ½ Hp and larger will operate on 480 V, 3 phase. Smaller motors will be operated on 120 V, single phase. Motors will have cast iron housing, copper windings, 40° C ambient rating with a 1.15 service factor. Motors ½ Hp and larger will typically be premium efficiency type, NEMA Design B with Class F insulation. All AC motors will be squirrel-cage induction type. Motors will typically be provided with totally enclosed fan cooled (TEFC) enclosures unless otherwise dictated by the area in which they are located. Sound attenuation enclosures will be provided for selected motors located external to the MF/RO Building. Please refer to Section 8 for additional details regarding these enclosures.

11.9 Variable Speed Control

When pumps are required to be operated over an adjustable speed range by the process parameters, pumps will be provided with AC motors and VFD. The equipment, materials and installation will conform to IEEE 519 for harmonics generation and mitigation. Typically motors smaller than approximately 40 HP will utilize 6 pulse VFDs and larger motors will utilize 18 pulse drives or drives with active front end designs.

11.10 Lighting

Lighting will be installed as required to appropriately illuminate the new facilities. Lighting will be designed in accordance with the lighting efficiency Title 24 requirements. New fixtures will be similar to the existing to the extent possible. Low-profile, exterior lighting will be provided at the process units that are not enclosed, such as the NTF recycle pump station and UV system.

11.11 Communications

Raceways will be provided for extension of the plant communications system (telephone, intercom, etc.)

11.12 Control Systems

The Water Reuse facilities control system will be based on PLCs and personal computer running Human Machine Interface (HMI) software. The new system will be designed to run in a freestanding mode, but will be interfaced to the existing plant control system to the maximum extent possible. Additional investigation will be required to determine the most cost effective method of integrating the systems. To the extent feasible, new PLCs and HMI software will be of the same manufacturer as the existing plant systems.

Several of the new process systems will be provided with integral control systems by their manufacturer (UV, Reverse Osmosis, Micro Filtration, etc.). These systems will be connected via either data highway or individual hardwire input/output (I/O) to the main Water Reuse control system.

Because control system hardware and software is rapidly changing and since standard control approaches adopted by process system manufacturers vary, additional development of the control system hardware, operation strategy philosophies and physical connections will need to be developed as the project progresses.

12.1.2 Operating and Maintenance Cost Estimates

All the O&M cost estimates below are based on Year 2007 dollars.

- **Electrical Power Cost –** Electrical power costs used were $0.12/kWhr, which is based on the average unit price for power at the WWTP for one winter month and one summer month.

- **Labor Cost –** Labor cost was assumed at $50/hr, which includes City's normal general and administrative overhead. Administrative labor costs were estimated at 15% of the direct operations and maintenance costs for management and supervision.

- **Equipment Repair and Replacement –** An allowance of two percent (2%) per year of the estimated construction cost of major mechanical and electrical equipment was made to establish a sinking fund to repair and replace major items of equipment.

- **Chemicals –** Costs of sodium hypochlorite, sodium hydroxide and sodium bisulfite were obtained from City WWTP staff for actual cost paid for these chemicals. Cost for other chemicals (sulfuric acid, citric acid and antiscalants) were obtained from suppliers.

- **Other Consumables –** Cost of other consumables, such as replacement membranes, cartridge filters, UV lamps and ballasts were obtained from the respective equipment vendors. Those estimated costs are presented within the estimate of each system.

- **Special Maintenance –** Many WWTPs contract out for special maintenance services for electrical and instrumentation systems. An allowance for a special maintenance contract was made in the amount of $50,000, based on experience from a similar plant.

12.2 Estimated Construction and Capital Costs

~~Using~~ CDM developed construction cost estimates based on the cost assumptions described above and based upon ~~, construction costs were estimated for the various unit processes.~~ the construction costs of similar water reuse projects, including projects for the Carmel Area Wastewater District, City of Livermore, the Dublin San Ramon Services District, and East Bay Municipal Utility District/Chevron. Construction costs were updated from those presented in the October 2006 CDR using additional information developed during the preliminary design phase. Also, vendors were contacted for updated major equipment prices. Lastly, CDM reviewed the Engineering News Record Construction Cost Index (ENR CCI) for the San Francisco Area from October 2006 to September 2007, to determine if construction costs have escalated during that period. Although some small increase occurred in this index between October 2006 and September 2007, overall it actually dropped fractionally from 9099 to 9078. However, as was discussed with the City last November, the ENR CCI has not really tracked the significant cost increases that have been experienced in water-related,

public works projects. Hence, a modest inflation increase of 2.5% has been added to the October 2006 estimates.

The capital cost of a project includes both the initial construction cost plus all "soft costs" that are required to implement the project. These soft costs include: engineering, construction management, administration, environmental compliance, acquisition of permits and financing costs. Other assumptions used in developing the project capital cost estimates are:

- The cost for a "break tank" at Valero sized for 6 hrs of storage at the Water Reuse plant flowrate.
- 25% for engineering design and construction management and $1 million for the preliminary engineering, water quality testing, and environmental planning costs that will be completed prior to the start of engineering design.
- Contingency has been reduced from 25% in the CDR to 20% owing to the development of more detailed information from the preliminary design work upon which to base estimates.

~~Table 12-1 presents a summary of the estimated capital costs for project with production capacity of 2.0.~~ Tables 12-1, 12-2, and 12-3 present the estimated capital costs for projects with a production capacity of 2.0 mgd, 1.5 mgd, and 1.0 mgd, respectively.

Table 12-1
Summary of Estimated Capital Cost
2.0 mgd Water Reuse Project

Component	***Estimated Cost ($ millions)***
Microfiltration/Reverse Osmosis Systems	$11.3
Civil/Electrical Site Work	$1.0
UV Disinfection System	$1.2
Chemical Storage Tanks and Containment	$0.3
Recycled Water Pump Station	$0.57
Pipeline	$2.3
Nitrifying Trickling Filters	$3.1
Valero break tank, 0.5 MG	$0.51
Subtotal (rounded)	$20.3
Engineering and CM at 25%	$5.1
Subtotal	$25.4
Contingency at 20%	$5.1
Costs for preliminary engineering, water quality testing, and environmental planning	$1.0
Total Estimated Cost in September 2007 dollars	$31.5

Table 12-2 ***Summary of Estimated Capital Cost*** ***1.5 mgd Water Reuse Project***	
Component	***Estimated Cost ($ millions)***
Microfiltration/Reverse Osmosis Systems	$9.1
Civil/Electrical Site Work	$0.9
UV Disinfection System	$1.1
Chemical Storage Tanks and Containment	$0.3
Recycled Water Pump Station	$0.5
Pipeline	$2.1
Nitrifying Trickling Filters	$2.6
Valero break tank, 0.38 MG	$0.4
Subtotal (rounded)	$17.0
Engineering and CM at 25%	$4.3
Subtotal	$21.2
Contingency at 20%	$4.3
Costs for preliminary engineering, water quality testing, and environmental planning	$1.0
Total Estimated Cost in September 2007 dollars	26.6

Table 12-3 ***Summary of Estimated Capital Cost*** ***1.0 mgd Water Reuse Project***	
Component	***Estimated Cost ($ millions)***
Microfiltration/Reverse Osmosis Systems	$6.3
Civil/Electrical Site Work	$0.8
UV Disinfection System	$1.0
Chemical Storage Tanks and Containment	$0.3
Recycled Water Pump Station	$0.5
Pipeline	$2.1
Nitrifying Trickling Filters	$1.7
Valero break tank, 0.25 MG	$0.3
Subtotal (rounded)	$12.0
Engineering and CM at 25%	$3.3
Subtotal	$16.3
Contingency at 20%	$3.3
Costs for preliminary engineering, water quality testing, and environmental planning	$1.0
Total Estimated Cost in September 2007 dollars	$20.6

12.3 Estimated Annual Operation and Maintenance Costs

The annual O&M costs of the project include power, labor, chemicals, and replacement of consumables (e.g., membranes, UV lamps, etc). Labor estimates were based on experience with other operations at plants, available guidelines and discussions with existing Benicia Plant operations staff. The replacement costs for major consumables were based on manufacturers' recommendations and experience with other projects. Detailed estimates of O&M costs were developed and presented in the CDR. It was assumed that O&M costs have increased similar to construction costs and hence an inflation factor of 2.5% was added to the detailed estimates from the CDR. ~~A summary of estimated annual O&M costs is presented in Table 12-2. The amounts in the far right hand column are the updated O&M costs.~~

Tables 12-4, 12-5, and 12-6 present the estimated annual O&M costs for projects with a production capacity of 2.0 mgd, 1.5 mgd, and 1.0 mgd, respectively. The amounts in the far right hand column are the updated O&M costs.

Table 12-4~~2~~
Estimated Annual O&M Costs of 2.0 mgd Water Reuse Project

Item	NTF's	MF	RO	UV	Pumping	Admin	Totals Sept 2006	Totals Sept 07
Chemicals	$91,000	$56,300	$68,600	$19,600	$0	$35,300	$270,800	$277,600
Power	$26,700	$44,500	$151,000	$17,700	$108,300	$52,200	$400,400	$410,400
Consumables	$0	$63,500	$61,100	$16,700	$0	$21,200	$162,500	$166,600
Equipment R/R	$18,400	$20,100	$23,200	$15,600	$9,200	$13,000	$99,500	$102,000
Labor	$28,800	$68,800	$48,800	$38,000	$23,900	$31,200	$239,500	$245,500
E and I&C Maint.	$0	$20,000	$10,000	$11,000	$3,000	$6,000	$50,000	$51,300
Total	**$164,900**	**$273,200**	**$362,700**	**$118,600**	**$144,400**	**$158,900**	**$1,222,700**	**$1,253,400**

Table 12-5
Estimated Annual O&M Costs of 1.5 mgd Water Reuse Project

Item	NTF's	MF	RO	UV	Pumping	Admin	Totals Sept 2006	Totals Sept 07
Chemicals	$68,300	$42,200	$51,500	$14,700	$0	$26,500	$203,200	$208,300
Power	$20,000	$33,400	$113,300	$13,300	$81,200	$39,200	$300,400	$307,900
Consumables	$0	$47,600	$45,800	$12,500	$0	$15,900	$121,800	$124,800
Equipment R/R	$17,500	$20,100	$17,300	$14,300	$8,500	$11,600	$89,300	$91,500
Labor	$28,800	$68,800	$48,800	$38,000	$23,900	$31,200	$239,500	$245,500
E and I&C Maint.	$0	$20,000	$10,000	$11,000	$3,000	$6,000	$50,000	$51,300
Total	**$134,600**	**$232,100**	**$286,700**	**$103,800**	**$116,600**	**$130,400**	**$1,004,200**	**$1,029,300**

Table 12-6
Estimated Annual O&M Costs of 1.0 mgd Water Reuse Project

Item	NTF's	MF	RO	UV	Pumping	Admin	Totals Sept 2006	Totals Sept 07
Chemicals	$45,500	$28,200	$34,300	$9,800	$0	$17,700	$135,500	$138,900
Power	$13,400	$22,300	$75,500	$8,900	$54,200	$26,100	$200,400	$205,400
Consumables	$0	$31,800	$30,600	$8,400	$0	$10,600	$81,400	$83,400
Equipment R/R	$16,000	$20,100	$11,600	$12,700	$8,500	$10,300	$79,200	$81,200
Labor	$28,800	$68,800	$48,800	$38,000	$23,900	$31,200	$239,500	$245,500
E and I&C Maint.	$0	$20,000	$10,000	$11,000	$3,000	$6,000	$50,000	$51,300
Total	**$103,700**	**$191,200**	**$210,800**	**$88,800**	**$89,600**	**$101,900**	**$785,940**	**$805,700**

Figure 12-1 shows graphic distribution of the estimated annual O&M cost for a 2 mgd capacity plant. Labor costs, which include plant laboratory staff, make up approximately 33% of the estimated O&M costs and power and chemicals each make up about 25%.

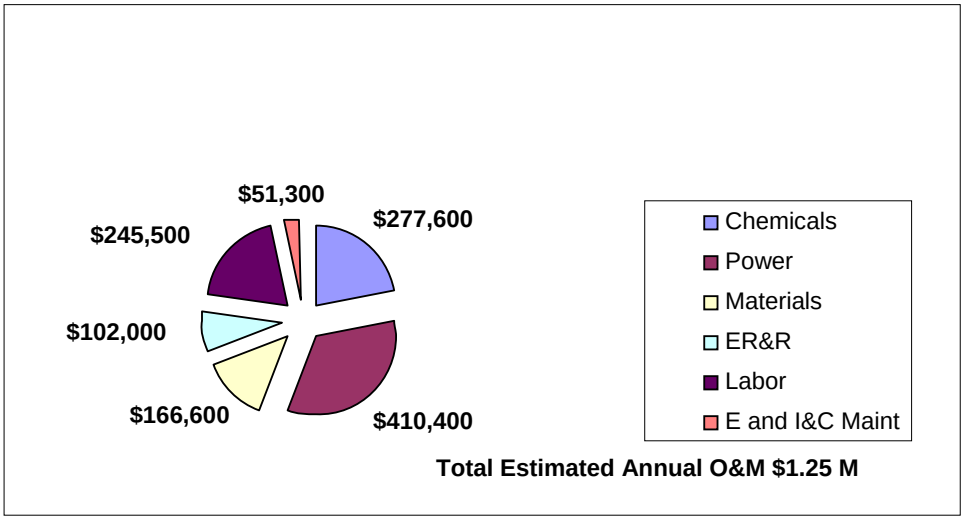

Figure 12-1
Distribution of Estimated O&M Costs for 2.0 mgd Capacity Project

12.4 Estimated Cost of Recycled Water Production

Based on the estimated O&M costs presented in Tables 12-~~2~~4, 12-5, and 12-6, the unit cost of producing and delivering recycled water to Valero was calculated for plant productivity ratios of 75% and 100%. Labor, materials, equipment repair/replacement and special electrical & instrumentation cost remain constant and independent of flow. Chemical and electrical power costs vary nearly directly proportional to flow. Based on those assumptions, the unit costs are shown in Table 12-~~3~~7. For example, the unit cost for a 2 mgd plant varies from about $560/acre foot (AF) at 100% productivity (basically, 24/7/365, which is unlikely given the reliability features designed into the project) up to $64~~5~~0/AF at 75% productivity. These estimates are based on operation and maintenance costs and do not include the amortization of capital costs.

Table 12-~~3~~ 7
Cost of Producing Recycled Water[1] ($/Acre ft)

Percent Productivity	***2.0 mgd Plant ~~Production Capacity~~***	***1.5 mgd Plant***	***1.0 mgd Plant***
100[2]	$560	$610	$720
75[3]	$64~~5~~0	$710	$860

[1] Do not include amortized capital costs.
[2] 24/7/365 operation at 100% productivity.
[3] For example, 24/7/365 at 75% productivity.

Section 13
Project Schedule

13.1 Project Schedule

Figure 13-1 contains an updated project milestone schedule. As shown therein, completion of the CEQA compliance process and final design will be needed before construction can begin.

As shown in Figure 13-1, the final design phase is projected to take approximately 10 months, bid phase 4 months and construction approximately 20 months, including start-up, testing and commissioning.

The preliminary schedule has been developed only for the treatment system. It is not known what contracting mechanism will be used to construct the off-site pipeline. Valero may build it with a separate contractor. Valero may want to have its engineering department design it, or a firm familiar with Valero's piping design requirements. No matter what the design arrangements are, CDM recommends that the pipeline should be built under a separate construction contract from the treatment system, since these types of construction are specialties, and generally pipeline contractors do not build treatment systems, and vice versa. CDM estimates that the pipeline could be constructed and tested in approximately 12 to 14 months or about 240 to 280 working days, within the estimated construction period for the treatment system.

Section 14
Remaining Major Decisions and Additional Studies

14.1 Remaining Major Decisions

Remaining technical decisions include the following:

- The design output capacity of the Project.
- The size of the break tank to be located near the Valero cooling towers.
- Whether to pre-purchase the MF and the UV equipment. Pre-purchase might save ten to fifteen percent on the cost of the equipment.

14.2 Additional Studies Recommended During Final Design

- Evaluate the capacity of the existing storm water pump station and industrial sewer to handle the combination of storm water flow within the site and return flows from the Water Reuse Project.
- Evaluate installing submerged membrane bioreactor (MBR) for combined nitrification and microfiltration in one or more RBC bays, as compared with separately stand alone NTFs and pressure MF. (This concept was introduced by plant staff.)
- Evaluate alternative methods of reprocessing the MF backwash water and the best location for return of this flow.
- Determine the best method of providing standby power for the critical loads of the Water Reuse Project.
- Conduct a corrosion study of soils, groundwater and sea air and recommend appropriate mitigation.
- Conduct background noise monitoring under varying conditions to obtain adequate data to support the efficiency and impact of project noise mitigation.
- Drill additional soil borings and update the Harza geotechnical report.
- There may be additional studies that result from the anticipated update of the draft IS/MND, prepared pursuant to CEQA compliance requirements.

Appendix A
Drawings

G-1	Title Sheet
PD-1	Process Block Diagram No. 1 Sec. Eff. Transfer Systems
PD-2	Process Block Diagram No. 2 Nitrifying Trickling Filters
PD-3	Process Block Diagram No. 3 Micro-Filtration System
PD-4	Process Block Diagram No. 4 Reverse Osmosis System
PD-5	Process Block Diagram No. 5 UV & RW Pump Station
PD-6	Process Block Diagram No. 6 Chemical Systems
HP-1	Preliminary Hydraulic Profile
C-1	Preliminary Site Plan Partial Area Plan III
C-2	Preliminary Site Plan Partial Area Plan IV
M-1	Recycled Water Pump Station Mechanical Plan & Section
E-1	Electrical Distribution Single Line
P-1	Plan and Profile Sta 1+00 to Sta 14+20
P-2	Plan and Profile Sta 7+92 to Sta 18+00
P-3	Plan and Profile Sta 18+00 to 32+00
P-4	Plan and Profile Sta 32+00 to Sta 46+00
P-5	Plan and Profile Sta 46+00 to Sta 60+00
P-6	Plan and Profile Sta 60+00 to 74+00
P-7	Plan and Profile Sta 74+00 to 88+00
P-8	Plan and Profile Sta 88+00 to 102+00
P-9	Plan and Profile Sta 102 to 116+90
P-10	Plan and Profile Sta 116+90 to 130+46
P-11	Plan and Profile Sta 130+46 to 146+50

THE CITY OF BENICIA CALIFORNIA

WATER REUSE PROJECT
PRELIMINARY DESIGN DRAWINGS
MARCH 2008

Drawing List

G-1	Title Sheet and Drawing List
PD-1	Process Block Diagram No. 1 Sec. Eff. Transfer System
PD-2	Process Block Diagram No. 2 Nitrifying Trickling Filters
PD-3	Process Block Diagram No. 3 Micro-Filtration System
PD-4	Process Block Diagram No. 4 Reverse Osmosis System
PD-5	Process Block Diagram No. 5 UV & RW Pump Station
PD-6	Process Block Diagram No. 6 Chemical Systems
HP-1	Preliminary Hydraulic Profile
C-1	Preliminary Site Plan Partial Area Plan III
C-2	Preliminary Site Plan Partial Area Plan IV
M-1	Recycled Water Pump Station Mechanical Plan & Section
E-1	Electical Distribution Single Line
P-1	Plan and Profile Sta 1+00 to Sta 14+20
P-2	Plan and Profile Sta 7+92 to Sta 18+00
P-3	Plan and Profile Sta 18+00 to Sta 32+00
P-4	Plan and Profile Sta 32+00 to Sta 46+00
P-5	Plan and Profile Sta 46+00 to Sta 60+00
P-6	Plan and Profile Sta 60+00 to Sta 74+00
P-7	Plan and Profile Sta 74+00 to Sta 88+00
P-8	Plan and Profile Sta 88+00 to Sta 102+00
P-9	Plan and Profile Sta 102+00 to Sta 116+90
P-10	Plan and Profile Sta 116+90 to Sta 130+46
P-11	Plan and Profile Sta 130+46 to Sta 146+50

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REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY:
DRAWN BY:
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
0 1/2 1"
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations
100 PRINGLE AVENUE
WALNUT CREEK, California 94596
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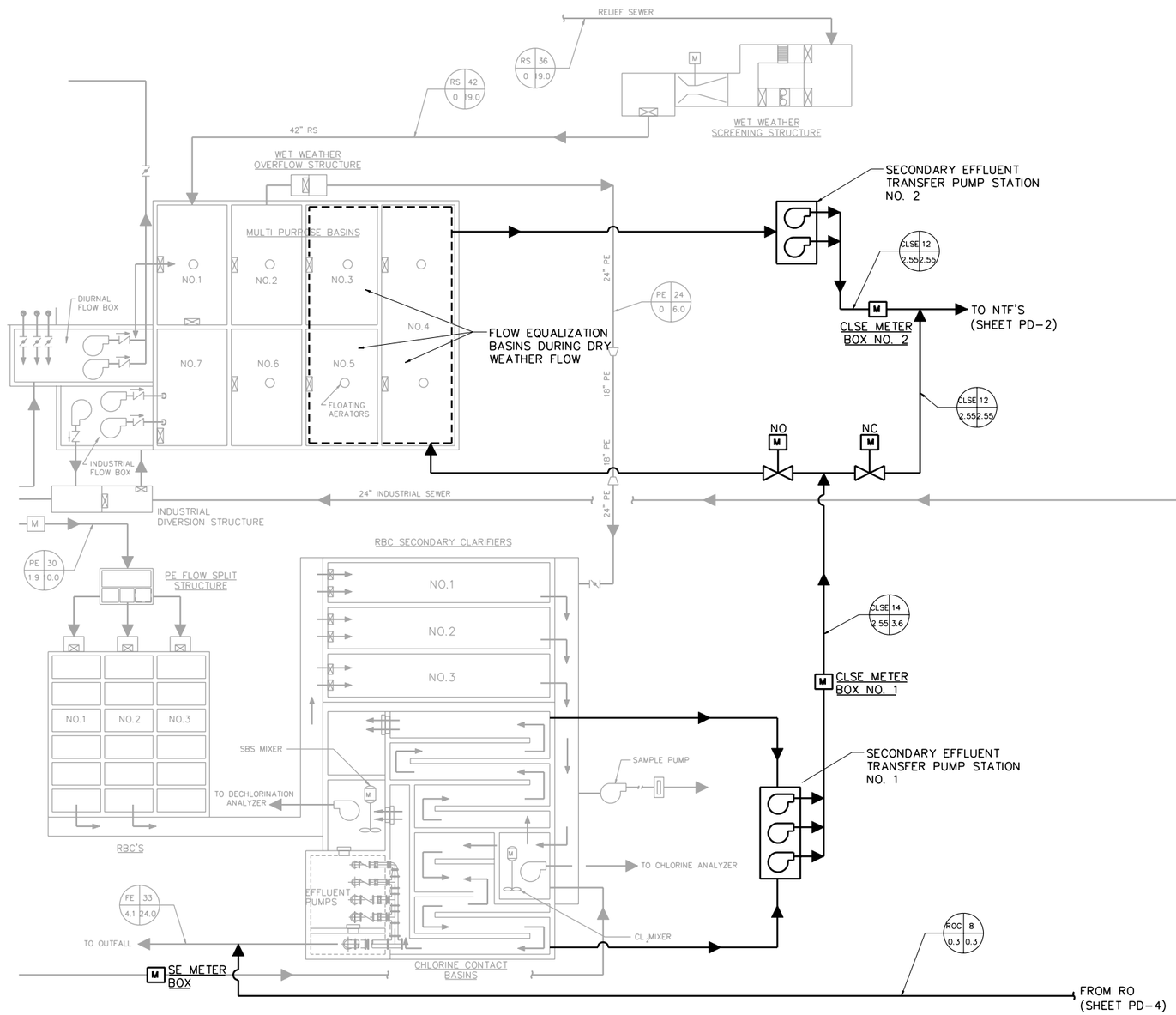
THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

TITLE SHEET AND DRAWING LIST

SHEET
OF ___ SHEETS
SHEET ID
G-1

PROCESS BLOCK DIAGRAMS KEY	**SECONDARY EFFLUENT TRANSFER SYSTEMS SHEET PD-1**	NITRIFYING TRICKLING FILTER SYSTEM SHEET PD-2	MICRO-FILTRATION SYSTEM SHEET PD-3	REVERSE OSMOSIS SYSTEM SHEET PD-4	UV & RECYCLED WATER PUMP SYSTEMS SHEET PD-5	CHEMICAL SYSTEMS SHEET PD-6



LEGEND

- = EXISTING STRUCTURE
- = NEW STRUCTURE
- = FUTURE STRUCTURE
- = EXISTING PIPING
- = NEW PIPING
- = FUTURE PIPING

FE = FINAL EFFLUENT
MFR = MICRO-FILTRATION REJECT
PD = PROCESS BLOCK DIAGRAM
PE = PRIMARY EFFLUENT
RAS = RETURN ACTIVATED SLUDGE
RS = RAW SEWAGE
ROC = REVERSE OSMOSIS CONCENTRATE
SE = SECONDARY EFFLUENT
CLSE = CHLORINATED SECONDARY EFFLUENT
M = MOTOR OPERATED VALVE
NO = NORMALLY OPEN
NC = NORMALLY CLOSED

SERVICE — DIAMETER (INCHES) — AVERAGE FLOW (MGD) — PEAK FLOW (MGD)

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY:
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
0 1/2 1"
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations
100 PRINGLE AVENUE
WALNUT CREEK, California 94596
Tel (925) 933-2900
Fax (925) 933-4174

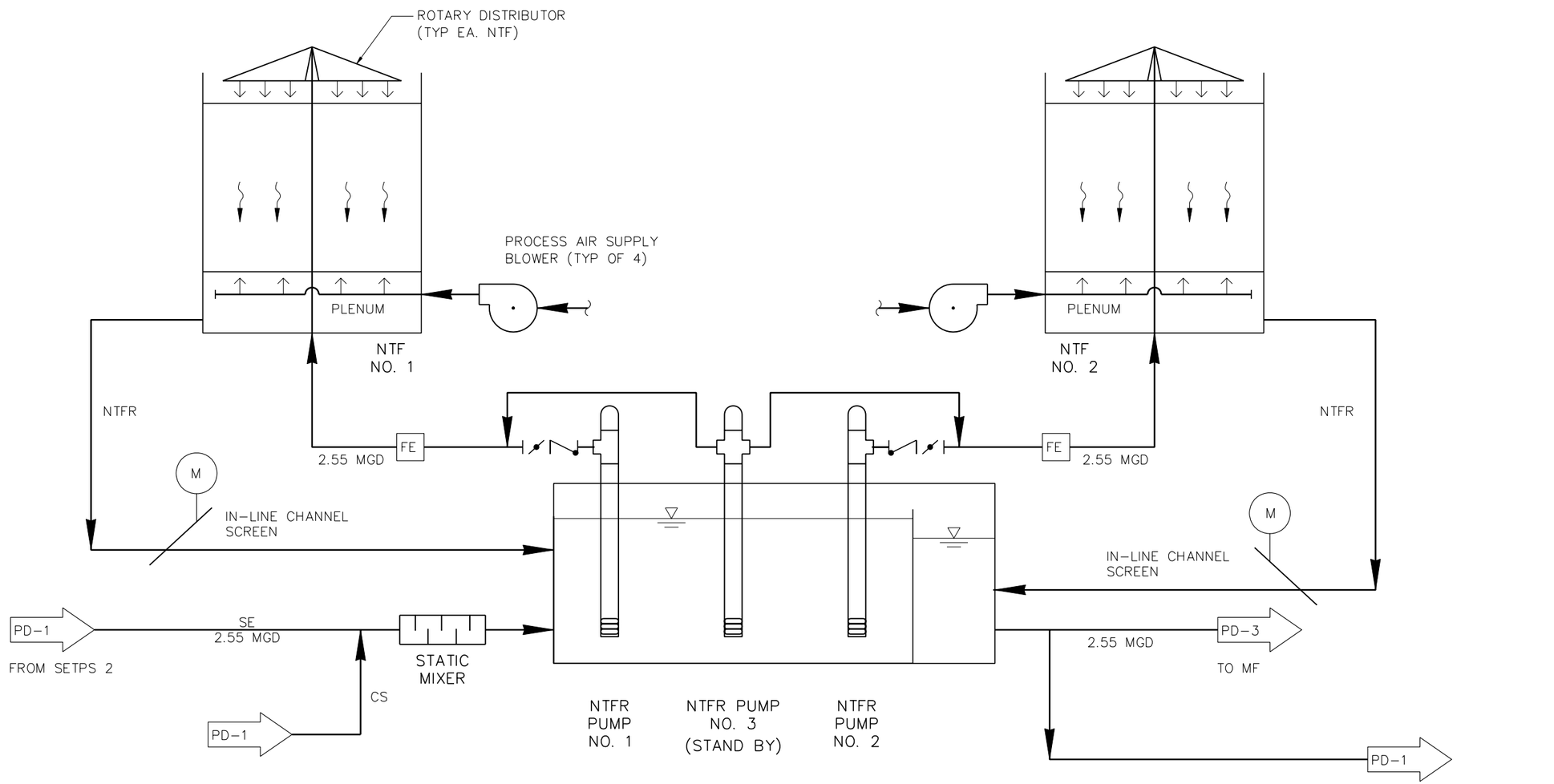
THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

PROCESS BLOCK DIAGRAM NO. 1 SEC. EFF. TRANSFER SYSTEMS

SHEET 1 OF ___ SHEETS
SHEET ID
PD-1

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_PD-01 02/11/08 13:40 talbotwk XREFS: 43059MFG000



NTF	NITRIFYING TRICKLING FILTER
NTFR	NTF RECYCLE
SE	SECONDARY EFFLUENT
CS	CAUSTIC SODA
FE	FLOW METER
SETPS 2	SECONDARY EFFLUENT TRANSFER PUMP STATION NO.2
PD	PROCESS BLOCK DIAGRAM

NITRIFYING TRICKLING FILTER RECYCLE
PUMP STATION.

NITRIFYING TRICKLING FILTERS SYSTEM

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JJS
DRAWN BY: TVN
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
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BENICIA, CALIFORNIA 94510

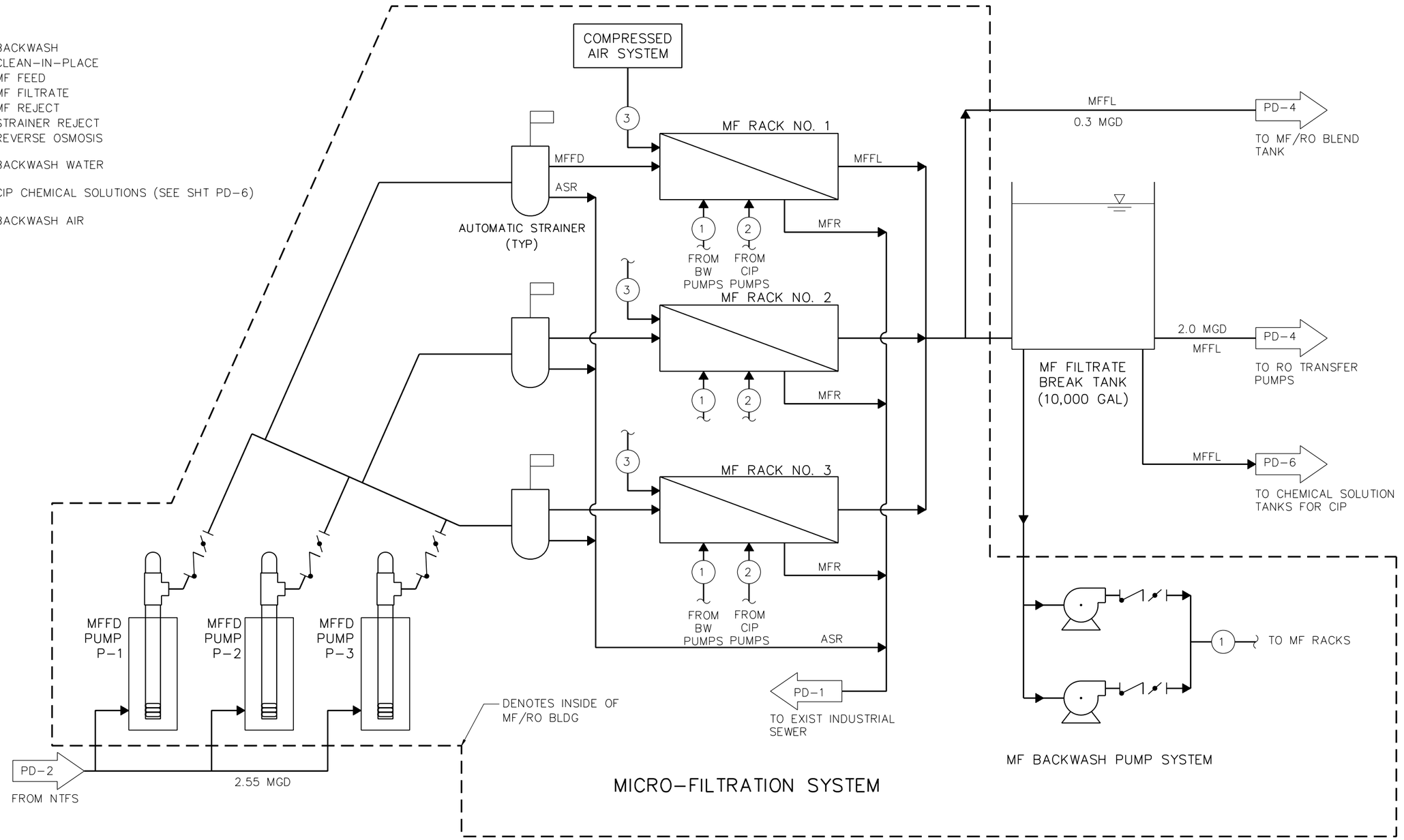
WATER REUSE PROJECT
PHASE 1

PROCESS BLOCK DIAGRAM NO. 2
NITRIFYING TRICKLING FILTERS

SHEET
OF SHEETS
SHEET ID
PD-2

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_PD-02 02/11/08 17:09 talbotwk XREFS: 43059MFG000

BW	BACKWASH
CIP	CLEAN-IN-PLACE
MFFD	MF FEED
MFFL	MF FILTRATE
MFR	MF REJECT
ASR	STRAINER REJECT
RO	REVERSE OSMOSIS
(1)	BACKWASH WATER
(2)	CIP CHEMICAL SOLUTIONS (SEE SHT PD-6)
(3)	BACKWASH AIR



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JJS
DRAWN BY: TVN
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
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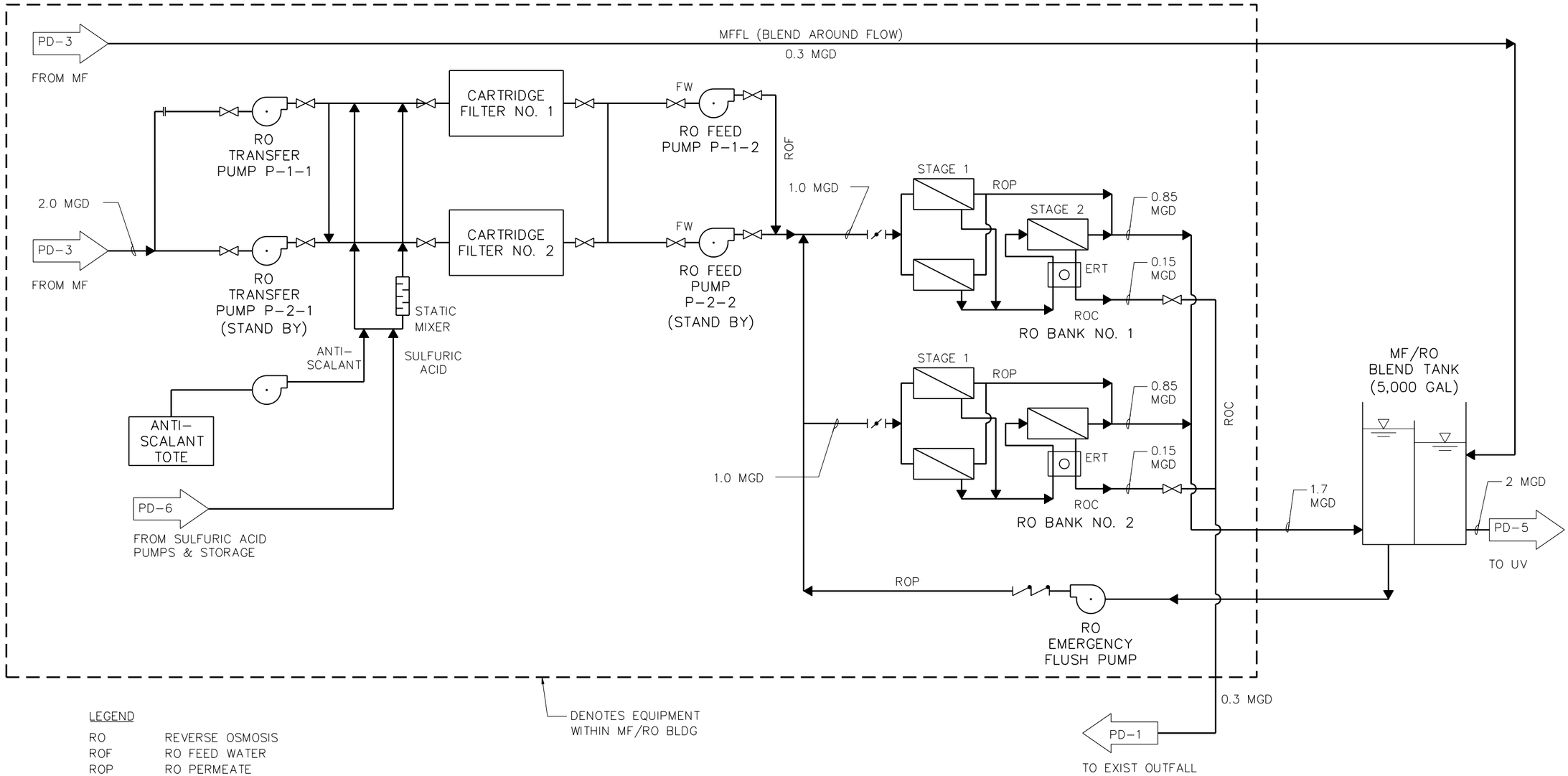
THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

PROCESS BLOCK DIAGRAM NO. 3
MICRO-FILTRATION SYSTEM

SHEET
OF ___ SHEETS
SHEET ID
PD-3

N:\ACAD2000\216\43059\01-SHEETS\ 43059_PD-03 02/11/08 14:54 talbotwk XREFS: 43059MFG000



LEGEND

RO	REVERSE OSMOSIS
ROF	RO FEED WATER
ROP	RO PERMEATE
ROC	RO CONCENTRATE (REJECT)
ERT	ENERGY RECOVERY TURBINE

REVERSE OSMOSIS SYSTEM

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JJS
DRAWN BY: TVN
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
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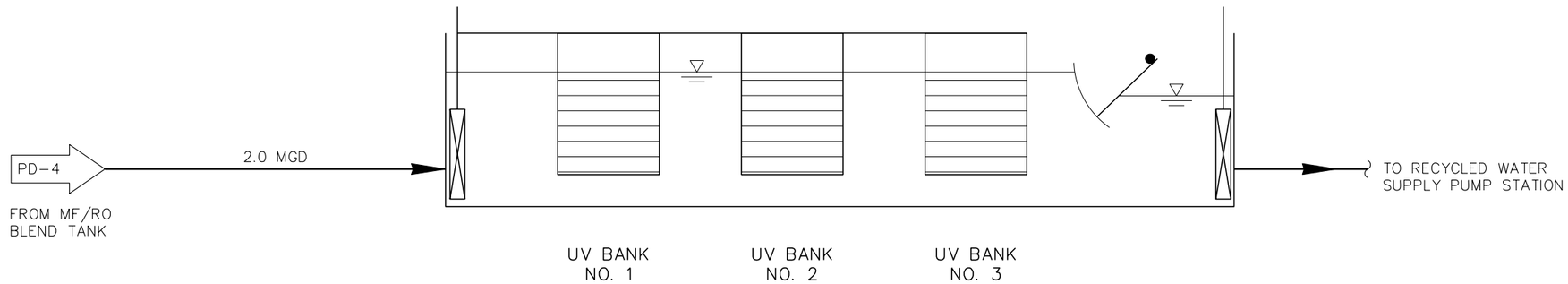
WATER REUSE PROJECT
PHASE 1

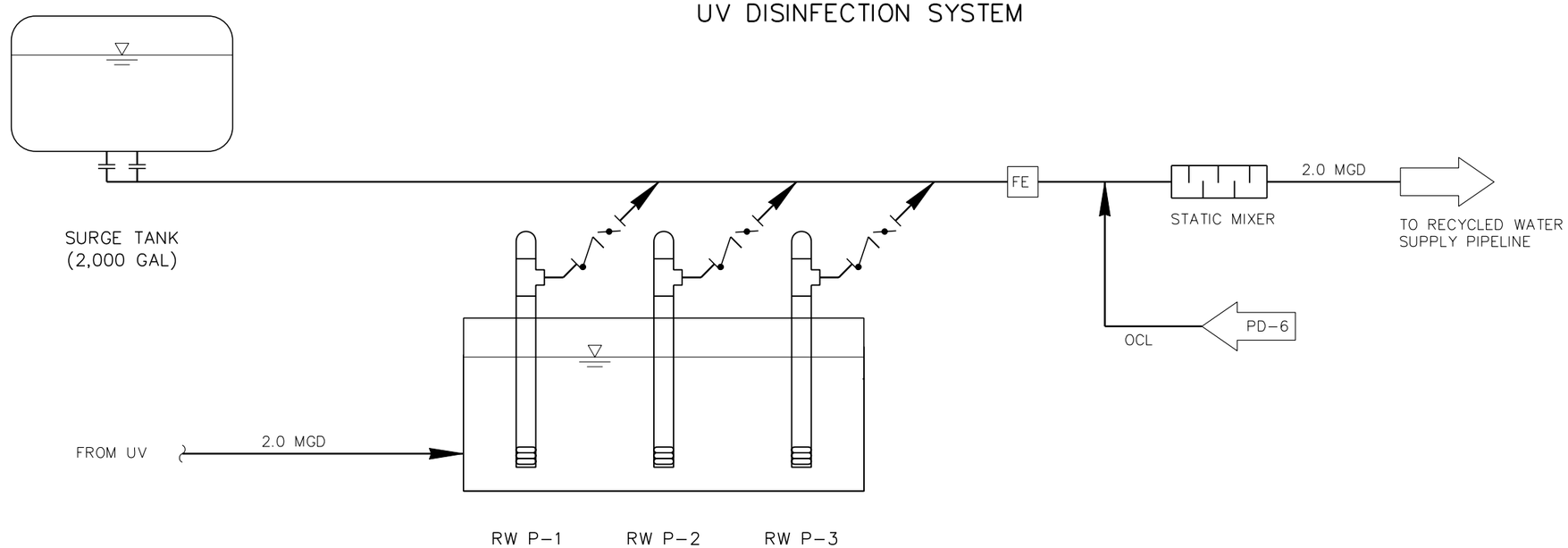
PROCESS BLOCK DIAGRAM NO. 4
REVERSE OSMOSIS SYSTEM

SHEET
OF SHEETS
SHEET ID
PD-4

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_PD-04 02/11/08 15:15 talbotwk XREFS: 43059MFG000



UV DISINFECTION SYSTEM



RECYCLED WATER SUPPLY PUMP STATION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JJS
DRAWN BY: TVN
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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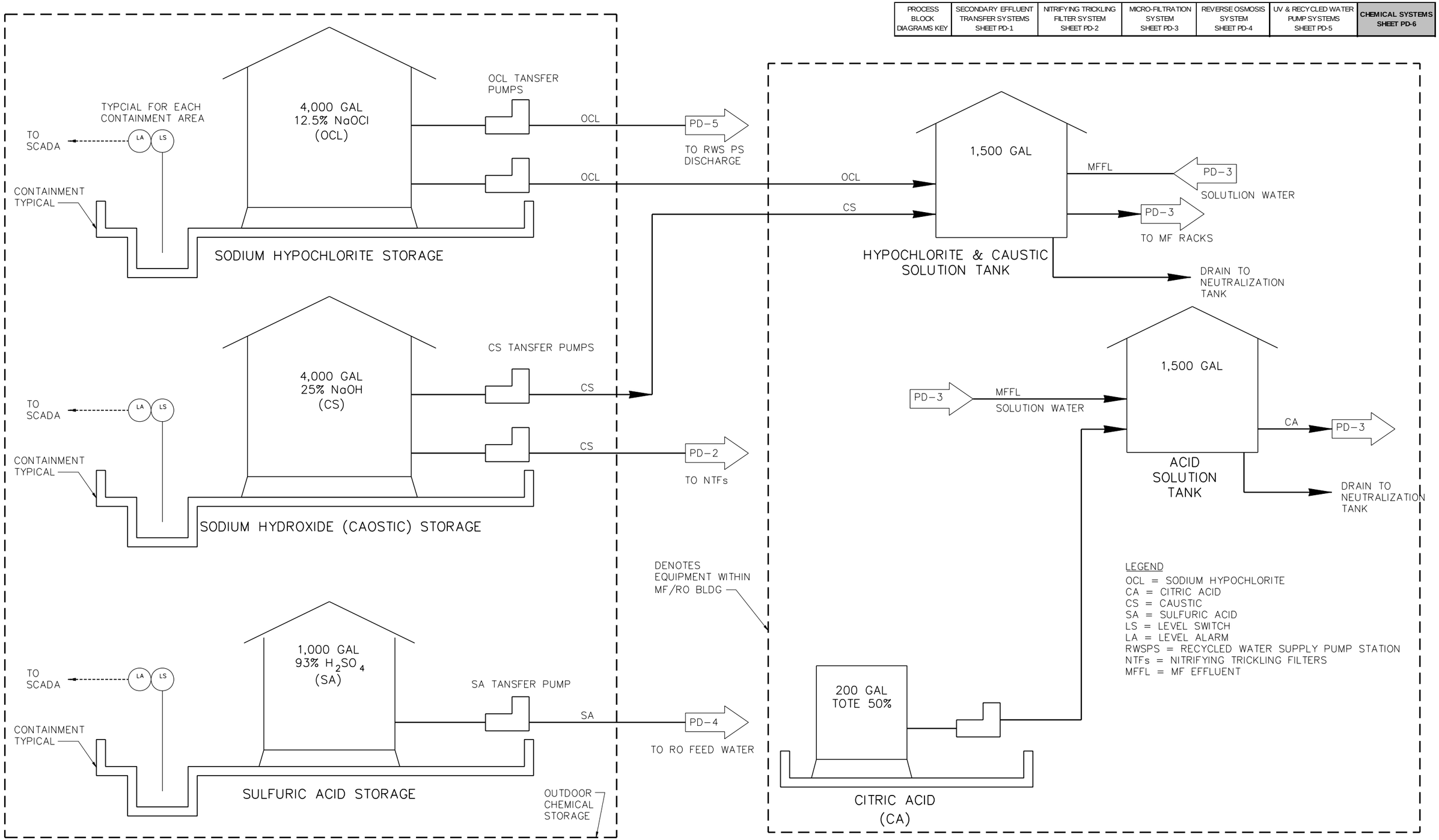
WATER REUSE PROJECT
PHASE 1

PROCESS BLOCK DIAGRAM NO. 5
UV & RW PUMP STATION

SHEET
OF SHEETS
SHEET ID
PD-5

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_PD-05 02/11/08 17:06 talbotwk XREFS: 43059MFG000

PROCESS BLOCK DIAGRAMS KEY	SECONDARY EFFLUENT TRANSFER SYSTEMS SHEET PD-1	NITRIFYING TRICKLING FILTER SYSTEM SHEET PD-2	MICRO-FILTRATION SYSTEM SHEET PD-3	REVERSE OSMOSIS SYSTEM SHEET PD-4	UV & RECYCLED WATER PUMP SYSTEMS SHEET PD-5	CHEMICAL SYSTEMS SHEET PD-6



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JJS
DRAWN BY: TVN
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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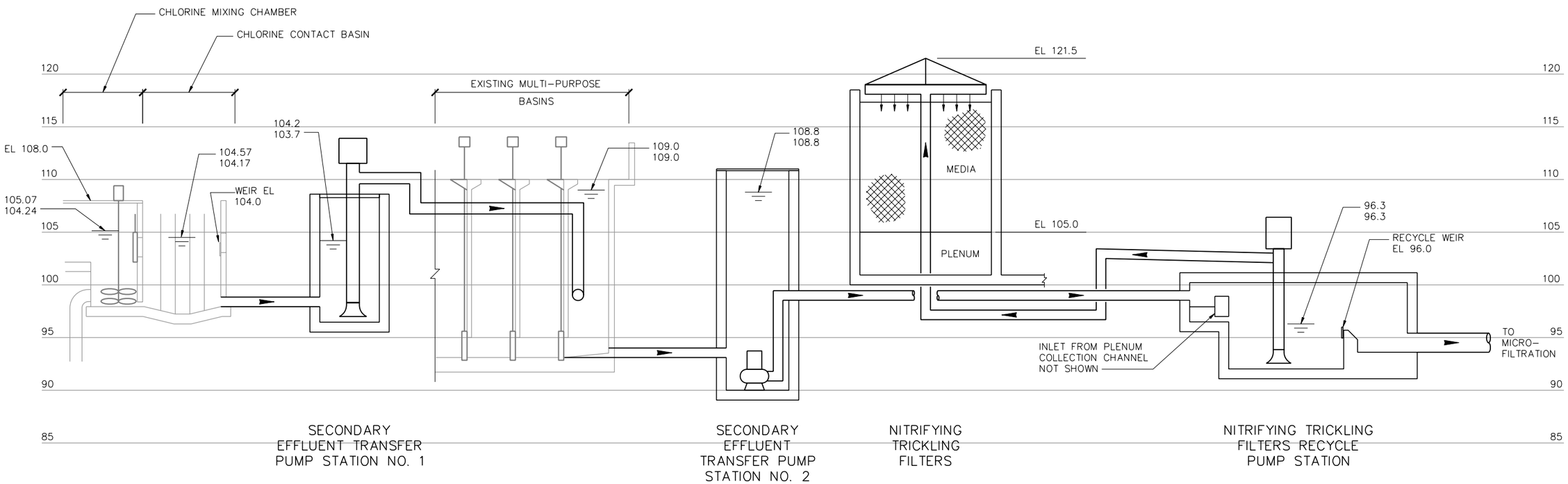
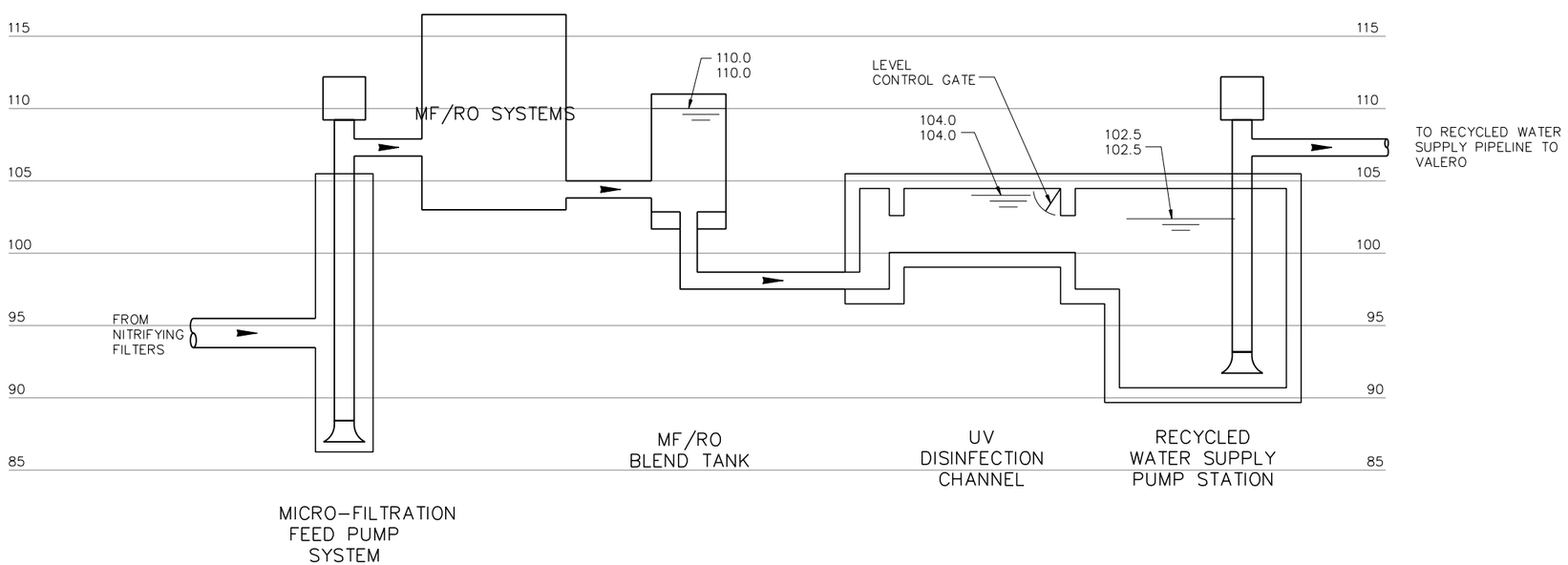
WATER REUSE PROJECT
PHASE 1

PROCESS BLOCK DIAGRAM NO. 6
CHEMICAL SYSTEMS

SHEET
OF SHEETS
SHEET ID
PD-6

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_PD-06 02/11/08 17:06 talbotwk XREFS: 43059MFG000





NOTES:

1. VERTICAL DATUM – PROJECT EL 100 EQUAL USC AND GS NORTH AMERICAN 1929 SEA LEVEL DATUM WITH SUPPLEMENTARY ADJUSTMENT OF JUNE 1959.

2. WATER SURFACE ELEVATIONS ARE TAKEN FROM THE WET WEATHER IMPROVEMENTS PROJECT HYDRAULIC PROFILE AND ARE FOR THE FOLLOWING CONDITIONS:
PLANT PEAK HYDRAULIC EFFLUENT FLOW = 24 MGD;
2 MGD RECYCLED WATER PRODUCTION
PLANT AVERAGE DAY MAXIMUM MONTH FLOW (YEAR 2005) = 4.06 MGD; 2 MGD RECYCLED WATER PRODUCTION

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JJS
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SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

PRELIMINARY HYDRAULIC PROFILE

SHEET
OF ___ SHEETS
SHEET ID
HP-1

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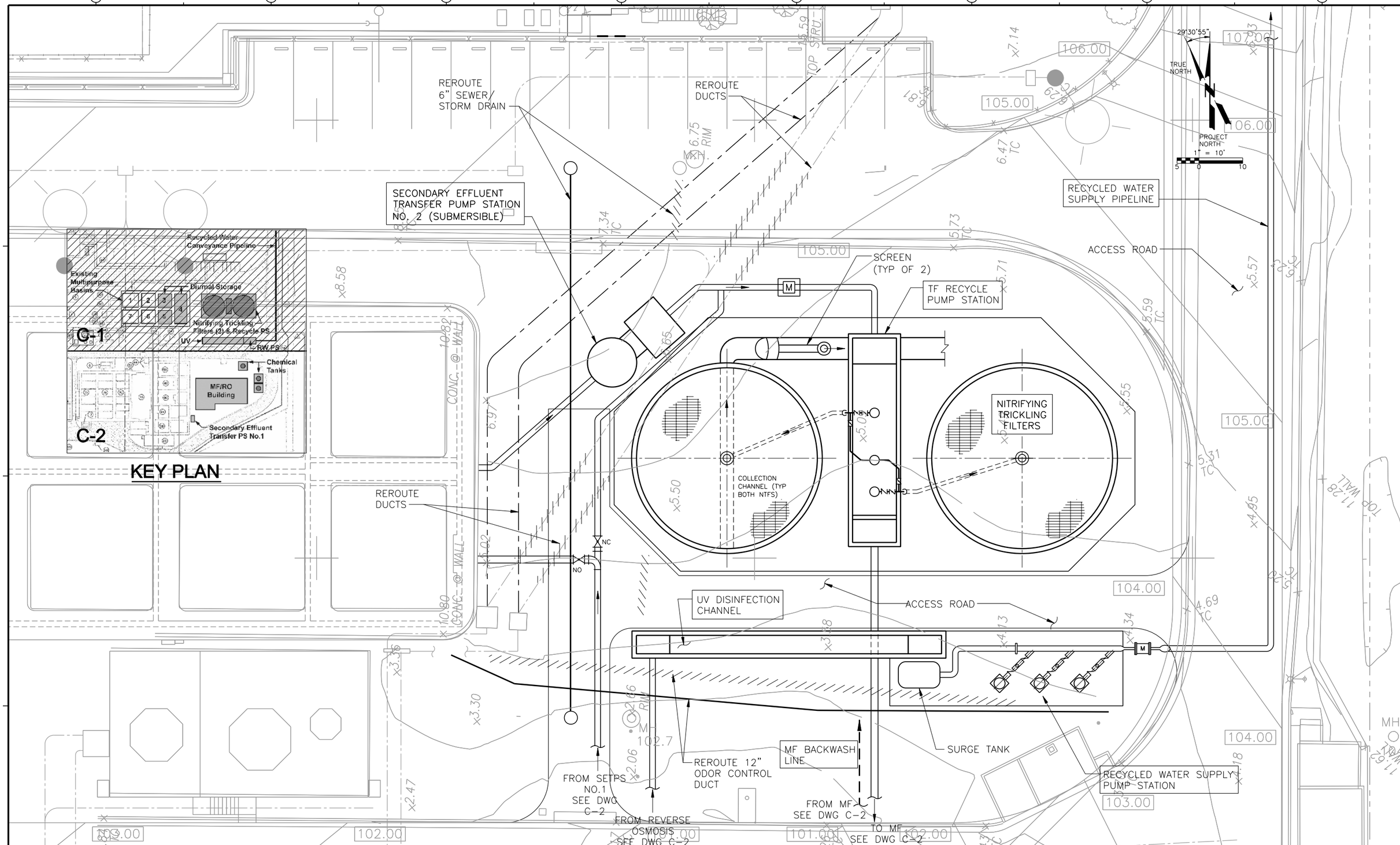

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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THE CITY OF BENICIA
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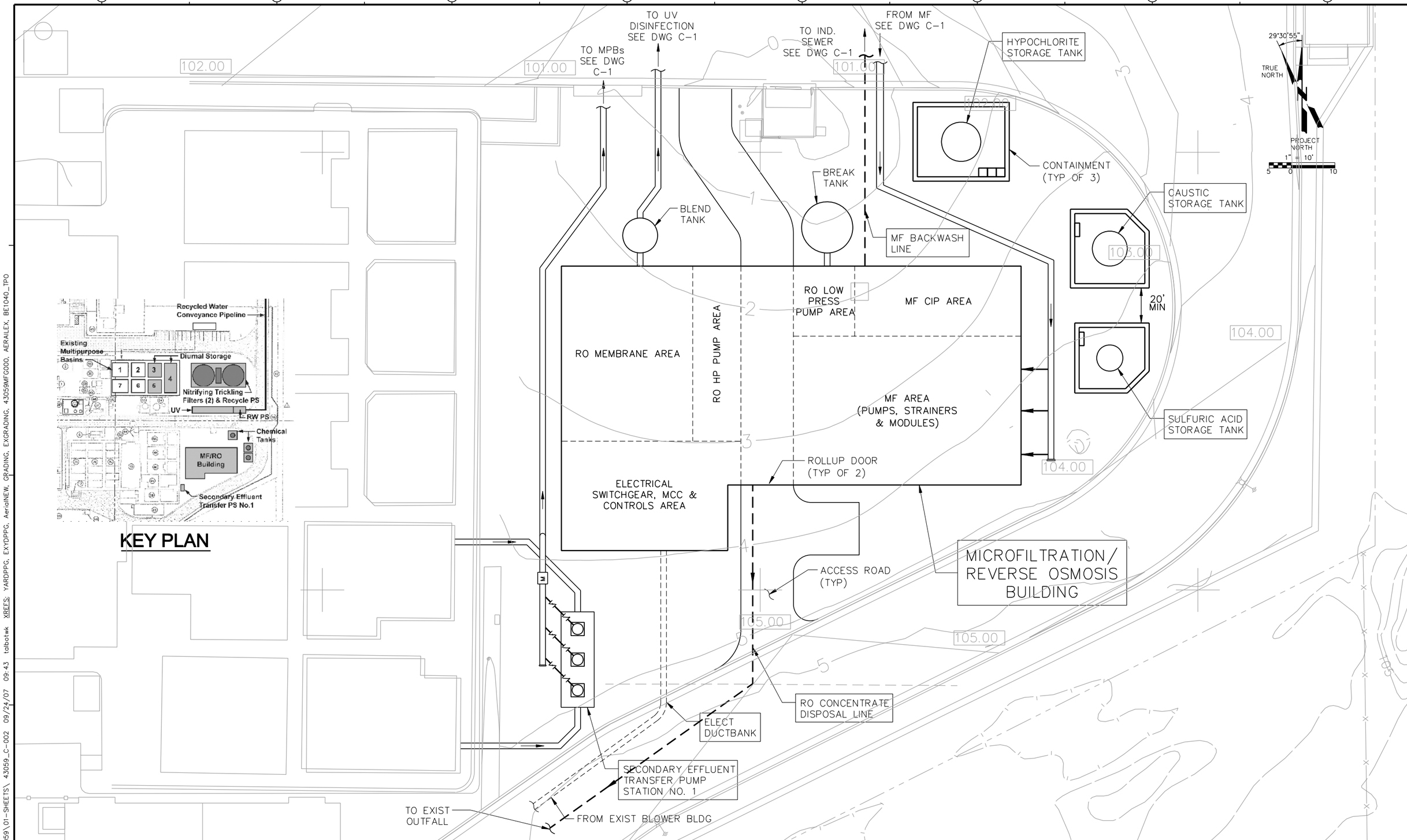
WATER REUSE PROJECT
PHASE 1

PRELIMINARY SITE PLAN
PARTIAL AREA PLAN III

SHEET 1 OF --- SHEETS
SHEET ID C-1

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_C-001 09/20/07 09:36 marshallkm XREFS: YARDPPG, EXYDPPG, AerialNEW, GRADING, EXGRADING, 43059MFG000, AERAILEX, BE1040_TPO, X-ELEC



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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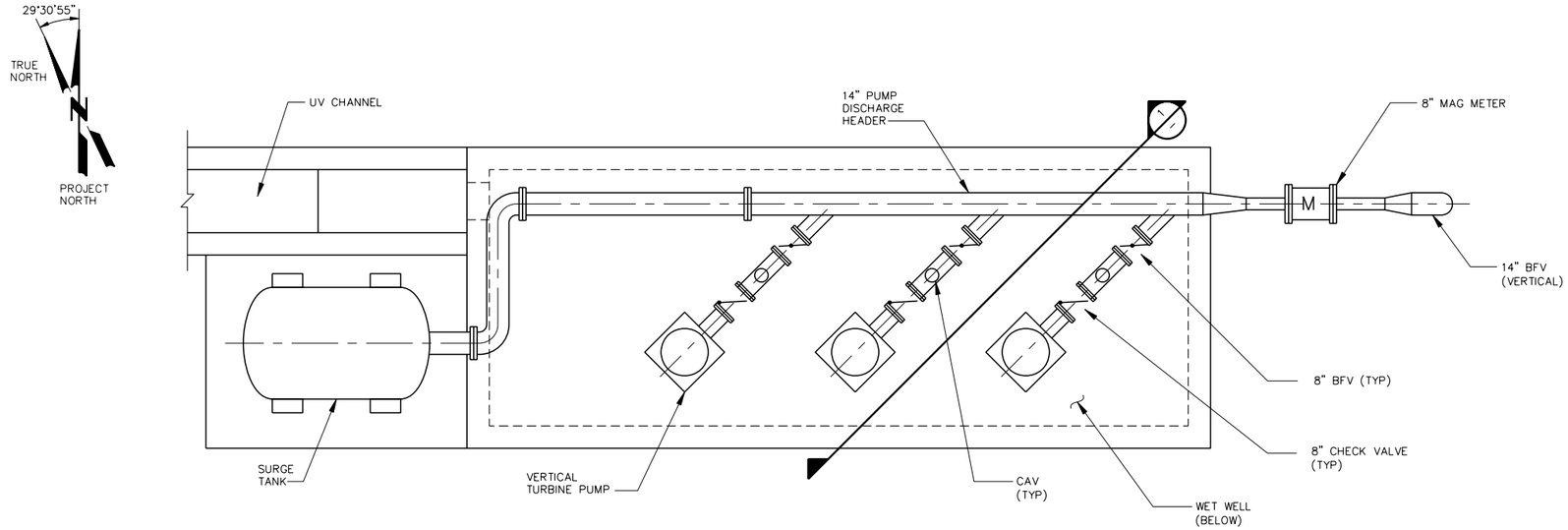
THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

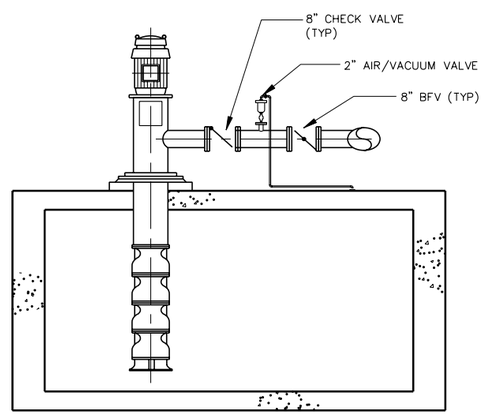
PRELIMINARY SITE PLAN
PARTIAL AREA PLAN IV

SHEET 1 OF ___ SHEETS
SHEET ID
C-2

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_C-002 09/24/07 09:43 talbotwk XREFS: YARDPPG, EXYDPPG, AerialNEW, GRADING, EXGRADING, 43059MFG000, AERAILEX, BE1040_TPO



PLAN
1/4" = 1'-0"



SECTION 1
1/4" = 1'-0"

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

RECYCLED WATER PUMP STATION
MECHANICAL PLAN & SECTION

SHEET 1 OF ___ SHEETS
SHEET ID
M-1

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_M-001 09/19/07 10:10 nguyentv XREFS: 43059MFG000

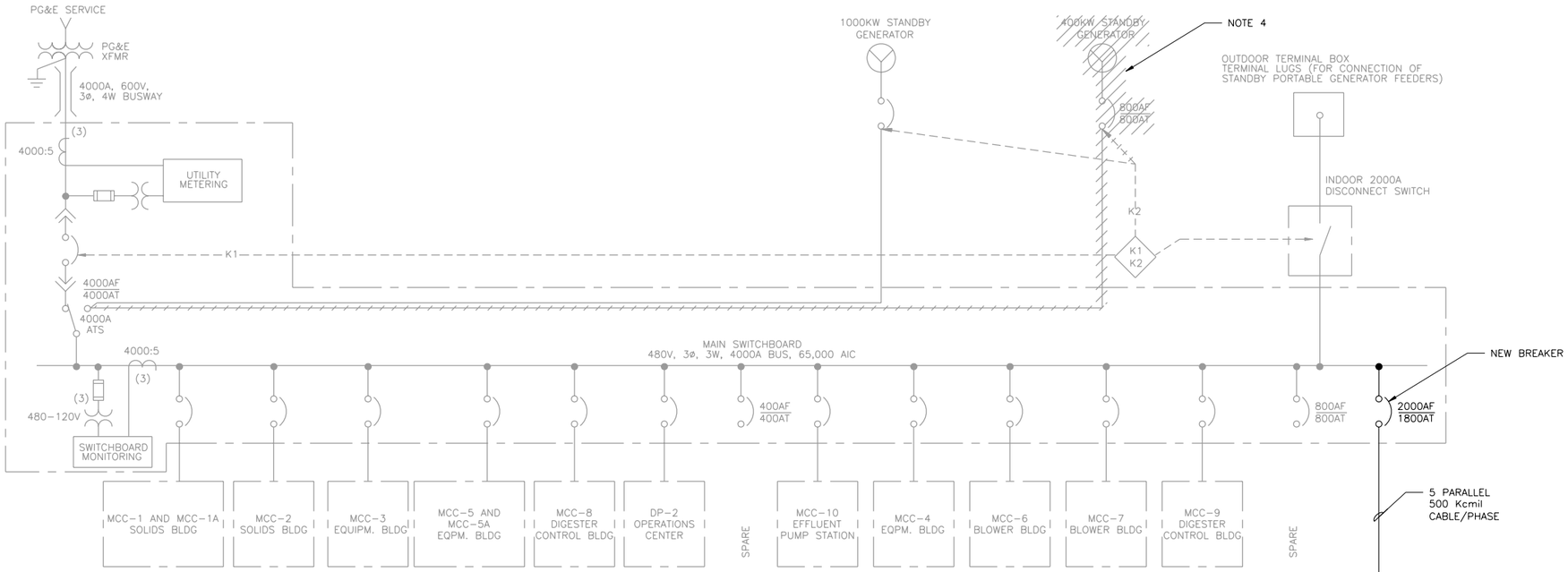
NOTES:

1. NOT ALL EXISTING MCC AND LOADS ARE SHOWN.

2. EXISTING ELECTRICAL DISTRIBUTION SYSTEM DETAILS SHOWN HAVE BEEN TAKEN FROM CAROLLO RECORD DRAWINGS FOR BENICIA WWTP IMPROVEMENTS PROJECT (JUNE 1998). INFORMATION HAS NOT BEEN FIELD VERIFIED.

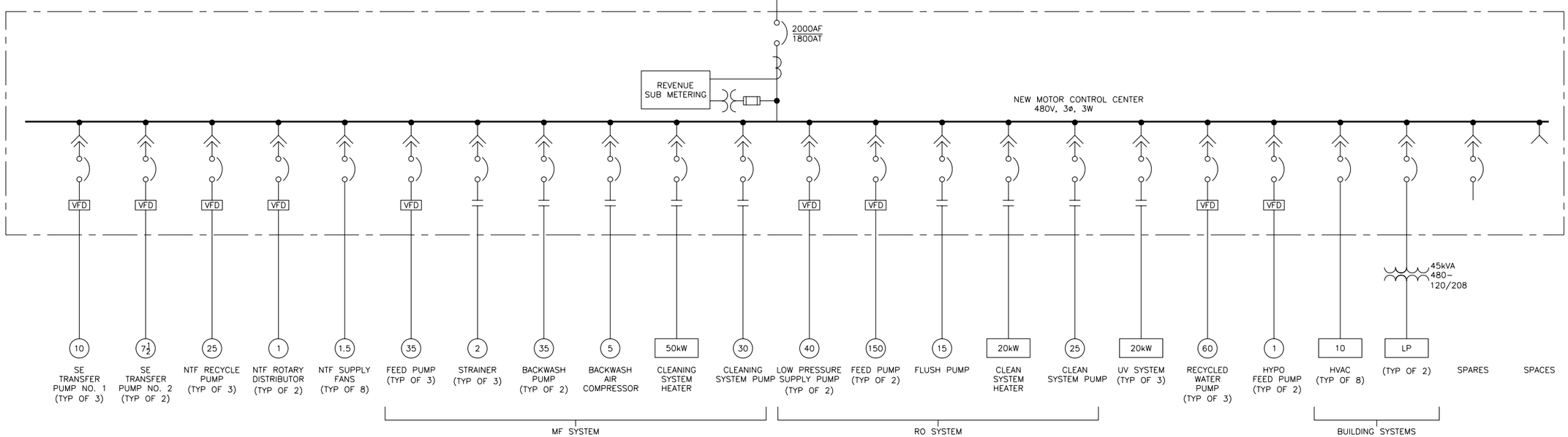
3. NEW EQUIPMENT SHOWN IN BOLD LINES & EXISTING EQUIPMENT SHOWN IN LIGHT LINES.

4. EXISTING GENERATOR, INDICATED BY PLANT STAFF TO BE REMOVED IN THE FUTURE.



EXISTING PLANT SINGLE LINE

(NOTES 1 & 2)



NEW WATER REUSE SYSTEMS – SINGLE LINE

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
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250 EAST L STREET
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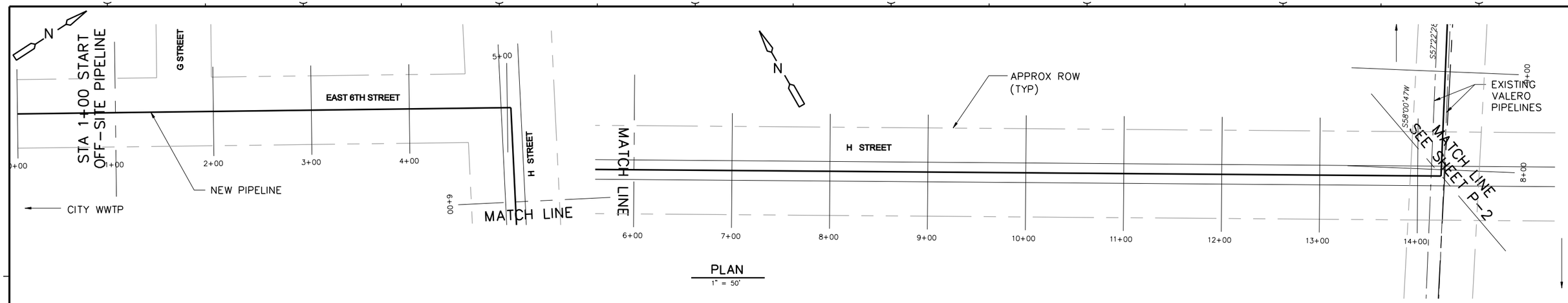
WATER REUSE PROJECT
PHASE 1

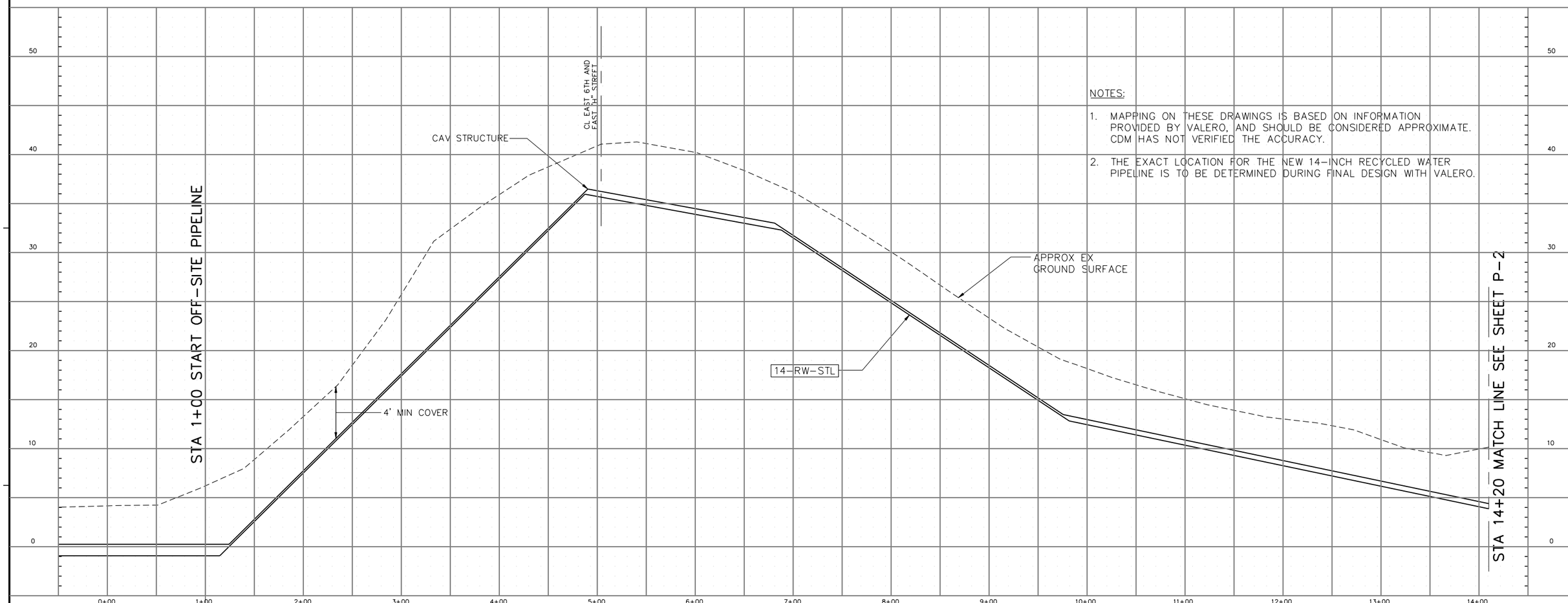
ELECTRICAL DISTIBUTION SINGLE LINE

SHEET 1 OF ___ SHEETS
SHEET ID
E-1

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_E-001 09/20/07 14:53 marshallkm XREFS: 43059MFG000



PLAN
1" = 50'



PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

NOTES:

1. MAPPING ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY VALERO, AND SHOULD BE CONSIDERED APPROXIMATE. CDM HAS NOT VERIFIED THE ACCURACY.
2. THE EXACT LOCATION FOR THE NEW 14-INCH RECYCLED WATER PIPELINE IS TO BE DETERMINED DURING FINAL DESIGN WITH VALERO.

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
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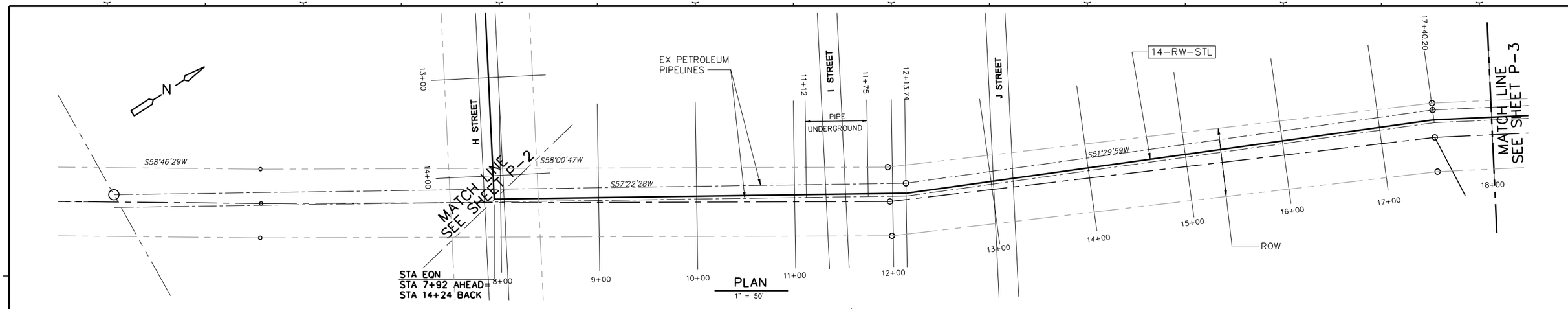
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

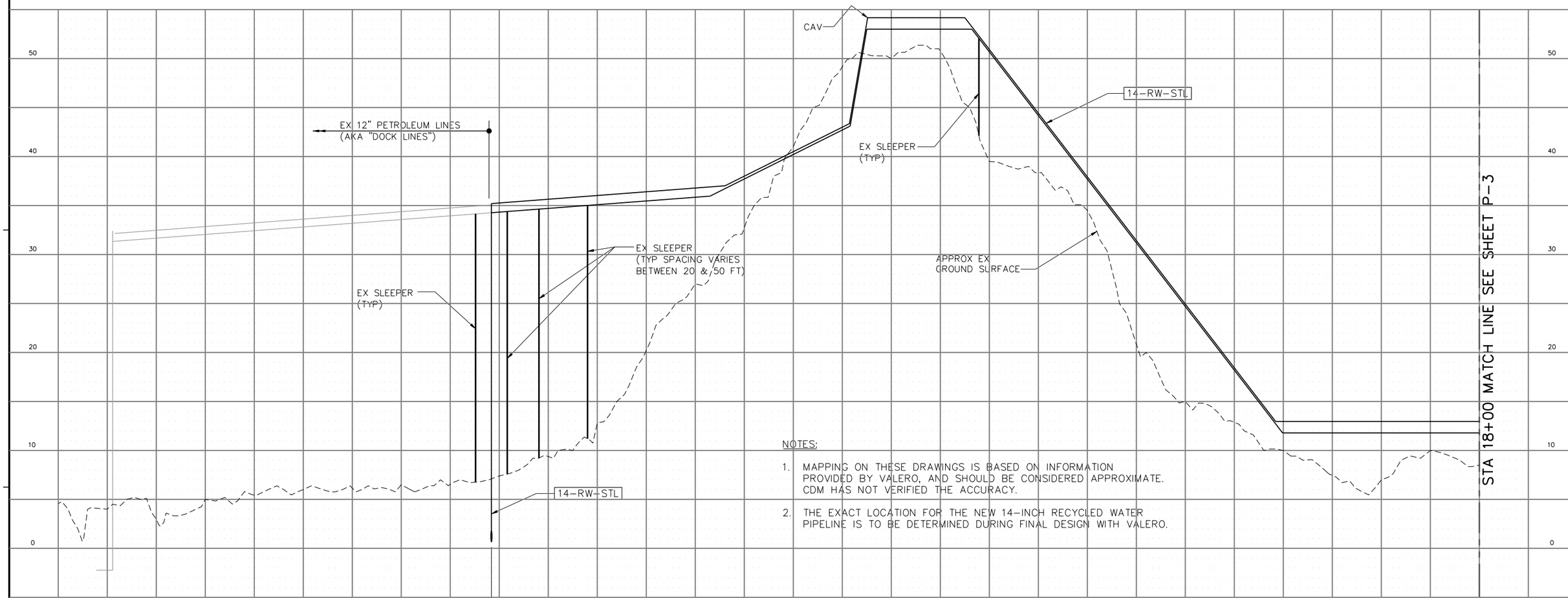
PLAN AND PROFILE
STA 1+00 TO STA 14+20

SHEET 1 OF ___ SHEETS
SHEET ID
P-1

N:\ACAD2000\2161\43059\01-SHEETS\43059_P-001 09/06/07 13:40 weiner.jo XREFS: 43059MFG000, PROFILE



PLAN
1" = 50'



NOTES:

1. MAPPING ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY VALERO, AND SHOULD BE CONSIDERED APPROXIMATE. CDM HAS NOT VERIFIED THE ACCURACY.
2. THE EXACT LOCATION FOR THE NEW 14-INCH RECYCLED WATER PIPELINE IS TO BE DETERMINED DURING FINAL DESIGN WITH VALERO.

STA EQN
STA 7+92 AHEAD=
STA 14+24 BACK

PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 7+92 TO STA 18+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-2

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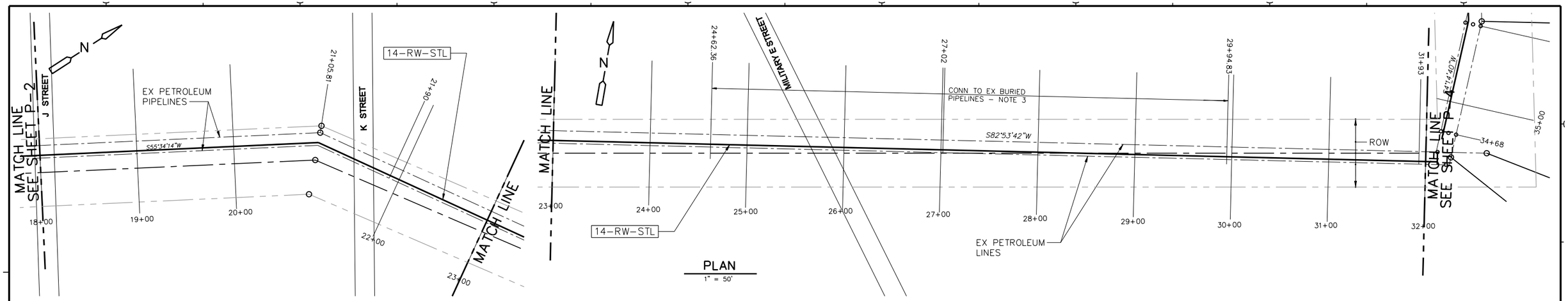
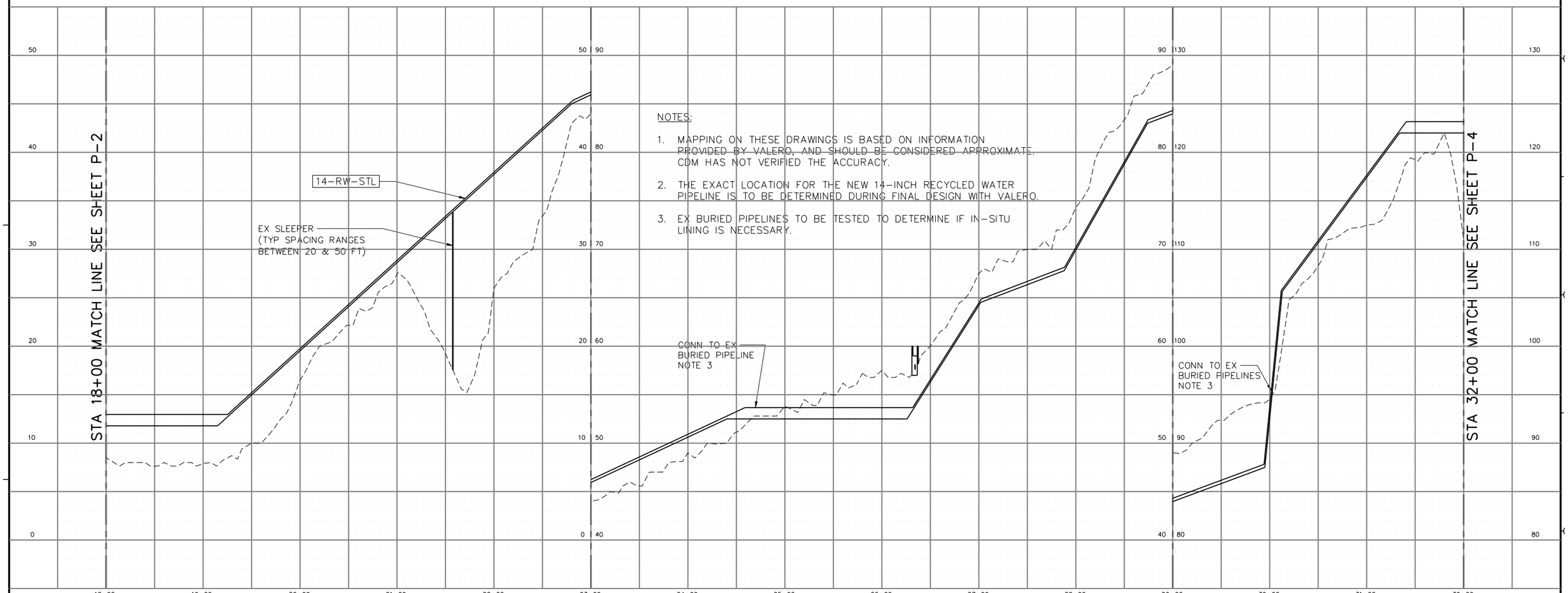


PLAN
1" = 50'



NOTES:

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2. THE EXACT LOCATION FOR THE NEW 14-INCH RECYCLED WATER PIPELINE IS TO BE DETERMINED DURING FINAL DESIGN WITH VALERO.
3. EX BURIED PIPELINES TO BE TESTED TO DETERMINE IF IN-SITU LINING IS NECESSARY.

PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
0 1/2 1"
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

CDM Camp Dresser & McKee Inc.
consulting engineering construction operations
100 PRINGLE AVENUE
WALNUT CREEK, California 94596
Tel (925) 933-2900
Fax (925) 933-4174

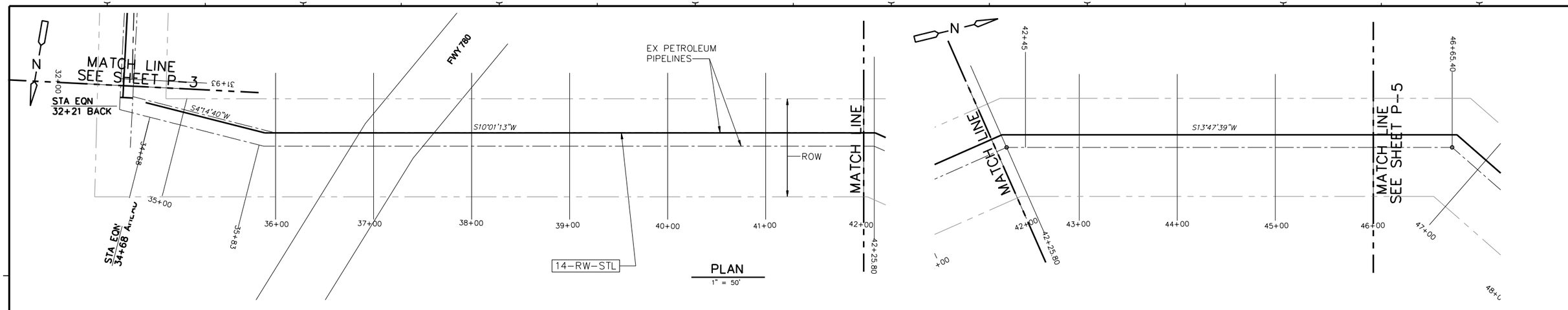
THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

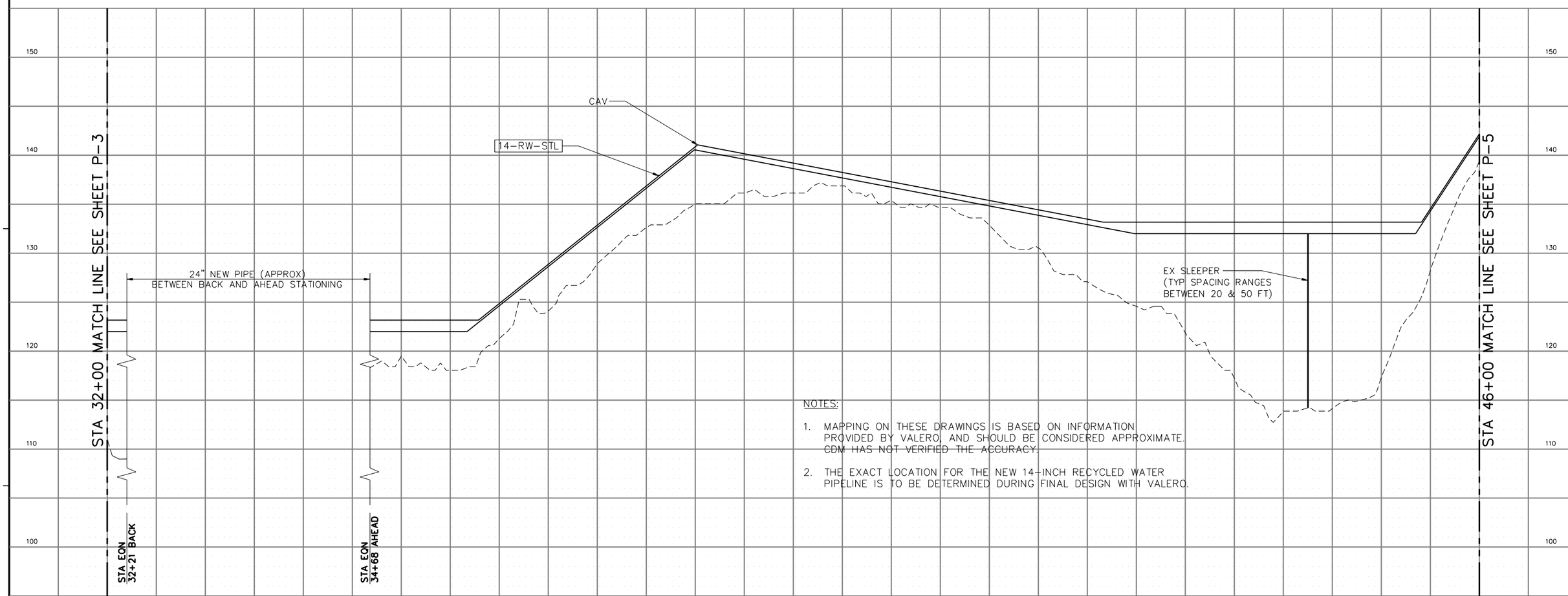
PLAN AND PROFILE
STA 18+00 TO STA 32+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-3

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_P-003 09/06/07 13:45 weiner.p XREFS: 43059MFG000, PROFILE



PLAN
1" = 50'



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PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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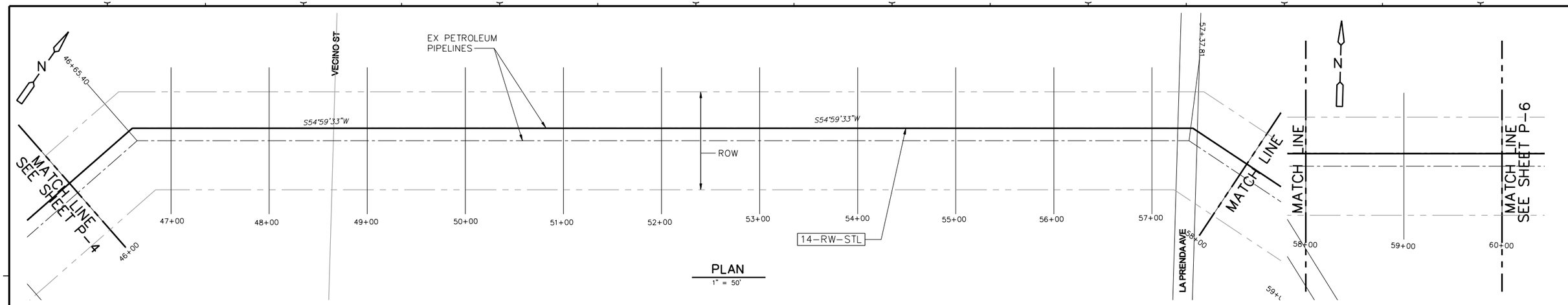
BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 32+00 TO STA 46+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-4

N:\ACAD2000\2161\43059\01-SHEETS\ 43059_P-004 09/04/07 17:21 weinerja XREFS: 43059WFG000, PROFILE



PLAN
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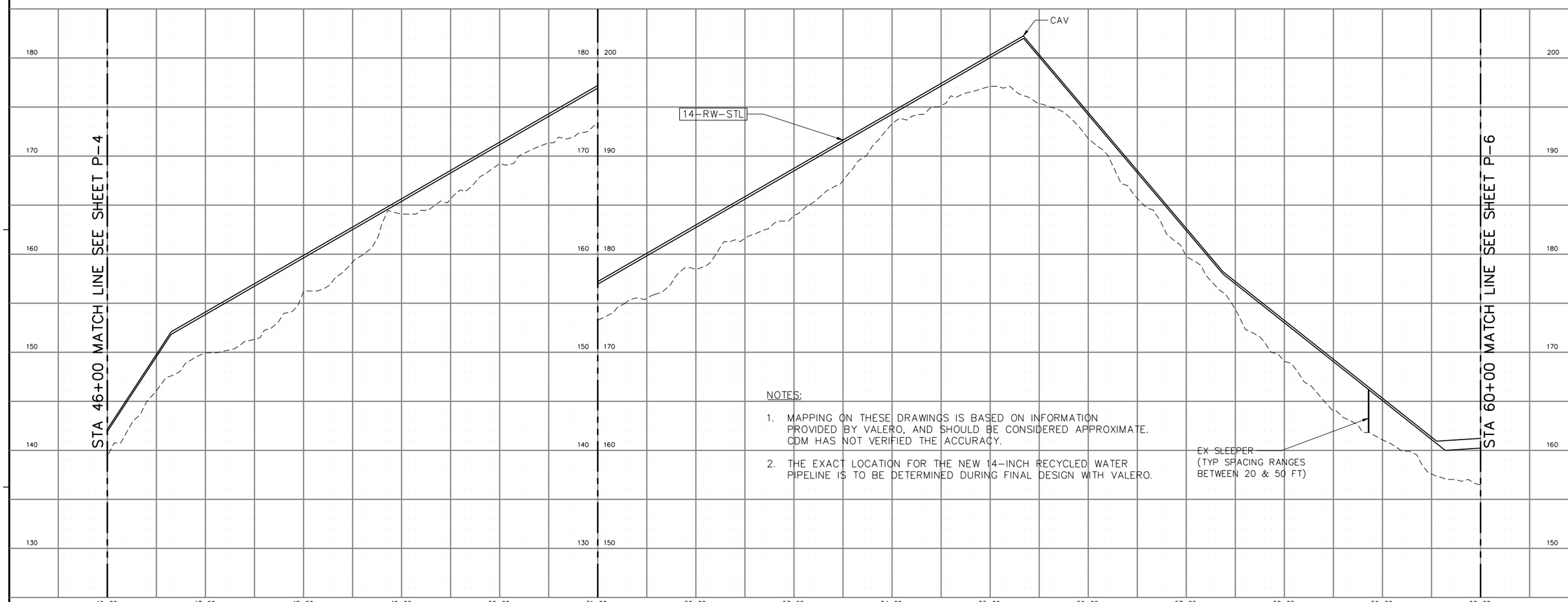

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PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
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WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 46+00 TO STA 60+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-5

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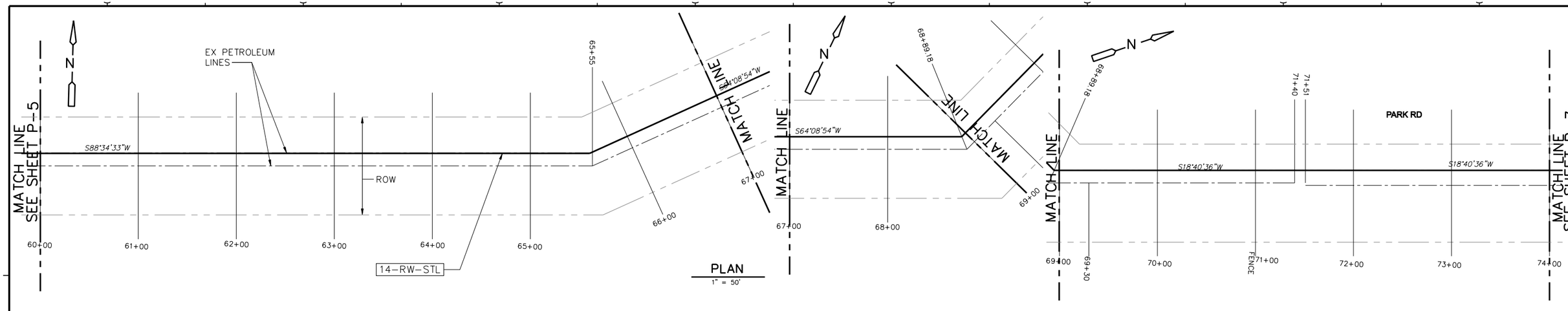
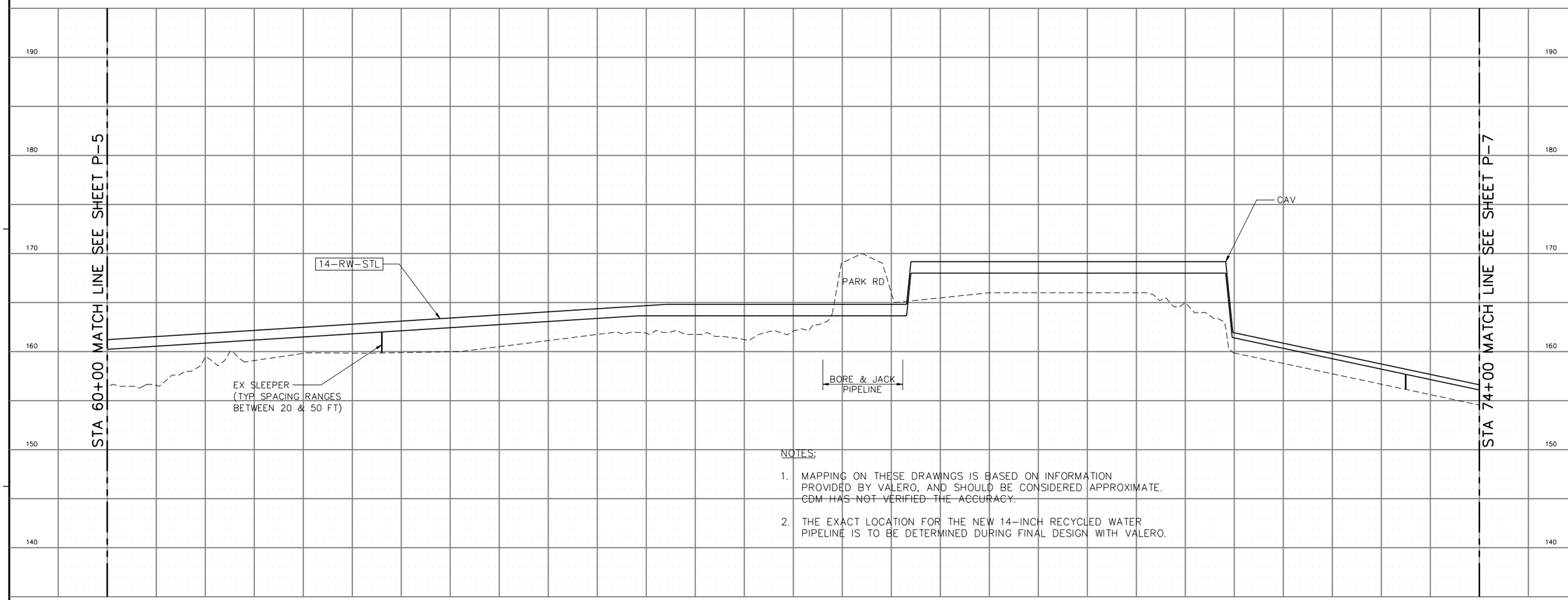


PLAN
1" = 50'



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PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

WARNING
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THE CITY OF BENICIA
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WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 60+00 TO STA 74+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-6

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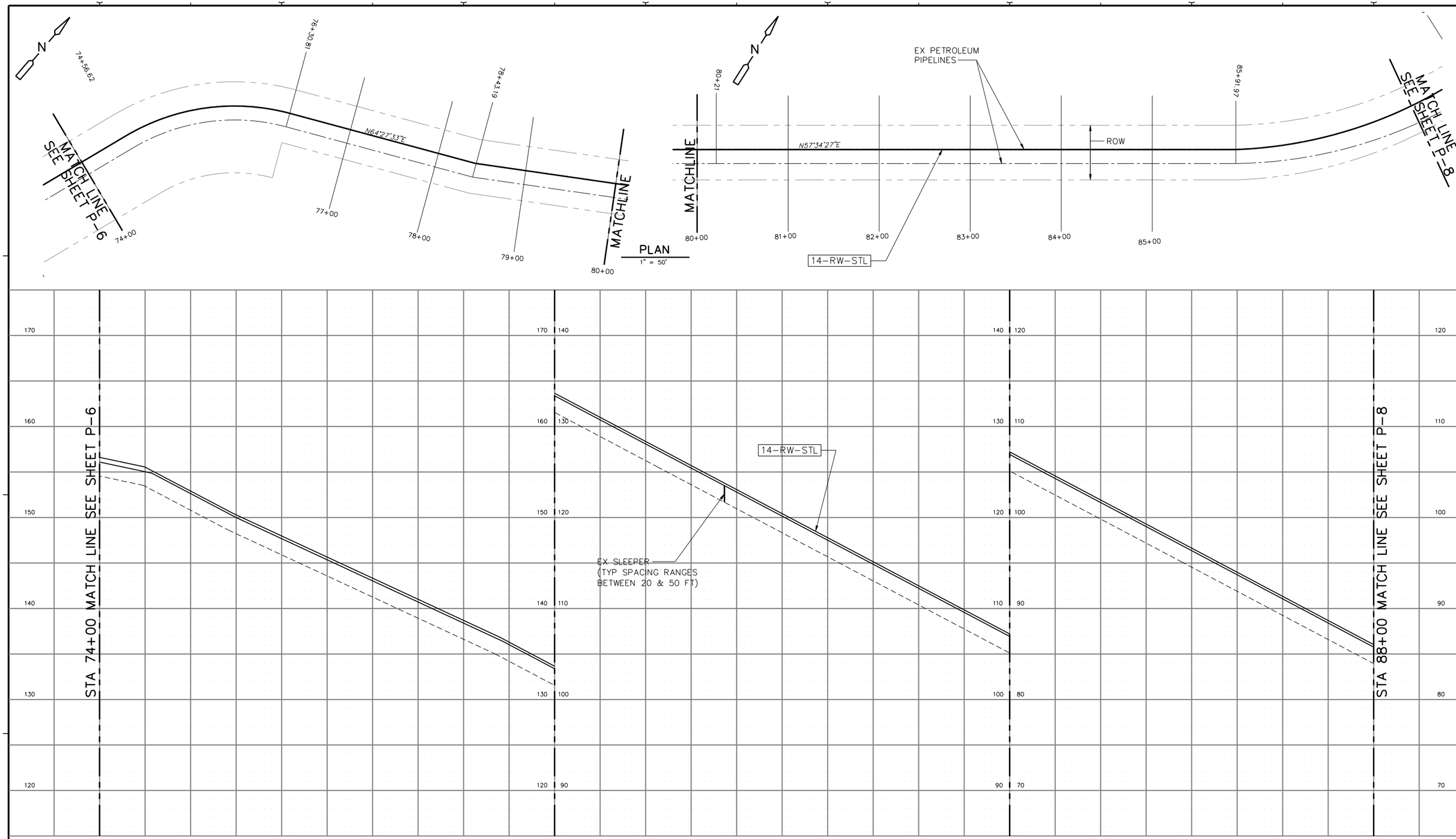

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 74+00 TO STA 88+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-7

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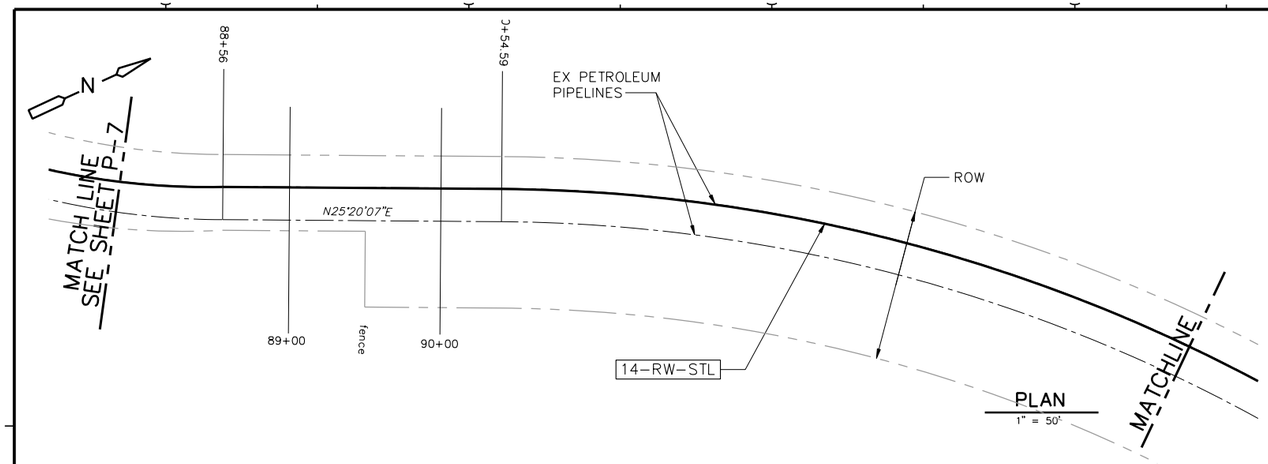
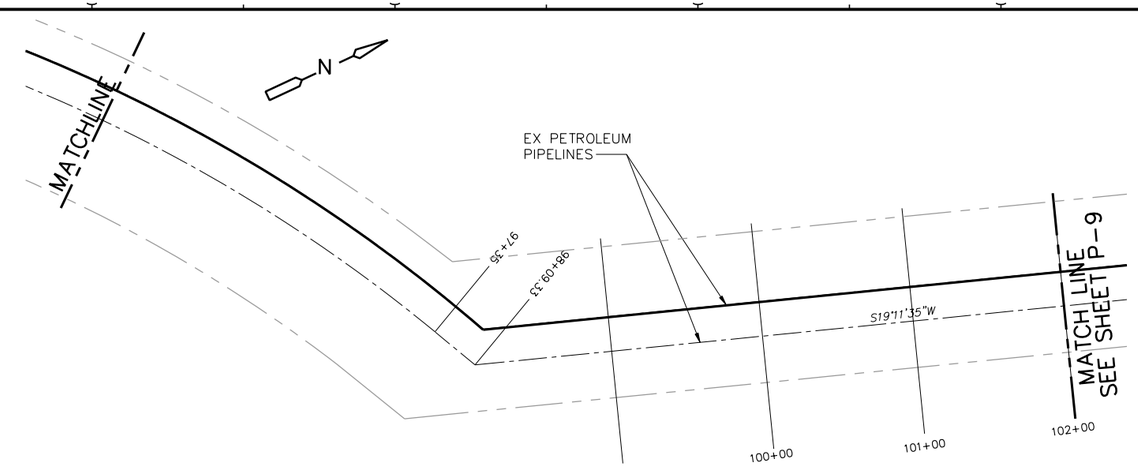


PLAN
1" = 50'



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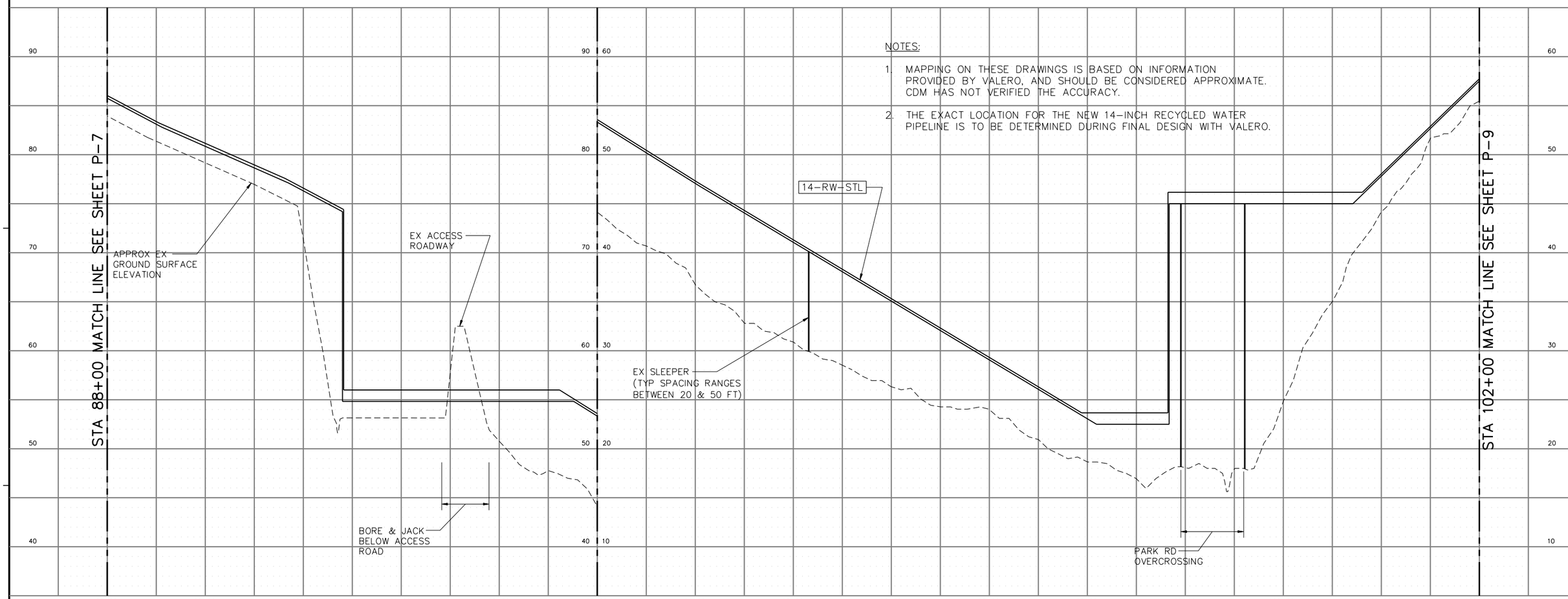

PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
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SHEET CHK'D BY:
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APPROVED BY:
DATE: MAR 2008

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WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 88+00 TO STA 102+00

SHEET 1 OF ___ SHEETS
SHEET ID
P-8

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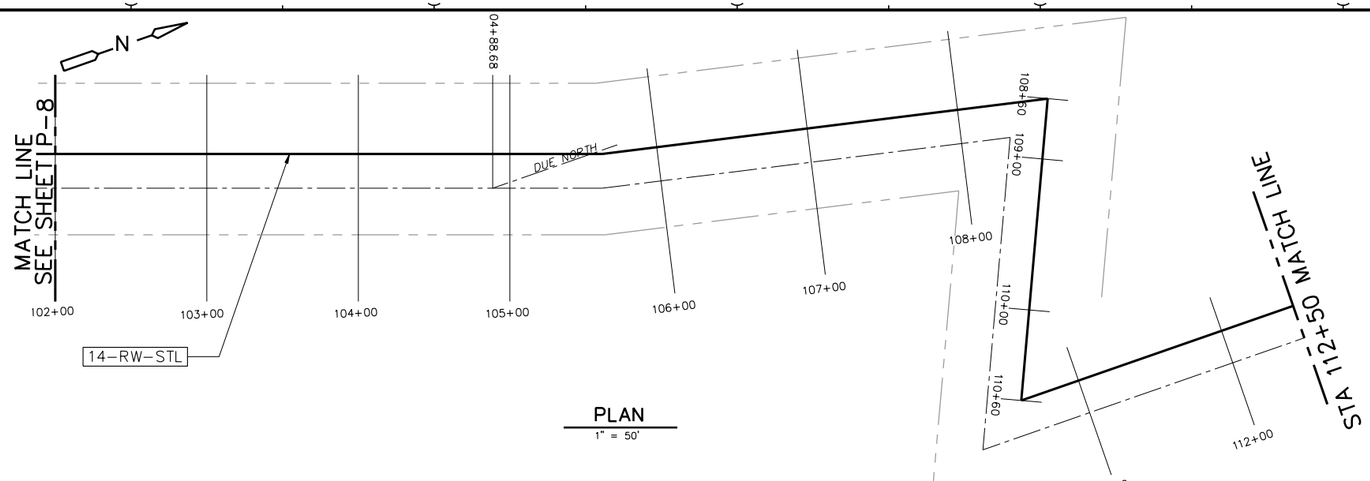
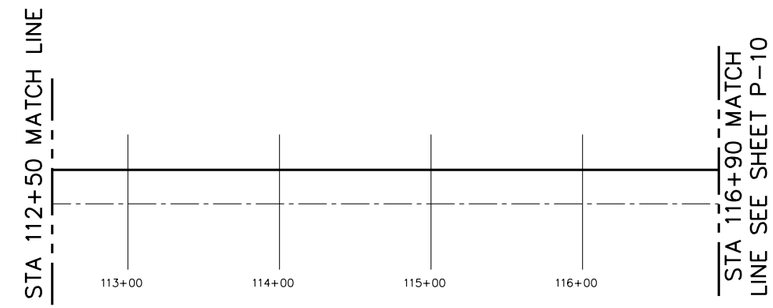
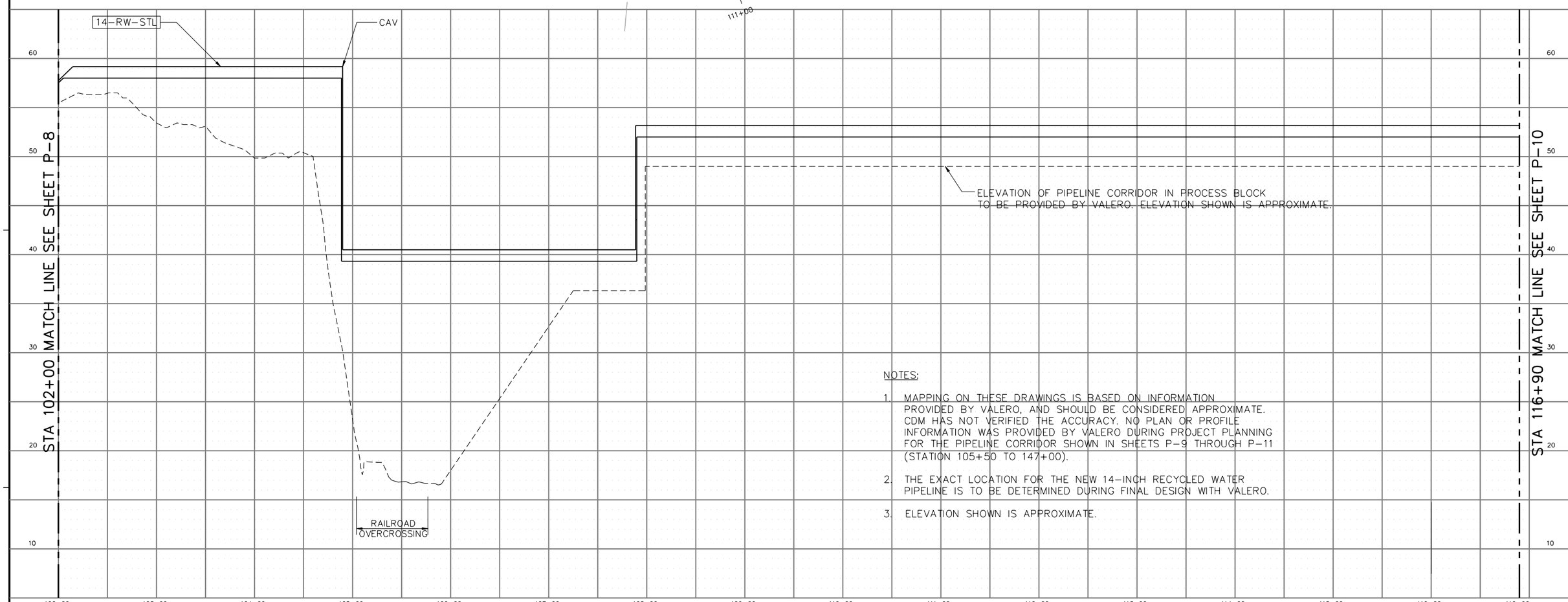


PLAN
1" = 50'





PROFILE
SCALE: HOR 1" = 50'
VRT 1" = 5'

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2. THE EXACT LOCATION FOR THE NEW 14-INCH RECYCLED WATER PIPELINE IS TO BE DETERMINED DURING FINAL DESIGN WITH VALERO.
3. ELEVATION SHOWN IS APPROXIMATE.

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: JC
DRAWN BY: JAW
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAR 2008

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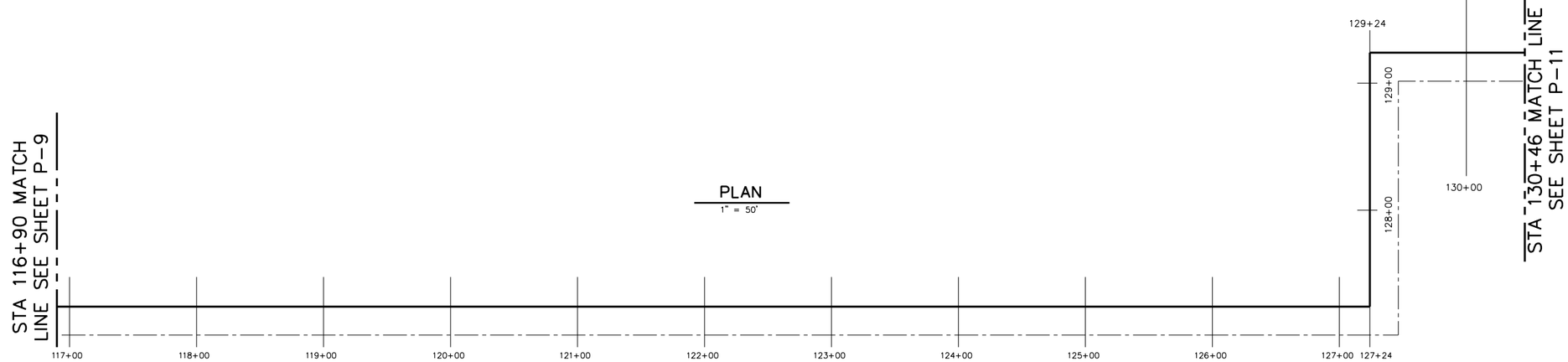
THE CITY OF BENICIA
250 EAST L STREET
BENICIA, CALIFORNIA 94510

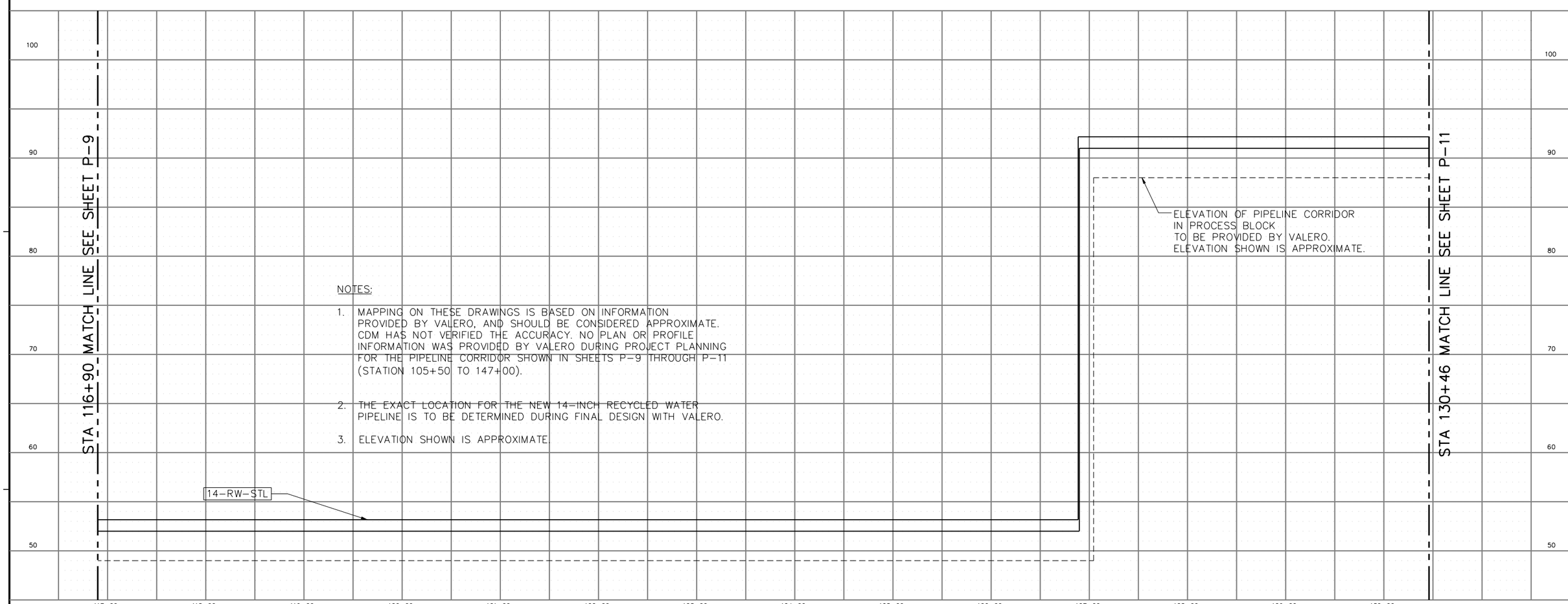
WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 102+00 TO STA 116+90

SHEET 1 OF ___ SHEETS
SHEET ID
P-9

N:\ACAD2000\216\43059\01-SHEETS\ 43059_P-009 09/20/07 17:15 talbotwk XREFS: 43059MFG000, PROFILE





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PROFILE

SCALE: HOR 1" = 50'
VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

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SHEET CHK'D BY:
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WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 116+90 TO STA 130+46

SHEET 1 OF ___ SHEETS
SHEET ID
P-10

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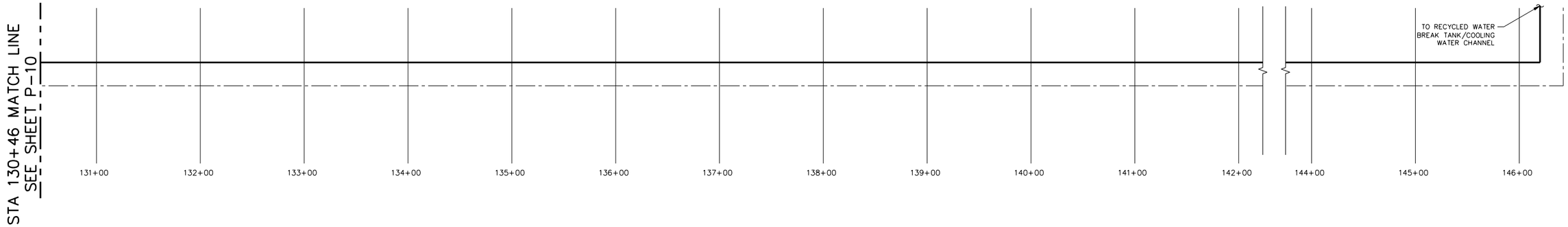
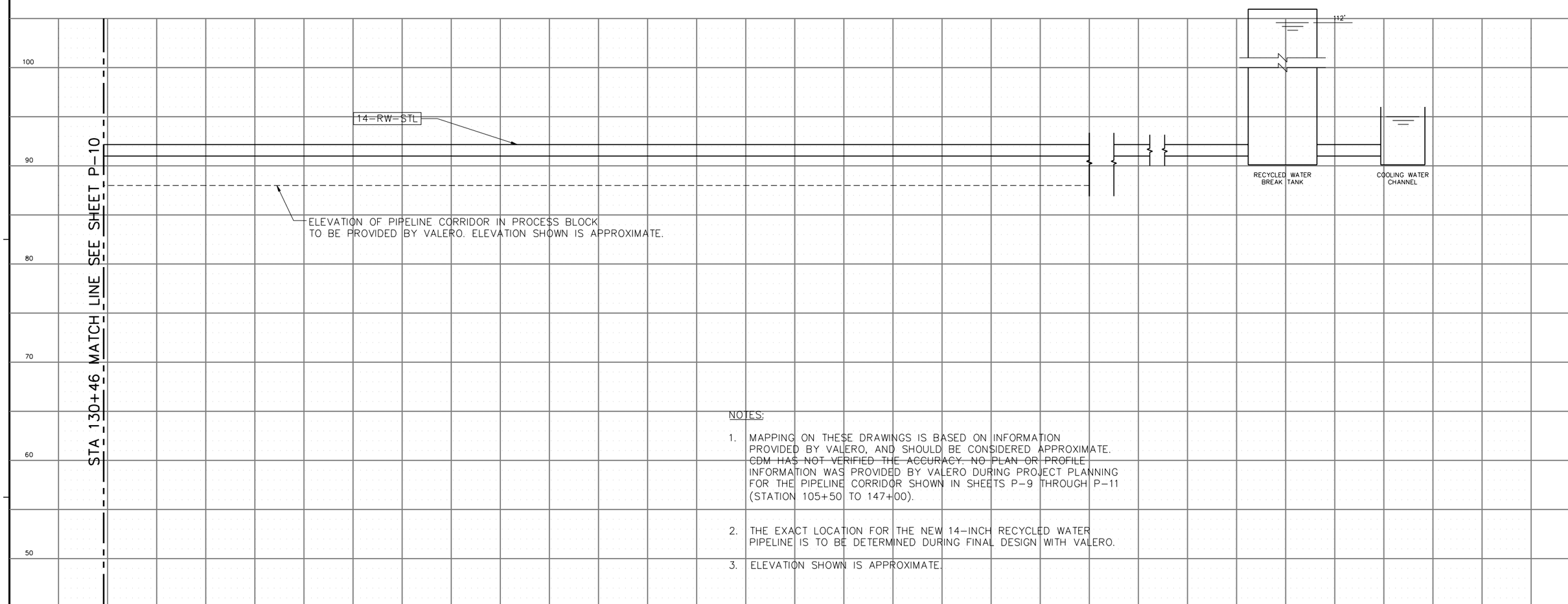


PLAN
1" = 50'



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PROFILE
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VRT 1" = 5'

REV. NO.	DATE	DRWN	CHKD	REMARKS

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SHEET CHK'D BY:
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BENICIA, CALIFORNIA 94510

WATER REUSE PROJECT
PHASE 1

PLAN AND PROFILE
STA 130+46 TO STA 146+20

SHEET 1 OF ___ SHEETS
SHEET ID
P-11

N:\ACAD2000\216\43059\01-SHEETS\43059_P-011 09/20/07 16:32 talbotwk XREFS: 43059MFG000, PROFILE

Appendix B

City of Benicia Noise Ordinance and City General Plan, Chapter 4 Community Health and Safety, Paragraph D Noise

Chapter 8.20
NOISE REGULATIONS[1]

Sections:

8.20.010 Declaration of policy.
8.20.020 Definitions.
8.20.030 Sound-amplifying equipment – Purpose of provisions.
8.20.040 Sound-amplifying equipment – Registration – Required.
8.20.050 Sound-amplifying equipment – Registration – Statement filing and approval.
8.20.060 Sound-amplifying equipment – Registration – Fee.
8.20.070 Sound-amplifying equipment – Appeal from disapproval.
8.20.080 Sound-amplifying equipment – Use regulations.
8.20.090 Radios, television sets and similar devices.
8.20.100 Hawkers and peddlers.
8.20.110 Drums – Use restricted.
8.20.120 Schools, hospitals and churches.
8.20.130 Animals and fowl.
8.20.140 Machinery, equipment, fans and air conditioning.
8.20.150 Construction of buildings and projects.
8.20.160 Vehicle repairs.
8.20.170 Motor-driven vehicles.
8.20.180 Sound level measurement criteria.
8.20.190 Ambient base noise level.
8.20.200 Excessive noise prohibited.
8.20.210 Petition for temporary relief from regulations.
8.20.220 Repealed.
8.20.230 Violation – Additional remedy.

8.20.010 Declaration of policy.

It is declared to be the policy of the city to prohibit unnecessary, excessive and annoying noises from all sources subject to its police power. At certain levels noises are detrimental to the health and welfare of the citizenry and in the public interests shall be systematically proscribed. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-101).

8.20.020 Definitions.

As used in this chapter, unless the context otherwise clearly indicates, the words and phrases used in this chapter are defined as follows:

A. "Ambient noise" means the all-encompassing noise associated with a given environment, being usually a composite of sounds from any sources near and far. For the purpose of this chapter, ambient noise level is the level obtained when the noise level is averaged over a period of 15 minutes without inclusion of noise from isolated identifiable sources, at the location and time of day near that at which a comparison is to be made.

B. "Commercial purpose" means and includes the use, operation or maintenance of any sound-amplifying equipment for the purpose of advertising any business, or any goods, or any services, or for the purpose of attracting the attention of the public to, or advertising for, or soliciting patronage or customers to or for any performance, show, entertainment, exhibition, or event, or for the purpose of demonstrating such sound equipment.

C. "Decibel" means a unit of level when the base of the logarithm is the tenth root of 10 and the quantities concerned are proportional to power.

D. "Emergency work" means work made necessary to restore property to a safe condition following a public calamity, or work required to protect persons or property from an imminent exposure to danger, or work by private or public utilities when restoring utility service.

E. "Frequency" of a function periodic in time means the reciprocal of the primitive period. The unit is the hertz and shall be specified.

F. "Hertz" means the complete sequence of values of a periodic quantity which occurs during a period.

G. "Microbar" means a unit of pressure commonly used in acoustics and is equal to one dyne per square centimeter.

H. "Motor vehicles" includes, but is not limited to, mini-bikes and go-carts.

I. "Noncommercial purpose" means the use, operation or maintenance of any sound equipment for other than a commercial purpose. "Noncommercial purpose" means and includes, but is not limited to, philanthropic, political, patriotic and charitable purposes.

J. "Period" of a periodic quantity means the smallest increment of time for which the function repeats itself.

K. "Periodic quantity" means oscillating quantity, the values of which recur for equal increments of time.

L. "Person" means a person, firm, association, copartnership, joint venture, corporation, or any entity public or private in nature.

M. "Sound-amplifying equipment" means any machine or device for the amplification of the human voice, music, or any other sound. "Sound-amplifying equipment" shall not include standard automobile radios when used and heard only by the occupants of the vehicle in which the automobile radio is installed. "Sound-amplifying equipment," as used in this chapter, shall not include warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.

N. "Sound level" or "noise level," in decibels (dB), is the sound measured with the "A" weighting and slow response by a sound level meter.

O. "Sound level meter" means an instrument including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of sound levels which satisfies the pertinent requirements in American Standard Specifications for sound level meters S1.4-1971 or the most recent revision thereof.

P. "Sound truck" means any motor vehicle, or any other vehicle regardless of motive power, whether in motion or stationary, having mounted thereon or attached thereto any sound-amplifying equipment. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-102).

8.20.030 Sound-amplifying equipment – Purpose of provisions.

The council enacts this legislation for the sole purpose of securing and promoting the public health, comfort, safety and welfare of its citizenry. While recognizing that the use of sound-amplifying equipment is protected by the constitutional rights of freedom of speech and assembly, the council nevertheless feels obligated to reasonably regulate corrective constitutional rights of the citizens of this community to privacy and freedom from public nuisance of loud and unnecessary noise. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-501).

8.20.040 Sound-amplifying equipment – Registration – Required.

It is unlawful for any person, other than personnel of law enforcement or governmental agencies, to install, use or operate within the city a loudspeaker or sound-amplifying equipment in a fixed or movable position or mounted upon any sound truck for the purposes of giving instructions, directions, talks, addresses, lectures, or transmitting music to any person or assemblages of persons in or upon any street, alley, sidewalk, park, place or public property without first filing a registration statement and obtaining approval thereof as set forth in BMC 8.20.050 through 8.20.080. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-502).

8.20.050 Sound-amplifying equipment – Registration – Statement filing and approval.

A. Every user of sound-amplifying equipment shall file a registration statement with the city manager or his designee 15 days prior to the date on which the sound-amplifying equipment is intended to be used, which statement shall contain the following information:

1. The name, address and telephone number of both the owner and user of the sound-amplifying equipment;

2. The maximum sound-producing power of the sound-amplifying equipment which shall include the wattage to be used, the volume in decibels of sound which will be produced,

and the approximate distance for which sound will be audible from the sound-amplifying equipment;

3. The license and motor number if a sound truck is to be used;

4. A general description of the sound-amplifying equipment which is to be used; and

5. Whether the sound-amplifying equipment will be used for commercial or noncommercial purposes.

B. The city manager, or his designee, shall return to the applicant an approved certified copy of the registration statement unless he finds that:

1. The conditions of the motor vehicle movement are such that in the opinion of the city manager, use of the equipment would constitute a detriment to traffic safety; or

2. The conditions of pedestrian movement are such that use of the equipment would constitute a detriment to traffic safety; or

3. The registration statement required reveals that the applicant would violate the provisions set forth in BMC 8.20.080 or any other provisions of this code.

C. In the event the registration statement is disapproved, the city manager or his designee shall enforce upon the statement his reasons for disapproval and return it forthwith to the applicant. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-503).

8.20.060 Sound-amplifying equipment – Registration – Fee.

Prior to the issuance of the registration statement, a fee in the amount of $25.00 per day, or any portion thereof, shall be paid to the city, if the loudspeaker or sound-amplifying equipment is to be used for commercial purposes. No fee shall be required for the operation of a loudspeaker or sound-amplifying equipment for noncommercial purposes. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-505).

8.20.070 Sound-amplifying equipment – Appeal from disapproval.

Any person aggrieved by disapproval of a registration statement may appeal the disapproval to the city council within 10 days. The appeal shall be filed with the city clerk and placed on the next regular council meeting agenda for review. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-504).

8.20.080 Sound-amplifying equipment – Use regulations.

The commercial and noncommercial use of sound-amplifying equipment shall be subject to the following regulations:

A. The only sounds permitted shall be either music or human speech, or both.

B. The operation of sound-amplifying equipment shall only occur between the hours of 9:00 a.m. and 8:00 p.m. each day except on Sundays and legal holidays. No operation of sound-amplifying equipment for commercial purposes shall be permitted on Sundays or legal holidays. The operation of sound-amplifying equipment for noncommercial purposes on Sundays and legal holidays shall only occur between the hours of 9:00 a.m. and 9:00 p.m.

C. Sound levels emanating from sound-amplifying equipment shall not exceed 15 decibels above the ambient base noise level.

D. Notwithstanding the provisions of subsection (C) of this section, sound-amplifying equipment shall not be operated within 200 feet of churches, schools, hospitals, or city or county buildings unless specifically authorized by the city manager or his designee.

E. In any event, the volume of sound shall be so controlled that it will not be unreasonably loud, raucous, jarring, disturbing, or a nuisance to reasonable persons of normal sensitiveness within the area of audibility. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-506).

8.20.090 Radios, television sets and similar devices.

A. Use Restricted. It is unlawful for any person within any residential zone of the city to use or operate any radio receiving set, musical instrument, phonograph, television set, or other machine or device for the producing or reproducing of sound between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day in such a manner as to disturb the peace, quiet and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

B. Prima Facie Violation. Any noise level exceeding the ambient base level at the property

line of any property or, if a condominium or apartment house, within any adjoining apartment, by more than five decibels shall be deemed to be prima facie evidence of a violation of the provisions of this section. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-201).

8.20.100 Hawkers and peddlers.
It is unlawful for any person within the city to sell anything by outcry within any area of the city zoned for residential uses. The provisions of this section shall not be construed to prohibit the selling by outcry of merchandise, food and beverages at licensed sporting events, parades, fairs, circuses and other similar licensed public entertainment events. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-202).

8.20.110 Drums – Use restricted.
It is unlawful for any person to use any drum or other instrument or device of any kind for the purpose of attracting attention by the creation of noise within the city. This section shall not apply to any person who is a participant in a school band or duly licensed parade or who has been otherwise duly authorized to engage in such conduct. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-203).

8.20.120 Schools, hospitals and churches.
It is unlawful for any person to create any noise on any street, sidewalk or public place adjacent to any school, institution of learning or church while the same is in use, or adjacent to any acute hospital, which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such street, sidewalk or public place indicating the presence of a school, church or hospital. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-204).

8.20.130 Animals and fowl.
No person shall keep or maintain, or permit the keeping of, upon any premises owned, occupied or controlled by such person any animal or fowl otherwise permitted to be kept which, by any sound, cry or behavior shall cause annoyance or discomfort to a reasonable person of normal sensitiveness in any residential neighborhood. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-205).

8.20.140 Machinery, equipment, fans and air conditioning.
It is unlawful for any person to operate any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property line of any property to exceed the ambient base noise level by more than five decibels. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-206).

8.20.150 Construction of buildings and projects.
It is unlawful for any person within a residential zone, or within a radius of 500 feet therefrom, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type device between the hours of 10:00 p.m. of any one day and 7:00 a.m. of the next day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance unless beforehand a permit therefor has been duly obtained from the city manager or his designee. No permit shall be required to perform emergency work as defined in BMC 8.20.020. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-301).

8.20.160 Vehicle repairs.
It is unlawful for any person within any residential area of the city to repair, rebuild, or test any motor vehicle between the hours of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-401).

8.20.170 Motor-driven vehicles.

It is unlawful for any person to operate any motor-driven vehicle within the city in such a manner that a reasonable person of normal sensitiveness residing in the area is caused discomfort or annoyance; provided, however, any such vehicle which is operated upon any public highway, street, or right-of-way shall be excluded from the provisions of this section. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-402).

8.20.180 Sound level measurement criteria.

Any sound level measurement made pursuant to the provisions of this chapter shall be measured with a sound level meter using the "A" weighting. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-103).

8.20.190 Ambient base noise level.

Where the ambient noise level is less than designated in this section the respective noise level in this section shall govern.

		Sound Level A, decibels		
		Community Environment Classification		
Zone		Very Quiet (rural, suburban)	Quiet (suburban)	Slightly noisy (suburban, urban)
R1 and R2	10:00 p.m. to 7:00 a.m.	40	45	50
R1 and R2	7:00 p.m. to 10:00 p.m.	45	50	55
R1 and R2	7:00 a.m. to 7:00 p.m.	50	55	60
R3 and R4	10:00 p.m. to 7:00 a.m.	45	50	55
R3 and R4	7:00 a.m. to 10:00 p.m.	50	55	60
Commercial	10:00 p.m. to 7:00 a.m.	55	60	
Commercial	7:00 a.m. to 10:00 p.m.	60	65	
M1	anytime	70	70	
M2	anytime	75	75	

(Ord. 77-2 N.S. § 1, 1977; prior code § 12-104).

8.20.200 Excessive noise prohibited.

A. Notwithstanding any other provision of this chapter, and in addition thereto, it shall be unlawful for any person to wilfully make or continue, or cause to be made or continued, any loud, unnecessary, or unusual noise which disturbs the peace or quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

B. The standards which shall be considered in determining whether a violation of the provisions of this section exists shall include, but not be limited to, the following:

1. The level of the noise;
2. The intensity of the noise;
3. Whether the nature of the noise is usual or unusual;
4. Whether the origin of the noise is natural or unnatural;
5. The level and intensity of the background noise, if any;
6. The proximity of the noise to residential sleeping facilities;

7. The nature and zoning of the area within which the noise emanates;
8. The density of the inhabitation of the area within which the noise emanates;
9. The time of day or night the noise occurs;
10. The duration of the noise;
11. Whether the noise is recurrent, intermittent, or constant; and
12. Whether the noise is produced by a commercial or noncommercial activity. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-601).

8.20.210 Petition for temporary relief from regulations.

Any person may petition the city council for temporary relief from provisions of this chapter by written request directed to the city clerk. The city council shall hear such petition at the next regular city council meeting not less than five days after the filing of said request. Upon hearing all the evidence, the city council may grant temporary relief from the provisions of this chapter upon such terms and conditions as the council may see fit if the council finds that the temporary relief does not endanger the health, welfare or safety of the residents of the city. The temporary relief may not exceed 30 days in duration. The applicant for relief may not exceed the provisions of this chapter until such time as the permit of the city has been issued. The decision of the city council shall be final. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-701).

8.20.220 Violation – Penalty.

Repealed by Ord. 03-9. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-105).

8.20.230 Violation – Additional remedy.

As an additional remedy, the operation or maintenance of any device, instrument, vehicle, or machinery in violation of any provision of this chapter, which operation or maintenance causes discomfort or annoyance to reasonable persons of normal sensitiveness or which endangers the comfort, repose, health or peace of residents in the area, shall be deemed and is declared to be, a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction. (Ord. 77-2 N.S. § 1, 1977; prior code § 12-106).

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For statutory provisions on noise control, see Health and Safety Code § 46000 et seq.

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D. NOISE

The principal noise generator in Benicia is vehicular traffic. People are most sensitive to noise levels which disturb their comfort at home.

The Noise section describes the existing and projected future noise environments in Benicia so that harmful and annoying sound levels can be avoided or minimized. Major noise sources are identified, estimated noise levels throughout the community are reported, the effects of noise on the community are discussed, and ways to minimize unwanted noise are outlined.

1. Human Reaction to Noise

Three qualities characterize the subjective effect of noise on the listener: (1) the frequency of the noise, (2) the intensity of the noise, and (3) the time-varying character of the noise.

Researchers have grappled with how to translate objective measurements of sound into directly correlated measures of public reaction to noise.The descriptors of community noise in current use are the results of these efforts and represent simplified, practical measurement tools to gauge community response.

Table 4-1 shows the decibel levels of common noises.

Table 4-1. Decibel Levels of Common Noises

20	Soft whisper
40	Quiet office, living room, bedroom—away from traffic.
50	Light traffic at a distance, refrigerator, gentle breeze.
60	Average conversation, air conditioner at 20 feet, sewing machine.
65	Quiet typewriter.
70	Busy traffic, office tabulator, noisy restaurant. (This level may begin to affect hearing if one is constantly exposed.)
75	Vacuum cleaner.
80	Subway, heavy city traffic, ringing alarm clock at two feet, average factory noise. (Dangerous if exposure continues for more than eight hours.)
85	Truck traffic, noisy home appliances (washing machine, blender, food processor), power lawn mower. (Dangerous, even if exposure is less than eight hours.)
95	Noisy factory, shop tools.
100	Elevated train, chain saw, pneumatic drill. (Dangerous, even if exposure is less than two hours.)
120	Rock concert in front of speakers, sandblasting, thunderclap. (Danger is immediate.)
140	Jet airplane at 200 feet, gunshot blast. (Any length of exposure is extremely dangerous.)

The known effects of noise on people include hearing loss (not generally a factor with community noise), communication interference, sleep interference, physiological responses, and annoyance. Although the wide range of individual reactions to noise makes it extremely difficult to measure how noise affects individual health, medical studies suggest a correlation between noise and mental stress.

A decibel is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities.

COMMUNICATION INTERFERENCE

Communication interference is one of the primary environmental noise problems, and includes speech interference and interference of activities such as watching television. Normal conversational speech is in the range of 60 to 65 dB, and any noise in this range or louder may interfere with speech.

SLEEP INTERFERENCE

Sleep interference is a major noise concern. Noise can make it difficult to fall asleep, can create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages, and can cause awakening.

Extensive research has been conducted on the effect of noise on sleep disturbance. Recommended values for desired sound levels in residential bedroom space range from 25 to 45 dB with 35 to 40 dB being the norm. The National Association of Noise Control Officials published data on the probability of sleep disturbance with various single event noise levels. Based on experimental sleep data related to noise exposure, a 75 dB interior noise level event will cause noise-induced awakening in 30 percent of all cases.

PHYSIOLOGICAL RESPONSES

Physiological responses are those measurable effects of noise on people which are realized as changes in pulse rate, blood pressure, *etc.* While such effects can be induced and observed, it is not known to what extent these physiological responses cause harm. Generally, physiological responses are a reaction to a loud, short-term noise such as a rifle shot or a very loud jet overflight.

ANNOYANCE

Annoyance is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be quite unbearable to another. The level of annoyance

depends on the characteristics of the noise (*i.e.,* loudness, frequency, time, and duration), and how much activity interference (*e.g.,* speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. It has been estimated that 2 to 10 percent of the population is highly susceptible to noise not of their own making, while approximately 20 percent are unaffected by noise. Attitudes are affected by the relationship between the person and the noise source. (Is it our dog or the neighbor's?) Whether we believe that someone is trying to abate the noise will also affect our level of annoyance.

The following conclusions have been established through extensive study:

1. Except in carefully controlled laboratory experiments, an increase of only one dBA cannot be perceived by humans.
2. Outside of the laboratory, a three dBA increase is considered to be just noticeable.
3. A change of five dBA is required before any noticeable change in community reaction would be expected.
4. A 10 dBA increase is subjectively heard as a doubling of loudness and would most certainly cause community response.

2. Noise in the Community

EXISTING NOISE LEVELS

Once noise levels are computed or measured, they can be mapped. Noise levels are mapped as contours. Each contour line indicates an area on the inside of the line which has a higher noise level than the contour's value; the area on the outside of the line has a lower noise level than the contour's value. Because local topography, vegetation, or intervening structures may significantly affect noise exposure at a particular location, the noise contours should not be considered site-specific. Figure 4-6 shows existing noise contours in Benicia.

These noise contours were formulated based on a community noise survey conducted in October and November 1995. The results indicated that typical exterior noise levels in noise sensitive areas (*i.e.,* nursing homes, churches, theaters, residential uses, parks, libraries, and schools) are in the range of 51 dB to 63 dB L_{dn}. Traffic on local roadways and I-680 and I-780, industrial activities, and neighborhood activities are the contributing factors for background noise levels in the majority of the study area. Table 4-2 is a summary of the survey.

PROJECTED NOISE LEVELS

Traffic on I-680 and I-780 is expected to increase through the year 2015. The hourly traffic flow and mix of trucks and private automobiles during a typical 24-hour period is not expected to change. No major increase in railroad operation is expected to occur in the near future. Figure 4-7 indicates future noise contours.

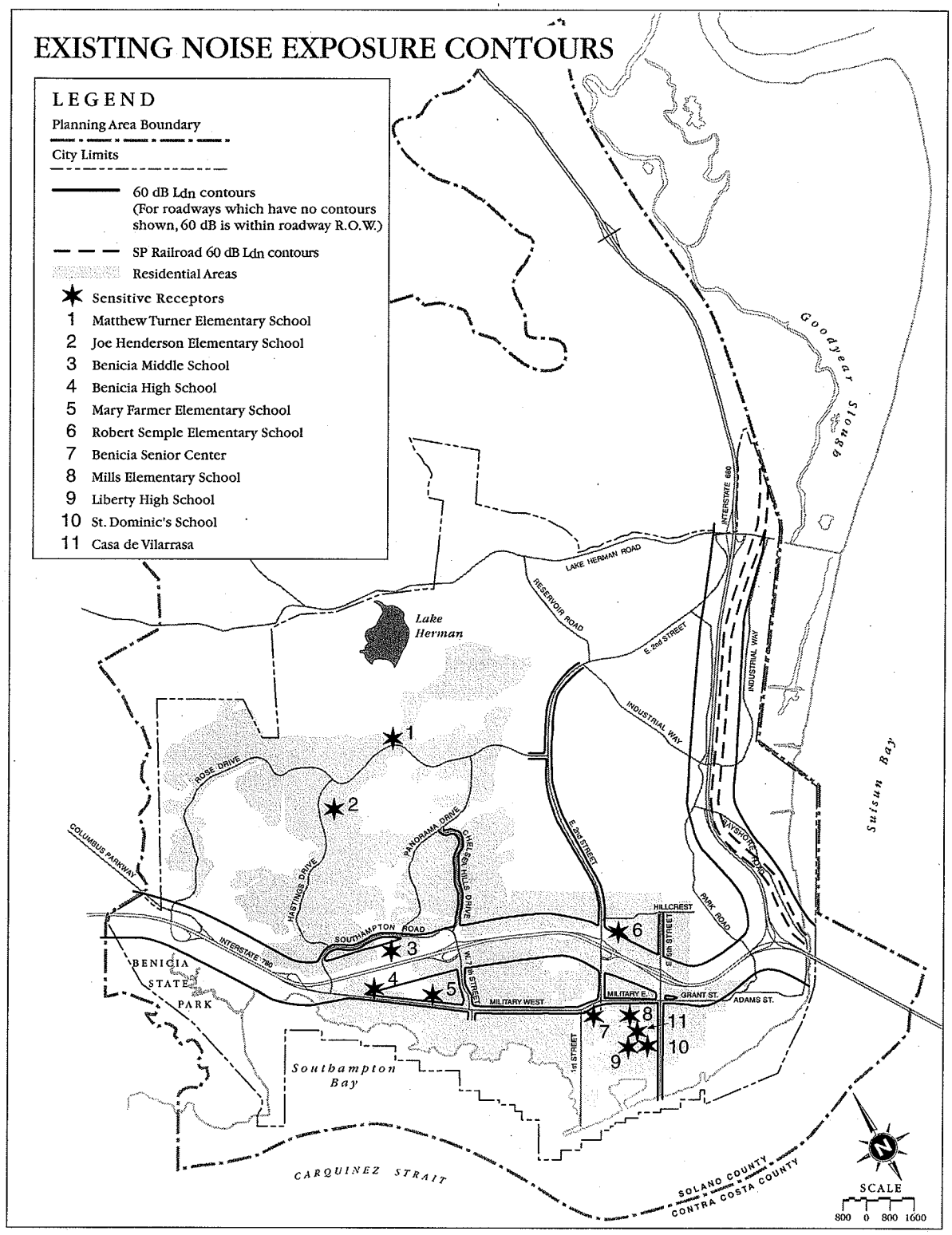

Figure 4-6. Existing Noise Contours

Table 4-2. Summary of Measured Exterior Noise Levels and Estimated Day-Night Average Levels (L_{dn}) in Areas Containing Noise-Sensitive Land Uses

Site	Location	Time/Period	Sound Level, dB				
			L_{eq}	L_{50}	L_{90}	L_{max}	Estimated L_{dn}
1*	329 Columbia Circle	—	—	—	—	—	54.2
2*	507 Bristol Court	—	—	—	—	—	54.0
3*	803 Elaine	—	—	—	—	—	50.8
4*	1781 Lindo Street	—	—	—	—	—	63.2
5	Corner of Reservoir Road and Lake Herman Road	Ld(1) Ld(2) Ln	51.5 55.5 41.0	39 48 35	32 37 30	66.0 70.5 60.0	53.1
6	Benicia Community Park	Ld(1) Ld(2) Ln	46.0 46.0 45.5	45 44 37	40 40 32	57.0 62.5 60.0	52.0
7	Southampton Park	Ld(1) Ld(2) Ln	56.5 53.5 47.0	53 47 40	46 39 36	72.0 68.5 59.0	56.0
8	Turnbull Park	Ld(1) Ld(2) Ln	48.5 53.5 43.0	45 48 39	43 44 37	63.0 70.5 57.5	52.2
9	City Park (Second St. & West K Street)	Ld(1) Ld(2) Ln	57.0 57.6 53.5	57 56 51	55 53 48	64.9 67.2 65.0	60.7
10	Bridgeview Park	Ld(1) Ld(2) Ln	51.9 49.8 42.8	45 45 40	41 43 38	67.8 60.7 58.0	51.6
11	Benicia Middle School Athletic Fields/ Bay View Villas	Ld(1) Ld(2) Ln	54.5 53.1 51.0	54 53 49	52 50 47	61.6 58.2 56.0	58.0
12	Matthew Turner Shipyard Park	Ld(1) Ld(2) Ln	58.4 53.1 47.3	58 51 45	54 48 42	63.1 63.1 58.0	56.8

* Continuous Monitoring Site

Ld = Measured noise level during daytime hours (7:00 am - 10:00 pm)

Ln = Measured noise level during nighttime hours (10:00 pm - 7:00 am)

L_{eq} = The average noise level during a given time period

$L_{50, 90}$ = The average noise level experienced 50 and 90 percent of a given time period

L_{max} = The maximum sound level recorded during a noise event

L_{dn} = The average noise level during a 24-hour day after 10 decibels has been added to the levels between 10 pm and 7 am.

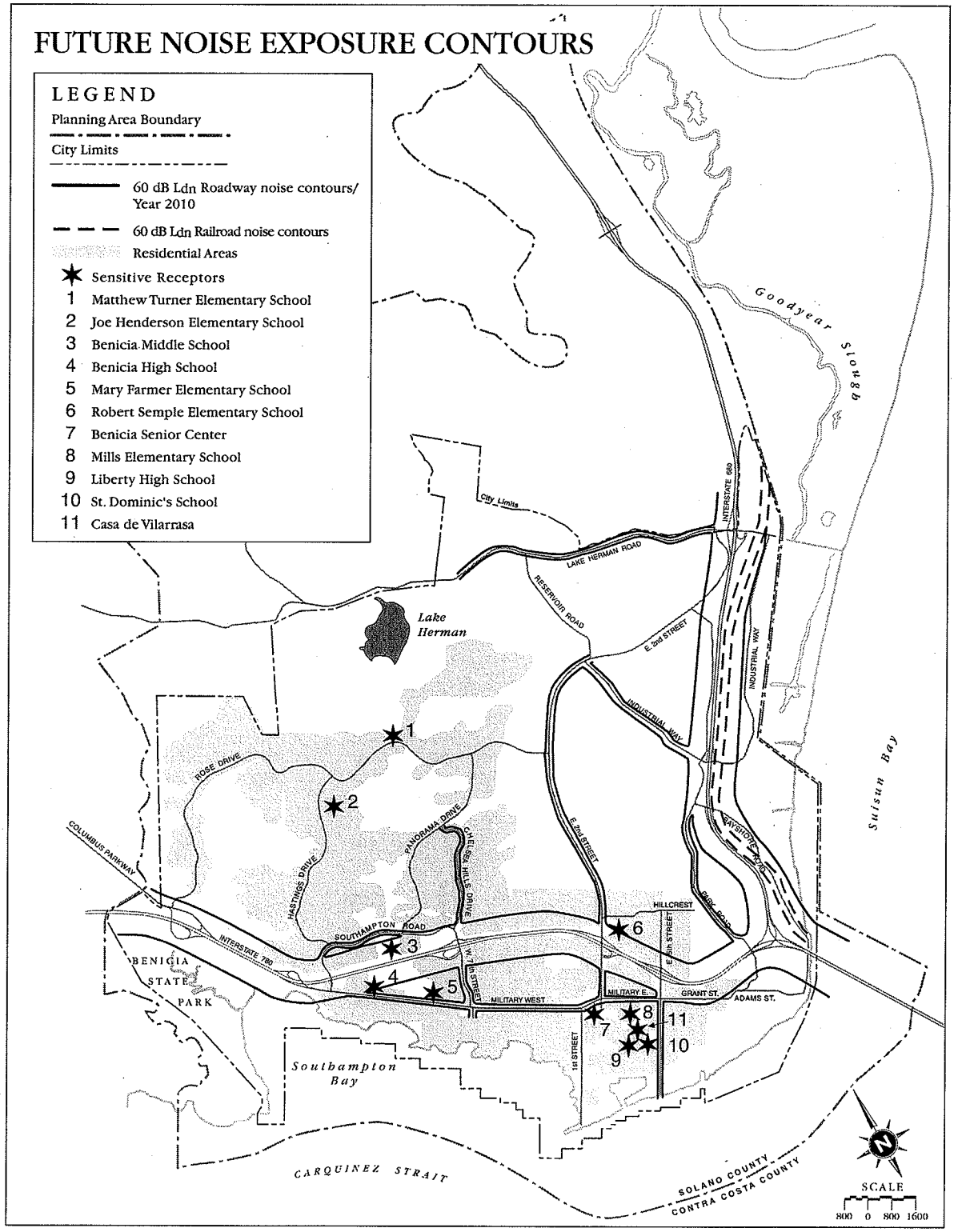

Figure 4-7. Future Noise Contours

3. Performance Standards for Noise Sensitive Uses

TRANSPORTATION NOISE SOURCES

Table 4-3 provides specific standards for determining the compatibility of proposed noise-sensitive land uses with transportation noise sources (refer to glossary for definition). Where noise-sensitive projects are proposed within areas which exceed the standards contained in Table 4-3, it is necessary to prepare a report that (a) performs an analysis of noise impacts, and (b) recommends mitigation measures to reduce noise levels on the site to comply with the standards in Table 4-3. This table is only to be used with proposed projects; the City's noise ordinance governs noise associated with existing uses.

Table 4-3. Maximum Allowable Noise Exposure for New Noise-Sensitive Uses From Transportation Noise Sources

Land Use	Outdoor Activity Areas[1]	Interior Spaces	
	L_{dn}/cnel, dB	L_{dn}/dB	L_{eq}, dB[2]
Residential	60[3]	45	—
Transient Lodging	65[4]	45	
Hospitals, Nursing Homes	60[3]	45	—
Theaters, Auditoriums, Music Halls	—	—	35
Churches, Meeting Halls	60[3]	—	40
Office Buildings, Commercial Uses, Industrial, Manufacturing, Utilities[5]	—	—	45
Schools, Libraries, Museums	60[3]	—	45
Playgrounds, Neighborhood Parks	65	—	—

[1] Where the location of outdoor activity areas is unknown; or does not exist, the exterior noise level standard will be applied to the property line of the receiving land use. Refer to glossary for definition of outdoor activity area.

[2] As determined for a typical worst-case hour during periods of use.

[3] Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table. If these noise levels cannot be complied with this will constitute a significant environmental impact.

[4] In the case of hotel/motel facilities or other transient lodging; with no proposed outdoor activity areas such as pool areas, only the interior noise level criterion will apply.

[5] Standards would only apply to areas requiring good speech intelligibility such as offices, conference rooms, etc.

STATIONARY NOISE SOURCES

Table 4-4 provides specific performance standards for determining the compatibility of proposed noise-sensitive land uses with stationary noise sources.The performance standards are for new noise-sensitive developments which may be affected by an existing stationary noise source.The performance standards also apply to new developments that include a stationary noise source which may affect an existing noise-sensitive development.

The intent of these performance standards is both to prevent new noise sources from encroaching on existing noise-sensitive developments and to prevent new noise-sensitive developments from encroaching on existing uses.

Noise sources evaluated relative to the performance standards in Table 4-4 should be considered with respect to their standard daily or weekly operating conditions. Noise sources may produce unusual noise levels due to temporary equipment malfunction, or unusual atmospheric conditions. Noise levels associated with these infrequent conditions are exempt from the performance standards contained in Table 4-4. In addition, the performance standards are not to be applied to safety signals or warning devices. In the event an acoustical study is required of an applicant, refer to Appendix I: "Requirements for an Acoustical Analysis."

Table 4-4. Noise Level Performance Standards for Noise-Sensitive Land Uses Which May Be Affected by Stationary Noise Sources

Land Use	Exterior Hourly L_{eq}, dB		Interior Hourly L_{eq}, dB	
	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m
Residential	55	50	40	35
Transient Lodging	55	50	40	35
Hospitals	—	—	40	35
Nursing Homes	55	50	40	35
Theaters, Auditoriums	—	—	35	35
Churches	55	50	40	40
Schools	55	50	45	45
Libraries	55	50	45	45

Stationary noise sources include industrial operations, outdoor recreation facilities, HVAC units, loading docks, etc.

The above standards may be adjusted upwards to allow for an increase in the existing ambient hourly L_{eq} caused by a proposed project. An increase of less than 3dB is permitted, even if the standards in Table 4-4 are exceeded; an increase of 3dB or greater constitutes a significant environmental impact, unless the increase does not cause the standards in Table 4-4 to be exceeded.

The noise level standards contained above shall be applied to a typical hour of operation. When a peak hour of operation is expected to occur consistently during daily or weekly operations, the standards shall also be applied to those operations.

Each of the noise standards specified above shall be lowered by five dB for tonal noises (humming, high-pitched tones, speech music, or recurring impulsive noises). This lowering of the standard does not apply to residential units established in conjunction with industrial or commercial caretaker dwellings. (See Glossary for definition of tonal noise).

The City may choose to apply the noise level performance standards at designated outdoor activity areas, in lieu of the property line.

The above standards do not apply to safety signals or warning devices.

For noise sources that occur on an infrequent basis and are considered to be safety equipment (such as flaring or pressure relief valves), a maximum noise level of 75 dB is acceptable, as measured from the receiver's property line. Noise levels which are projected to exceed this maximum are considered a significant environmental impact.

Where outdoor activity areas do not exist and/or are not expected to be affected, the City may choose to only apply the interior noise level criteria. For example, in the case of single family residences which do not have second story patios or outdoor activity areas, the City may choose to only apply an interior noise level standard at the second story interior spaces.

4. Community Noise Goals, Policies, and Programs

GOAL 4.23: **Reduce or eliminate the effects of excessive noise.**

Policy 4.23.1: Evaluate the compatibility of proposed projects with respect to existing and future transportation noise levels by utilizing Tables 4-3 and 4-4.

Program 4.23.A: Investigate and implement techniques to reduce traffic noise.

Policy 4.23.2: Use noise dampening building standards, site design, landscaping, and setbacks instead of sound walls, wherever possible.

Policy 4.23.3: Use available techniques such as building insulation, berms, building design and orientation, buffer yards, and staggered operating hours to minimize noise at the source.

Policy 4.23.4: Control development of noise-sensitive land uses in areas exposed to existing or projected noise which exceed the levels specified in Tables 4-3 and 4-4 unless the project includes specific, effective mitigation measures to reduce interior and exterior noise levels to those specified in Tables 4-3 and 4-4.

Program 4.23.B: Investigate conditioning construction of live/work units with a requirement to record a "notice of special restrictions" which would acknowledge the noisy nature of existing adjacent industrial uses.

Policy 4.23.5: Accommodate roadway improvement projects for build-out of the General Plan by recognizing that existing noise-sensitive uses may be exposed to increased noise levels from roadway repairs, increased traffic, and increased travel speeds. When it is not practical to reduce traffic noise levels to those in Table 4-4, the following criteria will be used as a test of significance for the environmental review of roadway improvement projects:

(a) Where existing noise levels are less than 60 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 5 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant;

(b) Where existing noise levels range between 60 and 65 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 3 dB L_{dn} increase in noise levels due to a roadway improvement project will be considered significant; and

(c) Where existing noise levels are greater than 65 dB L_{dn} at the outdoor activity area of a noise-sensitive use, a 1.5 dB L_{dn}

increase in noise levels due to a roadway improvement project will be considered significant.

Program 4.23.C: If needed, revise the City's noise ordinance and consider incorporating the noise level performance standards in Table 4-4.

POLICY 4.23.6: Attempt to reduce noise in areas already highly impacted by excessive noise.

Program 4.23.D: Identify sources of noise in the community (such as flight patterns, construction noise, traffic, railroads, industrial, and amplified sound). Develop measures to reduce excessive noise to acceptable levels.

Appendix C

Letter Report for the City of Benicia by CSA,
dated 20 September 2006

Appendix D-4: Climate Change Vulnerability Assessment

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Benicia Climate Change Vulnerability and Adaptation Plan

Vulnerability Assessment

Prepared for:

The City of Benicia

Prepared by:

With Contributions from:

PlaceWorks

Moffat & Nichol

Date: April 2015

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1 Introduction

1.1 Project Background

The City of Benicia is a waterfront community in the San Francisco Bay Area. As one of California's early capitals, it is full of history--home to the first West Coast U.S. Army post, a railroad car ferry, and numerous other historic sites. Today, Benicia is home to a thriving arts community, beautiful weather and scenic vistas, and a downtown full of charming boutiques and antique shops.

In order to maintain its high quality of life, prosperous businesses, productive ecosystems, and vibrant neighborhoods, Benicia is proactively planning for the challenges that a changing climate may bring. To do so, Benicia is conducting a Climate Change Vulnerability Assessment and creating an Adaptation Plan that will identify adaptation measures that are sustainable, equitable, economically viable, cost effective, and where feasible, able to be integrated into existing and future City plans. This plan will help Benicia prepare for and become a more resilient city that can manage the risks of today, as well as those of tomorrow.

Building on the ART Project

The City of Benicia project is modeled after the San Francisco Bay Conservation and Development Commission's (BCDC) Adapting to Rising Tides (ART) project. During the ART project, BCDC, with support from the National Oceanic and Atmospheric Administration Coastal Services Center (NOAA CSC), undertook a detailed sea level rise vulnerability assessment project in Alameda County.

The ART project developed and piloted a process for conducting vulnerability assessments by bringing together a broad suite of stakeholders and experts to collectively gain a better understanding of how climate change will affect the ecosystems, infrastructure, and economy of Alameda County.

The City of Benicia is using the tools and framework developed for the ART project as much as feasible. Due to the differing scales of analysis (city vs. region) and project timeline, the tools have been customized for a local planning effort.

For more information on the ART project, please see http://www.adaptingtorisingtides.org/.

This document provides an overview of the vulnerability assessment findings and builds on the prior Existing Conditions Report. Adaptation strategies will be explained in a subsequent report.

This work is funded through the California Coastal Conservancy's Climate Ready Grant Program (Round 1). The grant program seeks to help California's coastal communities act now to prepare for climate change effects. The City of Benicia is using its grant to build upon prior and ongoing sustainability efforts within the City, such as Climate Action Plan (CAP) implementation. The City is committed to reducing greenhouse gas (GHG) emissions by implementing CAP strategies such as increasing renewable energy and making City facilities more efficient. Now, the City is examining ways to prepare for a future climate that is different from that of today.

1.2 Project Scope

General Project Approach

This project is following the Adapting to Rising Tides Planning Process (see Figure 1) developed by the Bay Conservation Development Commission (BCDC), and includes the following phases:

Figure 1: Adapting to Rising Tides Planning Process, http://www.adaptingtorisingtides.org/wp-content/uploads/2012/09/CH-1-Intro.pdf

- **Scope and Organize (completed).** The scoping process was completed in September 2014, and included three primary activities.

  First, two Advisory Groups were convened to provide input throughout the project. The Technical Advisory Committee (TAC) consists of local, regional, and state public agencies that own, operate, or otherwise contribute to the planning and funding of infrastructure in Benicia. The Community Advisory Group (CAG) consists of members of the public with a vested interest in the project

Benicia Climate Adaptation Goals

These goals were developed with input from the Advisory Groups. They currently serve as aspirational goals, the implementation of which will extend beyond the life of this project.

1. Protect the beauty and functionality of the many assets that support Benicia's high quality of life, including historic districts and buildings, the shoreline, wetlands, marshes and shoreline recreational features.
2. Support all of Benicia's residents and businesses where they live and work in the face of climate change vulnerability, and help them to plan for and recover quickly from climate-related emergencies.
3. Incorporate planning for climate change, vulnerability and adaptation in all City functions, including planning, public works, parks and recreation, and emergency preparedness.
4. Revise local land use plans, development regulations and building codes to aid and protect future development projects in the face of climate change.
5. Serve as a regional leader and model in planning for climate change and adaptation, and cooperate with regional agencies and neighboring jurisdictions in planning for regional readiness and resilience.
6. Educate the public on the need for personal disaster preparedness, adaptation and investment in resilient infrastructure.
7. Use public art to illustrate issues and educate the public regarding climate change, vulnerability and adaptation.

(e.g., homeowners, business owners, community group representatives, and City commissioners). The project team held two kick-off meetings, each 3 hours long with the TAC and CAG. Both groups learned about project objectives, identified existing conditions, and helped brainstorm project goals. The TAC provided more technical information related to existing assets and infrastructure, e.g. Pacific Gas & Electric Company discussed its critical infrastructure in the project area.

Second, Benicia climate change projections were created using downscaled (i.e., a strategy for generating locally relevant data from global climate models) climate change from publicly accessible data sets and tools. Climate scenarios were developed for sea level rise and storm surge (total water levels), precipitation, and changing temperatures. Based on the severity of the climate change variables, sea level rise and extreme temperatures were selected for evaluation in the vulnerability assessment. A summary is contained in Section 4 of this report, and a more detailed overview is included in the separate Task 2 Summary Report.

Third, the TAC and CAG provided input on the selection of community assets and geographic areas for analysis in this study. The project team selected a diverse range of assets to 1) cover different types of infrastructure and community assets found within the Project Area, and 2) to serve as representative assets that can provide insight on other vulnerable assets within the Project Area that were not selected for further analysis (e.g., not *all* roads were assessed, only select roads in key locations). A summary of the assets can be found in Section 1.3.

- **Assess (completed).** The City of Benicia is already vulnerable to current hazards such as flooding, earthquakes, and wildfires. It is important to understand how infrastructure has been affected in the past and how asset managers might deal with the same or exacerbated future events. A summary of this information is contained in Section 3 of this report, and a more detailed overview is included in the Existing Conditions and Stressors Report completed previously for this project.

- **Define (subject of this report)**. This report discusses how sea level rise, storm surge, and changes in temperature will impact Benicia. It discusses potential vulnerabilities in the following sectors: Community Facilities and Services, Transportation, Port of Benicia, Wastewater, Stormwater, Natural Areas/Shoreline Protection, and Energy and Pipeline Infrastructure.

- **Plan (to be completed by June 2015).** The next step after this report is to develop adaptation strategies that could increase the City of Benicia's resilience to sea level rise, storm surge, and extreme temperatures. These options will undergo a qualitative evaluation to determine their impacts on economy, the environment, social equity, and a high-level benefit-cost assessment to determine priority actions. The top adaptation strategies will be documented in a report that will include opportunities to integrate them into existing City plans.

- **Implement and Monitor (following this project)**. Although outside the scope of this project, implementing and monitoring climate change and adaptation strategies will be vital steps in the

climate change resiliency process. The City of Benicia Adaptation Plan will include a monitoring plan to help the City advance this work.

Project Area

The City of Benicia is located on the north bank of the Carquinez Strait and the north side of Suisun Bay in Solano County. The Project Area is located along the City's shoreline, extending from the Benicia State Park in the west to the City's eastern extent, just past the east end of the Benicia Industrial Park (see Figure 1). The Project Area near the shoreline is relatively flat and then slopes upward in general as one proceeds further from the shoreline. The Project Area has a strong and relatively persistent breeze. The shoreline area encompasses a variety of land uses, including natural areas (e.g., marshes, wetlands, parks, beaches), park areas (some of which contain natural habitats), industrial/commercial developments, a port, and residential areas.

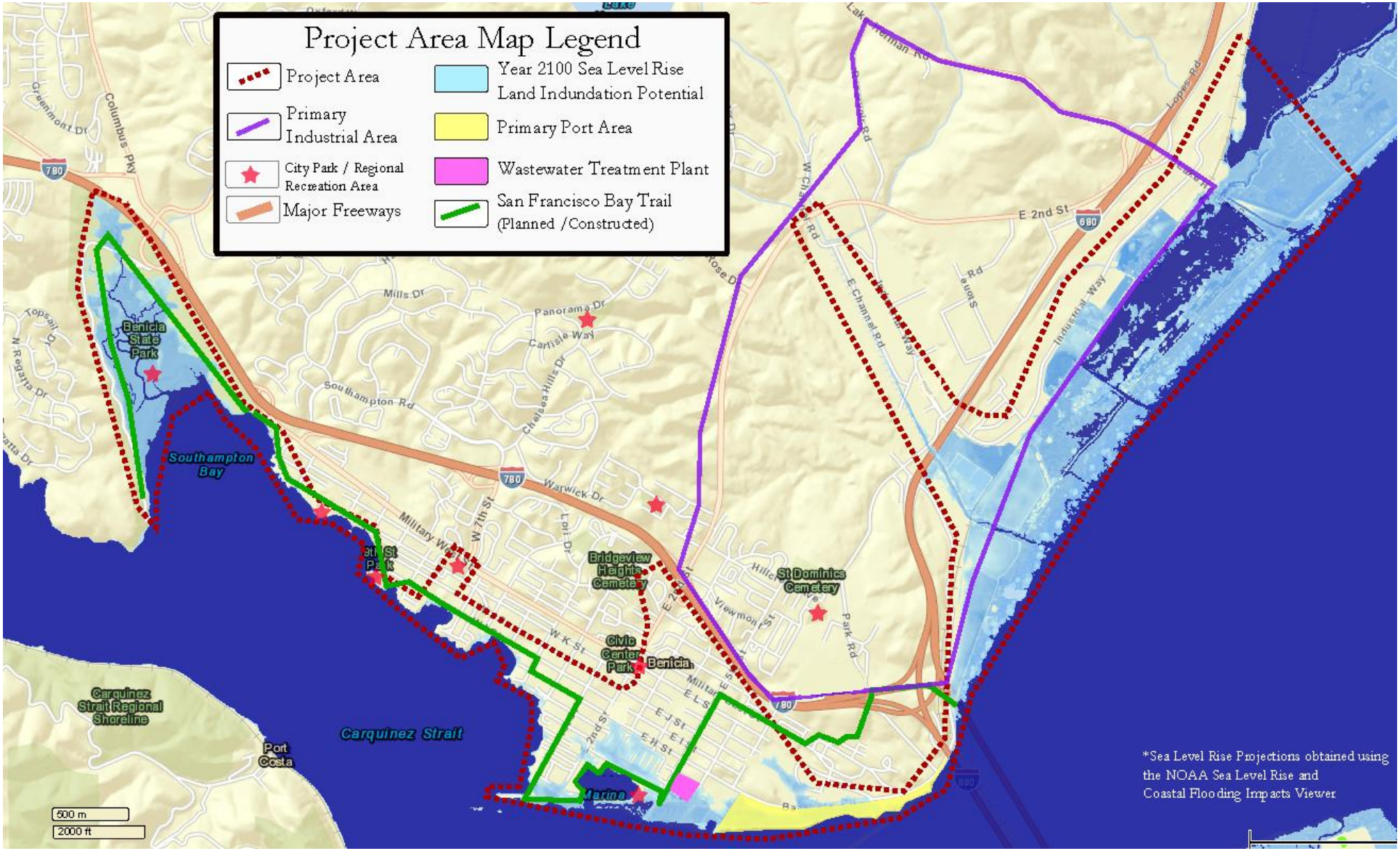

Figure 2: Project Area Map

1.3 Sectors for Study: Assets and Areas

The project team (ICF International, PlaceWorks, and Moffatt & Nichol) considered input from local, regional, and state public agencies, as well as community members, when identifying key assets and areas for study. These groups highlighted assets and area that they believe are highly critical to the community's function, and may be vulnerable to climate-related hazards. Based on that process, the following sectors were selected for study:

- **Community Land Use:** Community land use includes the buildings and infrastructure that make up Benicia's neighborhoods and commercial centers. This infrastructure supports the social and economic structure of the City.
- **Transportation:** The network of local roads, freeways, transit, bike and pedestrian paths, and rail lines that transport people and goods within the City and between the City and other locations.
- **Port of Benicia:** The Port of Benicia is privately owned and operated by AMPORTS; however, the underlying land is owned by the City of Benicia. The port is an international trading hub.
- **Wastewater:** The Benicia wastewater treatments plant treats residential, commercial, and industrial sewage from the City before discharging it into the Carquinez Strait.
- **Stormwater:** The stormwater system transports rainfall runoff into the Bay.
- **Natural Habitats:** The Benicia shoreline contains several areas with natural features, such as wetlands and marshes.
- **Energy Infrastructure:** Pacific Gas & Electric (PG&E) provides electricity and natural gas to the City of Benicia.

Additional considerations that led to the individual asset selection included 1) ensuring adequate coverage of the wide range of the types of infrastructure and community assets found within the Project Area, and 2) representative assets that can provide insight regarding other vulnerable assets within the Project Area that were not selected for further analysis. For example, there are many local streets within the Benicia Project Area; these streets all have fairly similar characteristics in terms of their construction materials, governance, and maintenance regimens. For this reason, it makes sense to analyze a few roads, determine their vulnerability, and apply the learning from that process to the other local roads. The specific community assets and areas advanced for inclusion in this vulnerability assessment are documented in Table 1.

This assessment is not comprehensive of all city services (e.g., the library) or private properties (e.g., Valero). Some private businesses (e.g., Union Pacific) were asked to participate but choose not to, while others have participated in a limited review of key documents (e.g., Valero). It is unknown whether these businesses are undertaking internal climate change vulnerability assessments.

Table 1: Select Community Assets and Areas for Vulnerability Assessment

Sector	Assets
Community Land Use	• Downtown commercial areas • Portside Village townhomes • Benicia Industrial Park • Benicia Public Schools • Police Station (200 East L Street) • Fire Station (150 Military West) • Benicia Community Center (370 E L St) • City Hall • Fitzgerald Field • Benicia Marina
Transportation	• East 2nd Street/East B Street • East 5th Street • Bayshore Road • Industrial Way • Bay Trail*
Port of Benicia	• Port property at large • Engineered shoreline protection structures
Wastewater	• Benicia Wastewater Treatment Plant (WWTP), including flood walls

Stormwater	• Stormwater outfalls at:
	  ○ East 2nd Street*
	  ○ East 5th Street*

Natural Habitats	• Benicia State Park (marsh and estuary) • Marsh in front of Benicia Industrial Park • Marsh in front of Benicia Marina
Energy Infrastructure	• PG&E infrastructure

**Vulnerability assessment results for these assets are limited due to insufficient data or no participation from the asset owners/managers. Results tend to be more generalized based on the professional opinion of the ICF Team.*

1.4 Overview of This Report

This vulnerability assessment discusses some of the ways that climate change could affect Benicia's community assets and areas, and what the consequences of those effects might be on the community. This assessment specifically focuses on potential changes in temperature, sea level rise, and storm surge, including their effect on local drainage. Changes in precipitation are not covered in this report because they are projected to be minimal for the Project Area (see the Task 2 Summary Report for additional information).

As previously discussed, this report covers the sectors and assets identified in Table 1, which were suggested as key sectors/assets during the Advisory Group workshops. Other assets and sectors in Benicia could also be affected by climate change, but they are not the focus of this report because they 1) are significantly similar to one or more of the selected assets, 2) their owner did not agree to participate in this project, or 3) they were not identified by the Advisory Groups or the City of Benicia for inclusion in this assessment (e.g., garbage collection/recycling).

The vulnerability assessment was conducted by evaluating the three components of vulnerability: exposure, sensitivity, and adaptive capacity. To evaluate components, the ICF Team first identified how the climate in Benicia might change (exposure), and then evaluated the assets' sensitivities to future climate events (sensitivity), and their ability to adapt to those changes in climate (adaptive capacity). The evaluation of sensitivity and adaptive capacity depended largely on input from the asset managers through participation in the workshop and through responses to a survey; expert judgment of the consultant team was used to fill in remaining gaps. Detailed information on the vulnerability assessment approach can be found in Section 5.

The goal of this vulnerability assessment is to identify the potential vulnerabilities associated with each asset. No judgment is made on the relative vulnerabilities of the assets or the overall extent to which they are vulnerable. No rankings or scores are assigned that would indicate that some assets are more vulnerable than others. This approach was taken because the BCDC Adapting to Rising Tides project determined that vulnerability rankings and scores can be misleading when trying to compare assets that are distinctly different. Additionally, scores can provide a false sense of confidence in an analysis that likely has many data gaps and/or qualitative judgments.

Key Terms and Concepts

Climate change: Long term changes to the global or regional "average weather" attributed to anthropogenic emissions.

Climate stressor: Parameters used to measure and describe climate. For example: temperature, precipitation, wind, storm surge, waves, and relative sea level change.

Climate impact: The effect that climate has on infrastructure and natural areas.

Asset: Asset refers to any piece of built infrastructure, natural area, or community facility under consideration in this assessment.

Asset sector: A collection of similar assets. For the purposes of this report – community facilities and services; transportation; Port of Benicia; natural habitats; stormwater; wastewater; energy infrastructure.

Vulnerability: The degree to which a system is exposed to, sensitive to, and unable to cope with or adapt to the adverse effects of change, including climate variability and extremes.

Adaptation: Adjustments in natural or human systems that occur in response to already experienced or expected climate changes and their impacts.

This report follows the following format:

- An introduction to vulnerability assessment terminology
- An overview of historical/current natural hazards and information on the existing conditions of community assets. Understanding the existing condition of community assets and areas, as well

as how they have been affected by past extreme weather events, provides insight to how the community asset or area could respond to future climate changes.

- An overview of future climate change stressors (i.e., sea level rise, storm surges, extreme temperatures)
- An overview of the vulnerability assessment methodology
- A summary of the key sector level vulnerability and consequence findings
- A summary of immediate next steps
- An appendix of asset specific vulnerabilities

To assist other local communities in conducting similar assessments, this report also includes "Tips for Success" boxes throughout the report that recommend best practices from the Benicia experience.

2 Introduction to Vulnerability

Vulnerability has a very specific definition for climate change assessments. The Intergovernmental Panel on Climate Change (IPCC), an internationally accepted authority on climate change, defines climate vulnerability as "the degree to which a system, whether it be communities, ecosystems, infrastructure assets, or others, is susceptible to and unable to cope with the effects of climate change," and consists of three main concepts[1]:

Exposure

The nature and degree to which an asset is exposed to significant climatic variations

Positively correlated with vulnerability

Sensitivity

The degree to which an asset is affected, either adversely or beneficially, by climate-related stimuli

Positively correlated with vulnerability

Adaptive capacity

The ability of a system (or asset) to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences

Negatively correlated with vulnerability

The greater the exposure and sensitivity of an asset or community, the greater the vulnerability and the greater the adaptive capacity of an asset or community, the lower the vulnerability. This relationship between adaptive capacity, sensitivity, and exposure can be seen in Figure 3. Low adaptive capacity combined with significant sensitivity and exposure will result in a vulnerable asset, while high adaptive capacity can counteract some sensitivity and exposure to result in a less vulnerable asset. The following sections dive deeper into each of the three components of vulnerability.

Figure 3: Combining the Elements of Vulnerability.

2.1 Exposure

Exposure measures the nature and degree to which an asset is exposed to significant climatic variations.[1] For example, parts of the Benicia Marina and Port Area are projected to be exposed to daily inundation (i.e., either permanently under water or within the daily tidal zones) from sea level rise by 2100 (storm surge will impact the area in the near term) because of their coastal location and lack of a shoreline protection system. Meanwhile, City Hall is not projected to be exposed to sea level rise or storm surge due to its inland location and higher elevation.

As another example, the entire City of Benicia is projected to be exposed to higher temperatures by 2050 due to climate change. Exposure to temperature increases tends to be more uniform within a small geographic area, because all assets tend to have similar exposure. Exposure to sea level rise and storm surge is more variable within a city, because asset location, land elevation, height of structure, and other features can greatly influence if, and to what degree, an asset is exposed.

[1] Definitions adapted from the IPCC in the U.S. Department of Transportation, Impacts of Climate Change and Variability on Transportation Systems and Infrastructure: The Gulf Coast Study, Phase 2, Task 3.1, Screening for Vulnerability Report. Accessible at: http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study/phase2_task3/task_3.1/index.cfm

2.2 Sensitivity

Sensitivity is the degree to which an asset is affected, either adversely or beneficially, by climate-related stimuli.[1] For example, a building is sensitive to flooding if it is not waterproofed. It is more sensitive if there is electrical equipment on the ground floor. But sensitivities can result from more than only the physical characteristics of a structure. By following the guidance in the Adapting to Rising Tides Report, sensitivities have been identified across the following subject areas:

- **Physical and Functional Sensitivities:** Describes existing conditions or design features that make a community asset more sensitive to temperature and sea level rise. These features may include:
    - **Outdoor equipment** may not have been designed to withstand high heat conditions.
    - High heat may lead to **unsafe working conditions.**
    - Infrastructure that is **at or below grade** may be more likely to flood.
    - Elements that are **water sensitive** such as electrical or mechanical equipment may short out or corrode if exposed to water.
    - Some assets (e.g., grass and vegetation) can withstand freshwater flooding but may be sensitive to **salt water** flooding.
    - Coastal areas can be sensitive to **erosion** if they are not engineered to withstand coastal forces.
    - Additional coastal areas may be exposed to **liquefaction** (i.e., when the soil behaves as a liquid) during earthquakes due to increased groundwater intrusion.
    - **Dependence on other systems** for operation such as access to roads, rail tracks, or utilities may increase sensitivity.
- **Management Sensitivities:** Describes governance and management challenges. These challenges may include:
    - Community assets where **multiple agencies** are responsible for asset governance. This coordination may require a longer lead time to implement adaptation strategies.
    - **Management approaches** where the previous way of conducting business could no longer be sufficient. For example, planning horizons of 5 to 10 years are likely insufficient for capturing the long-term investments needed to adapt to sea level rise. Additionally, the regular management routines may be insufficient to deal with exacerbated flooding issues.
    - The lack of flexibility in available **funding sources** creates financing issues. Even though existing funding sources can be used for resilience projects, the budgets tend to be stretched thin (e.g., funding for State Parks can be used to raise wetlands through sea level rise but many parks are closing due to insufficient funding).
- **Informational Sensitivities:** Describes challenges to obtaining the information necessary to sufficiently understand vulnerability and risk. As discovered in the ART project, "these

Tips for Success – Early Identification of Elements of Sensitivity

It is easy to jump to conclusions about the physical impacts that climate change will have on infrastructure and to forget about other sensitivities. By establishing sensitivity foci *before* diving into the vulnerability assessment, we were able to ensure that all aspects of sensitivity were evaluated.

challenges were not only barriers to fully understanding the issues, but were themselves causes of vulnerability and risk."[2] There are three types of informational sensitivities:

- In some cases, the information needed is **unavailable** or functionally out of date.
- At other times, the information is **inaccessible** because it is privately held.
- Sometimes, there is confusion over the availability of data due to **inadequate coordination** and/or inconsistencies in data formats that cannot be overcome (e.g., new staff may not be aware of the existence of older data sets such as historic maintenance and flooding remediation project details).

2.3 Adaptive Capacity

Adaptive capacity measures the ability of a system (or asset) to adjust to climate change by moderating potential damages, taking advantage of opportunities, or coping with the consequences.[2] For example, the City's Wastewater Treatment Plant (WWTP) has multiple positive and negative factors contributing to its overall adaptive capacity. Like many other cities, it is the only treatment plant that serves Benicia and so, there is a great need to adapt to changing conditions. The WWTP does have on-site pumps and an existing seawall that can help to constrain inundation and to remove water during a storm event which increases the overall adaptive capacity.

Determining the adaptive capacity of a system involves asking questions such as:

- Are there barriers to a system's ability to accommodate change in climate?
- What is the cost to repair the asset in the event of damage?
- Are plans already in place to respond to extreme weather events?
- Is there redundancy within the network of assets to support the City if one asset fails?
- Can the existing ventilation/cooling system handle the projected increase in temperature?
- Are other agencies and/or jurisdictions involved in the operation, design, or oversight of the infrastructure making it difficult to coordinate an emergency response?
- To what extent do climate change impacts and adaptation activities affect other sectors?

Adaptive capacity can be evaluated based on answers to these questions, using key metrics such as current condition of infrastructure assets and extent of backup, redundant or alternative assets.

2.4 Moving Beyond Vulnerability to Risk

Vulnerability is an indication of how a specific asset could be affected under future climate scenarios. Risk illustrates how probable the occurrence (or *likelihood)* of an event is, as well as the *consequence* of that event occurring (that is, how bad the damage from that event would be).[3] The IPCC states that all of their climate projections are "equally likely" future scenarios and so, while all scenarios show an upward trend in global greenhouse gas emissions and measurable changes in climate, it is uncertain whether the lower emissions scenarios or the higher emissions scenarios will come to pass. For that reason, this report considers *uncertainty* instead of likelihood/probability. Our treatment of characterizing uncertainty and consequence are discussed in the sections that follow.

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[2] BCDC. Adapting to Rising Tides, Vulnerability and Risk Assessment Report. Chapter 3: Vulnerability and Risk Classification. Available at: http://www.adaptingtorisingtides.org/vulnerability-and-risk-assessment-report/

[3] Definitions for risk, likelihood, and consequence are adapted from the International Panel on Climate Change (IPCC)'s Fifth Assessment Report. Please see "WGII AR5 Glossary" at http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Glossary_FGD.pdf.

Uncertainty

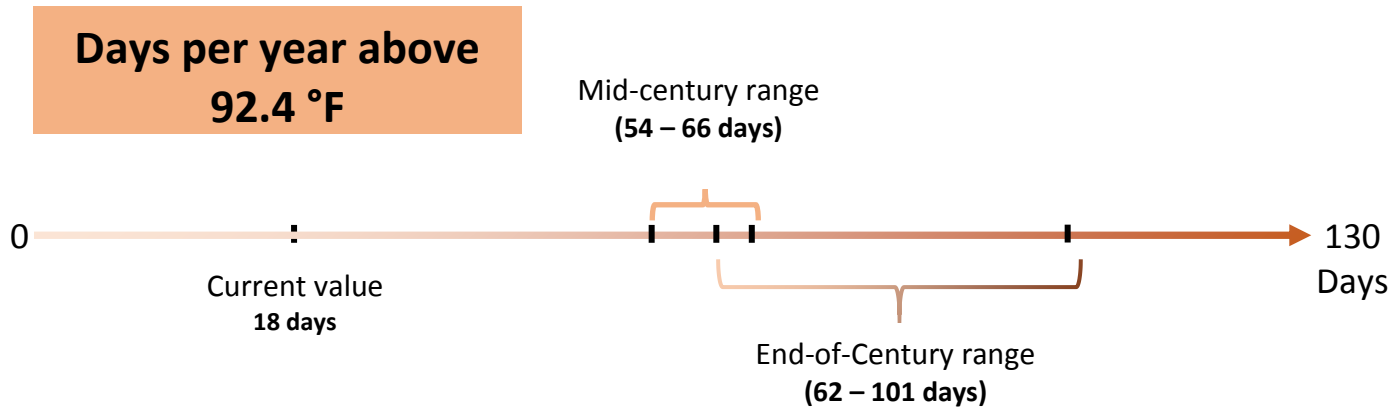
The climate scenarios described in this report are all plausible and bound our current understanding of potential future global greenhouse gas emissions and the resulting climate change, but no specific scenario is certain to occur. There are three main sources of uncertainty in climate model simulations:

1. Natural variability (the unpredictable nature of the climate system)
2. Model uncertainty (the ability to accurately model the Earth's many complex processes)
3. Scenario uncertainty (the ability to project future societal choices such as energy use)

The relative contribution of each uncertainty component to the climate model simulation's overall uncertainty varies with time. In the near term, scenario uncertainty is relatively minimal and model uncertainty and natural variability are the dominant contributors to near-term and mid-century uncertainty. Over the longer term, scenario uncertainty describes a larger portion of the total uncertainty. While the City of Benicia is actively working to reduce their emissions, their contribution to global emissions is very small compared to the emissions of the entire United States, China, and India. Therefore, despite the strong local commitment to emissions reductions, the global uncertainty in emissions policies and energy choices results in a wide range of potential emissions futures.

The three elements of uncertainty are mitigated by averaging across different data sets and presenting the outcomes as a plausible range of future conditions. Natural variability is addressed by averaging over 20 years of climate projections (e.g., 2046-2065). This averaging smoothes over some of the annual variability that may arise. Model uncertainty is addressed by averaging across 19 climate models and scenario uncertainty is addressed by using two, equally likely, future emission scenarios which represent differences in how society may change in the future. These emission scenarios bound the high and low range of the climate change projections. Neither end of the projection range is considered more likely to occur than the other.

In the near term, it is easier to predict emission levels because they will likely be similar to today's rate of emissions production given the limited time for the global society to evolve. However, it is very difficult to project emission levels out 50 to 90 years into the future because it is not known how our global society will evolve over time (e.g., population growth, economic growth, energy use, development of significant technological advancements, political action mitigating emissions). Thus, the range of plausible future emissions expands over future time, along with the plausible range of climate responses. The figure below, shows projected increases in the number of days per year above 92.4 °F (historically, 95% of days in Benicia have been below this temperature). As can be seen, there is less uncertainty across the plausible mid-century projections (a range of 12 days) compared to the end-of-century projections (a range of nearly 40 days). Additionally, the general trend towards an increased number of hot days is clear, despite the uncertainty surrounding the specific projections.



Because the range of projections grows with future time, the City of Benicia will place an emphasis on addressing near-term vulnerabilities since there is greater certainty that they will occur.

Consequence

Consequence represents the effects on natural and human systems.[3] In other words, it encompasses the effect that climate change-related damage would have on the greater community.[3] Consequence is qualitatively assessed in this report, using determining questions such as:

- If this asset is damaged due to climate change, what would be the potential economic affects?
- What is the estimated scale of the effect, such as the size of the population or land area affected?
- Is the asset considered critical to the City's mission?

The consequence findings in this report are classified in the following manner:

- **Economy** – For example, sea level rise threatens to inundate parts of the Benicia Industrial Park which could threaten jobs, and economic output due to disrupted businesses.
- **Environment** – For example, sea level rise threatens to inundate the Benicia State Park, which could negatively affect wildlife and reduce recreation areas.
- **Equity** – For example, increases in very hot days can disproportionally affect the elderly and the very young, whom are more vulnerable to heat-related illness.
- **Governance** – For example, advancing sea levels may require increased coordination between the City, BCDC, the Army Corps of Engineers, private entities and other parties.

The cost of adapting versus not adapting is not included in the consequences because it requires a more detailed assessment which cannot be completed until adaptation solutions are developed. This information will be included in the upcoming adaptation report. This structure also matches the Adapting to Rising Tides (ART) process which this project is using as a template.

3 Overview of Existing Conditions and Current Hazards

This section summarizes some of the most pertinent findings from the Existing Conditions and Stressors report. The Existing Conditions report was developed through a literature review of City documents and academic literature on the impacts of extreme weather events on infrastructure, as well as workshop sessions with the Technical Advisory Council and Community Advisory Group.

In order to develop robust adaptation measures that deal with some of the consequences mentioned in the previous section, it is important to first identify existing stressors that affect Benicia's infrastructure today. Existing stressors affecting Benicia include earthquakes, storm surge, flooding, wildfires, landslides, extreme temperatures, and drought. Some of these existing stressors could be exacerbated by climate change, such as flooding and extremer temperatures.

Tips for Success – Holding an Effective Data Gathering Workshop

- Holding an in-person meeting to discuss existing conditions was an effective way to establish the existing conditions.
- Divide technical experts and community members while gathering politically sensitive information.
- Focus invitations on staff who operate and manage important assets on a day-to-day basis.
- Ask people to provide web links or PDFs of management or emergency operation plans that provide insight on operations.
- Discuss existing conditions before discussing climate change in order to focus the conversation on existing impacts.
- Ask for examples of how infrastructure has been

3.1 Earthquake

Unlike the other existing stressors, the frequency and severity of earthquake magnitude are not affected by climate change. However, earthquakes can cause liquefaction, which occur when saturated or partially saturated soils lose stiffness and behave like a liquid. Rising groundwater levels due to sea level rise can increase the likelihood of liquefaction in the event of an earthquake. Earthquakes are thus included in this report because the consequences of earthquakes may be greater with sea level rise due to the potential for expansion of liquefaction areas.

Although other faults run closer to Benicia, the Hayward Fault poses the largest threat because it has the greatest likelihood of a sizable earthquake (e.g., a 7 or over on the Richter scale) in the next 30 years. If an earthquake were to occur, the Benicia shoreline could not only experience ground shaking but could also experience additional damage due to its susceptibility to liquefaction[4]. The last major earthquake centered in Solano County, a magnitude 6.5, occurred on the Concord/Green Valley fault in 1892. Currently, the following area in Benicia is exposed to earthquake impacts[5]:

- 25 acres vulnerable to earthquake faulting, mostly along the coastline

Examples of Existing Conditions

- **Transportation** –7 miles of railway in Benicia are located in potential earthquake and liquefaction susceptibility zones. Historic flooding has affected East 2nd St and East 5th St.
- **Shoreline Protection** – Shoreline protection structures such as levees are negatively impacted by coastal flooding, which lead to erosion and structural damage.

[4] Tables of land and infrastructure in Benicia vulnerable to various natural hazards are included in the "Annex to 2010 Association of Bay Area Governments Local Hazard Mitigation Plan: *Taming Natural Disasters".* Accessible at: http://resilience.abag.ca.gov/wp-content/documents/2010LHMP/Benicia-Annex-2011.pdf

[5] Statistics are from the City of Benicia "Annex to 2010 Association of Bay Area Governments Local Hazard Mitigation Plan: *Taming Natural Disasters".* Accessible at: http://resilience.abag.ca.gov/wp-content/documents/2010LHMP/Benicia-Annex-2011.pdf

- 1,320 acres classified as having severe earthquake shaking potential
- 833 acres vulnerable to liquefaction due to loose soils

The most severe shaking severity is projected to occur in coastal areas in the southern and eastern parts of Benicia, essentially overlapping the entirety of the project area.

3.2 Wildfires

Wildfire risks in Benicia are greatest in the inland grassy hills, which are outside of this project's study area. In total, 316 acres in Benicia are subject to high, very high, or extreme wildfire threat[6], and wildfires can also impair air quality in Benicia. However, the coastal regions have historically only been minimally affected by wildfires.

3.3 Flooding/Storm Surge

The Project Area has historically been affected by flooding due to its location on low-lying land adjacent to the shoreline without any significant grade to assist with drainage. The stormwater system in Benicia is gravity fed, and during storm events, undersized drainage pipes can become surcharged, leading to water backing up and flooding portions of the City. Flooding can occur both in areas that are hydrologically connected to the Bay as well as in low-lying areas that are not hydrologically connected to the Bay due to rainwater pooling in areas without drainage systems. This vulnerability assessment identifies assets that are currently affected by flooding and distinguishes between current drainage issues and those that could be exacerbated by climate change.

Examples of Flooding

1997 - The El Nino season in 1997 resulted in extreme coastal and inland flooding due to a combination of heavy rains, high tides, and undersized stormwater drainage systems.

2005 - A 40-year storm event coupled with extreme high tides with heavy rain. This led to coastal water overtopping local flood protection structures and flooding downtown, residential communities, and other portions of the City.

Current flooding occurs when rainfall events coincide with high tide and when storm conditions cause the stormwater outfalls to be blocked. Coastal areas in Benicia are vulnerable to flooding from storm surges, which are rises in water generated by a storm above and beyond the predicted tide. It is this combination of storm surge and precipitation that has historically resulted in flooding along East B, East 2nd and East 5th Streets, the Port of Benicia, and some natural shoreline areas.

3.4 Temperature

Currently, temperature extremes (high and low) have limited to no impact on the City of Benicia. Temperatures over 99° F only occur approximately four times per year, with the hottest temperature of the year, on average, reaching 102° F. Even when high temperatures occur, the coastal breezes moderate the temperature, reducing the "real feel" and limiting the negative impacts to human health (e.g., heat cramps, heat stroke).

[6] City of Benicia "Annex to 2010 Association of Bay Area Governments Local Hazard Mitigation Plan: *Taming Natural Disasters".* Accessible at: http://resilience.abag.ca.gov/wp-content/documents/2010LHMP/Benicia-Annex-2011.pdf

While the City of Benicia Emergency Operations Plan[7] indicates the steps for declaring a local emergency, and preparing and operating emergency healthcare services and shelters, it does not specifically identify temperature as a potential cause for activation. The Plan specifically states that the local state of emergency list is not comprehensive and that other causes of emergencies may exist. The extent to which private businesses have operational plans that address the proper response on high heat days is unknown.

Air conditioning in residences and commercial buildings is limited. In the event of high heat days, residents may have to seek out locations with air conditioning such as the library, schools, or the community center. Members of the CAG expressed concern that the only movie theatre in the City is closed, removing an obvious air conditioned location that residents could visit on high heat days.

3.5 Drought

California is currently in the midst of one of the worst droughts on record. Drought conditions occur when there are decreased levels of precipitation for an extended period of time. Droughts can be exacerbated by increased ambient temperatures which increase evaporation, melt the snowpack (or prevent precipitation from falling as snow), and generally results in increased human water consumption. Although the drought is a serious issue for the state and the City of Benicia, it is best addressed outside of this vulnerability assessment since drought conditions are a statewide phenomenon that will require additional stakeholders and partnerships to address.

Although this is a statewide issue, the City of Benicia has already conserved 22.6% of water between March 2014 and February 2015 compared to the same time in 2013. It continues to work toward the April 2015 state-mandated 25% reduction goal by encouraging residents and businesses to conserve water by providing rebates and incentives for more efficient appliances and fixtures and replacement of grass with native and lower water plantings and by investigating opportunities to treat and recycle wastewater for large industrial users in the City.

4 Overview of Future Climate Change Hazards

While a range of climate change impacts are projected to occur in Benicia, the scope of this project focuses on two hazards most certain to have significant negative effects on the City. While climate change could result in changes in the frequency and duration of drought, wildfires, precipitation events, extreme temperature events, sea level rise, and storm surge, this study focuses on extreme temperature and sea level rise/storm surge. Based on available climate change data, temperature and sea level rise are two stressors in Benicia that are projected to clearly deviate substantially from current

Tips for Success – Climate Change and Temperature Tools

There are two main temperature tools that could be used to obtain localized temperature projections:

1. CalAdapt – Provides California annual projections for six temperature variables (http://cal-adapt.org/temperature/heat/)
2. CMIP Climate Data Processing Tool – Averages data from multiple models and emission scenario (if desired) across 26 temperature variables. Allows user to select size of geographic area and range of years to average across (not yet posted on US DOT's website)

[7] City of Benicia, California Emergency Operation Plan. January 2007. Accessible at http://www.ci.benicia.ca.us/vertical/Sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7BFFAF7365-1029-485A-B5FF-8ECD7951574C%7D.PDF

conditions. Additional information on the selection of these two stressors can be found in the Task 2 Summary Report (an overview of input received from the TAC and CAG during the project kick-off meetings).

The following sections discuss how temperature and sea level rise projections were developed. They provide insight on the *exposure* aspect of vulnerability, while Section 5 provides an overview of the sensitivity and adaptive capacity methodology.

4.1 Extreme Temperature

Temperature projections are derived from the World Climate Research Programme's Fifth Coupled Model Intercomparison Project (CMIP5). CMIP5 averages the projections of many climate models under different future greenhouse gas emissions scenarios. ICF used the CMIP Climate Data Processing Tool, soon to be available on the US Department of Transportation (DOT) website, to process the model outputs into variables that are more useful for planning and engineering. This tool provides more robust information than the California Energy Commission, CalAdapt tool, which is frequently cited as a valuable resource. Key data points are shown in Table 2, while the full data set and additional information on the methods used to derive the data are available in the Task 2 Summary Report.

Table 2: Range of Projected Changes in Temperature

Variable	Baseline (1950-1999) *Observed Value*	Mid-century (2046-2065) *Modeled Value*	End-of-century (2080-2099) *Modeled Value*
Average Annual Mean Temperature	59 °F	62 – 63 °F	63 – 67 °F
Hottest Temperature of the Year	102 °F	107 – 108 °F	108 – 112 °F
Average Number of Days per Year above 92.4°F **(95% of days in Benicia have historically fallen below this temperature)**	18 days	54 – 66 days	62 – 101 days
Maximum Number of Consecutive Days per Year above 92.4°F	5 days	12 – 15 days	13 – 32 days
Average Summer Temperatures	84 ° F	88 – 89 ° F	89 – 93 ° F
Highest 4-Day Average Summer Temperature	98 ° F	102 – 104 ° F	103 – 107 ° F

4.2 Sea Level Rise and Storm Surge

The California Ocean Protection Council (OPC) released sea level rise planning guidance in 2013, which includes the scientific findings of the National Research Council (NRC) Sea-Level Rise for the Coasts of California, Oregon, and Washington study. This guidance has been adopted by many California agencies including the San Francisco Bay Conservation and Development Commission, and the California Coastal Conservancy. The OPC guidance recommends assessing 5 to 24 inches of sea level rise by mid-century and 17 to 66 inches by the end-of-century. In order to utilize publicly available sea level rise mapping tools (see callout box, below), Benicia has rounded these recommendations to develop the following three sea level rise scenarios:

- 12 inches (low, mid-century projection)
- 24 inches (high, mid-century projection and the low end-of-century projection)
- 60 inches (high end-of-century projection)

In order to determine the effect of storms on coastal flooding, a FEMA study of average water level depths during storm events of various return intervals (e.g., 1 yr., 2 yr., 5 yr., 10 yr., 25 yr., 100 yr.) within the San Francisco Bay was used to identify current flood levels[8]. To combine the sea level rise mapping data and the storm depth data, ICF used the same approach as BCDC used for the ART project, called "total water level". Total water level allows for the simultaneous consideration of changes in short-term, storm-related flooding as well as long-term permanent inundation due to sea level rise. This approach does have limitations—it does not specifically model storms and the wave run-up processes that occur in the San Francisco Bay; however, the narrow waterway of the Carquinez Strait does not allow for significant wave development, so the total water level approach may be more appropriate in Benicia than in other coastal communities that abut large expanses of open water. The newly released Our Coast Our Future (OCOF) tool does model storm surge in the San Francisco Bay Area; however, this model was not used in this analysis for three reasons: (1) it was released after the start of the project; (2) the inland extent of the OCOF modeling is substantially similar to the total water level mapping; and (3) the ICF Project Team identified limitations to the inland extent of the OCOF modeling that are specific to Benicia and limit the accuracy of the results.

The inundation scenarios represented by the total water level's combination of sea level rise and high tide are identified in the map legends in Figure 4 and Figure 5. The legend indicates that the water level at 60 inches of sea level rise, combined with the daily high tide, is equivalent to the water level at 24 inches of sea level rise, coupled with the 25-year high tide (i.e., a tide/storm event that, on average, has occurred once every 25 years; on an annual basis, this event has a 4% chance of occurrence any given year). In other words, 60 inches of flooding is possible even before sea levels rise 60 inches, due to infrequent, although possible, high tide storm surge events. Water level scenarios with a high sea level rise and more frequent high tide event (such as the 60 inch plus daily high tide scenario) could force communities to change the way they use a given area due to daily flooding events, whereas scenarios with less sea level rise and a less common high tide (such as the 24 inches plus 25-year high tide scenario) do not necessarily demand a change in use, as flooding is less common.

[8] FEMA CCAMP San Francisco Bay Area Coastal Study, http://www.r9map.org/Pages/San-Francisco-Coastal-Bay-Study.aspx

Tips for Success – Sea Level Rise Tools

There are several sea level rise tools that can be used to obtain localized maps:

1. **NOAA Digital Coast Sea Level Rise Viewer** - utilized for this project due to the clear maps, the commitment to maintaining and updating the data, and the opportunity for replication by using a nationally available tool. Can map up to six feet of sea level rise. (http://coast.noaa.gov/digitalcoast/tools/slr/)
2. **Surging Seas** - utilized for this project for the socioeconomic impact analysis. Did not use as main source of mapping because it was difficult to see the difference between flooded areas and areas that are low-lying but protected by levees or natural features. Allows for mapping up to 10 feet of sea level rise. (http://sealevel.climatecentral.org/)
3. **Our Coast Our Future** - Excellent tool for Bay Area specific sea level rise modeling and mapping. Recommended for use in areas abutting significant open water where wind and waves will impact the inland flooding extent. Not utilized in this project due to localized shortcomings on the inland extent of the modeled area. (http://data.prbo.org/apps/ocof/index.php?page=flood-map)
4. **Future San Francisco Bay Tidal Marshes** - utilized for determining the response of natural areas to sea level rise and sedimentation. Not appropriate for mapping outside of natural areas. (http://data.prbo.org/apps/sfbslr/)

The following maps display the 24-inch and 60-inch sea level rise scenarios for Benicia, with markers for the location of assets analyzed in this vulnerability assessment. Red markers indicate that the asset is within the sea level rise inundation area, while black markers indicate that the asset is not projected to be affected by daily inundation. For identification of the individual markers, please see Appendix A: Individual Asset Profile Sheets.

The areas projected to be affected by sea level rise are indicated by two main colors on the map—blue and green. The blue represents areas that are anticipated to be flooded while the green displays areas that would be "below sea level" but that are protected from flooding by topographical features or man-made shoreline protection systems. However, it should be noted that the elevation data used in the mapping may omit fine features affecting connectivity (e.g. seawalls, ditches), meaning that the sea level rise maps may overstate the extent of flooding. For example, the Benicia WWTP is protected by a flood wall that is not represented in the sea level rise model. In general, the mapping assumes that existing levees are in good condition and will be maintained at their current elevation into the future.

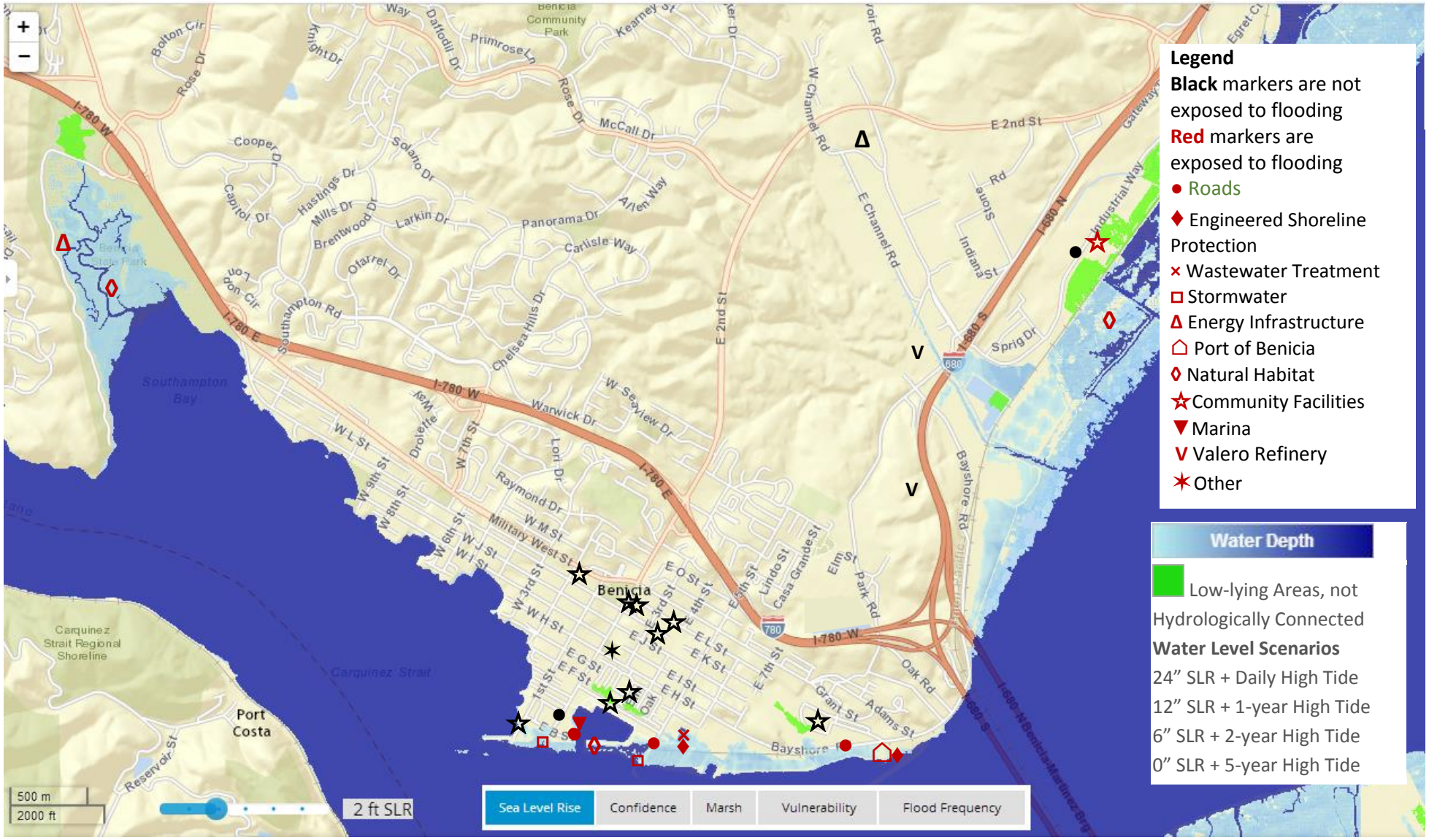


Figure 4: 24 Inch Total Water Level

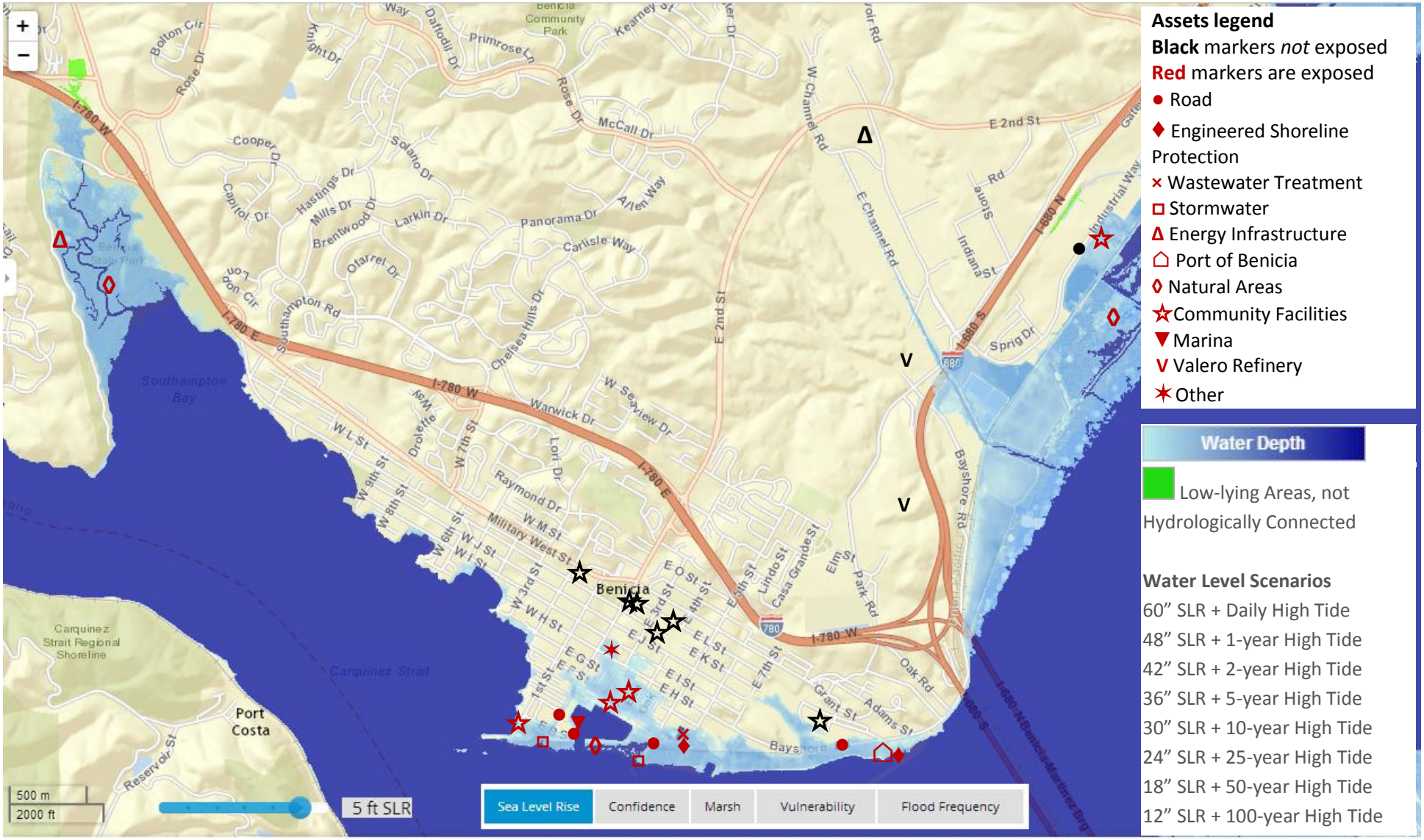


Figure 5: 60 Inch Total Water Level

5 Vulnerability Assessment Approach

This assessment approach relies on both qualitative and quantitative data as described in the following sections.

The vulnerability assessment is not a detailed engineering assessment nor does it pose solutions to the problems caused by sea level rise and high temperatures (adaptation options will be considered in a subsequent report). Engineering considerations, such as feasibility and cost estimates, will come under consideration in the development of adaptation measures.

5.1 Exposure -- Quantitative Analysis

The ICF Team conducted a quantitative analysis of exposure for the community areas and assets (as identified in Table 1) using the sea level rise and temperature data summarized in Section 4. In addition, specialized tools were used to conduct a more refined analysis of the sensitivity of marshes to sea level rise, and another sea level rise mapping tool was used to determine the socioeconomic exposure to sea level rise. Fortunately, these tools are free for public use:

- The Point Blue Conservation Science Future San Francisco Bay Tidal Marshes Tool[9] was used to determine how Benicia marshes could respond to sea level rise (see Section 6.6 for more information)
- The Climate Central Surging Seas Tool[10] was used to determine the socioeconomic exposure to sea level rise (see Section 6.1 for more information)

5.2 Sensitivity and Adaptive Capacity -- Qualitative Assessment

Asset owners and managers who interact with infrastructure on a day-to-day basis are a critical data source for sensitivity and adaptive capacity information. Collecting their input is integral to determining the sensitivity and adaptive capacity of an asset because this information is not always recorded in any traditional reports. In order to gather this information, the ICF team administered an online survey of asset owners and managers. The questions were provided by BCDC and modified by the ICF Team to include questions related to the effects of extreme temperatures.

The survey consisted of questions about the sensitivity and adaptive capacity of the particular assets operated, managed, or owned by the respondent. The survey also asked for input on the potential consequences to the asset, or to the larger system or community that relies on the asset, if impacts were to occur. Lastly, the survey included a section focused on the potential for equity issues, such as disproportionate burden on vulnerable populations if an impact were to occur. A copy of the survey questions can be found in Appendix B: Vulnerability and Risk Survey.

To help facilitate the survey, ICF and City of Benicia staff exchanged emails and held calls with select survey respondents to provide clarification and guidance on responding to the survey.

The vast majority of the assets assessed are owned and managed by the City of Benicia. Eleven additional people (a mix of private industries, local, state, and federal agencies) were asked to participate; of these eleven, six responded to the survey.

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[9] Point Blue Conservation Science. Future San Francisco Bay Tidal Marshes: a Climate-Smart Planning Tool. Accessible at http://data.prbo.org/apps/sfbslr/.

[10] Climate Central. Surging Seas. Accessible at http://sealevel.climatecentral.org/.

In addition to the survey, the ICF team reviewed a variety of literature sources, including:

- Other vulnerability reports (e.g., Adapting to Rising Tides, U.S. DOT Gulf Coast Study Phase 2[11])
- Professional literature on the effect of weather events on various types of infrastructure
- Benicia specific asset management or operating plans

These resources, as well as the ICF Team's professional knowledge, were used to complete the vulnerability assessment.

Tips for Success – Designing Effective Surveys

These tips cover elements of the survey design and implementation process that were effective as well as elements that the Project Team would change before undertaking a similar effort. In both cases, these tips should not be viewed as established best practices since they have not been sufficiently tested; they are simply the Project Team's thoughts on how to improve the survey response.

- **It's All in the Details –** Useful vulnerability assessments dive into the details. Be sure to balance the need for specifics with the users time.
- **Brevity is Key –** Ask fewer questions that allow for more narrative feedback in order to not overwhelm the respondent. Also, limit the amount of technical terminology unless it is well defined.
- **Be Specific –** Include examples in the questions that help elucidate the type of information desired.
- **The Right Person –** Confirm the identified contact is the correct person to be responding and enable them to skip questions or answer "I don't know" (which is also useful information!) if needed.
- **Format –** Online surveys allow the results to be easily consolidated. Google Forms provided skip-page functionality so asset owners only saw questions relevant to their asset. Users could also save and edit their responses at a future date.
- **Reminders –** Send frequent reminders of the survey and don't expect to receive responses until a week after the close date. Prepare a back-up plan in case survey responses are not submitted.
- **Education/Background – Provide** background information throughout the survey to educate the respondent on climate change vulnerability terms and data. This will also help them to understand the purpose of their responses. It is also useful to provide a PDF version of the survey so respondents can prepare their responses before entering them online.
- **Interviews –** Time and budget permitting, conducting individual interviews may be a more effective information gathering process than a survey. The questions can be customized and the interviewer can guide and probe to determine the underlying cause of specific vulnerabilities.

Definition of Sensitivity and Adaptive Capacity

There is frequently overlap between sensitivity and adaptive capacity. For the purposes of this assessment, adaptive capacity broadly encompasses:

- **Ability to quickly repair damage** – this may be due to the likely costs being low or the asset being prioritized for repair in the event of an emergency.
- **Redundancy** – if ability of alternative assets to replace some or all of the functionality of the damaged asset

Individual sectors may have additional and unique indicators of adaptive capacity; these will be found in the adaptive capacity sections of the report.

[11] U.S. Department of Transportation. 2008-2014. Accessible at https://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study/.

6 Key Sector Level Vulnerabilities

This section summarizes the key vulnerabilities and consequences identified within each sector. For each asset sector, a summary of the exposure, sensitivities, adaptive capacity, and the potential consequences of the climate change effects is presented. This section provides a high level overview of cross-cutting vulnerabilities identified at the systematic level rather than a detailed assessment of the vulnerability of each individual asset.

Tips for Success – Vulnerability Assessment Process

- Don't just depend on survey responses; use a variety of resources to identify sensitivities (e.g., other vulnerability reports, asset specific design standards and literature).
- If possible, conduct site visits to better understand the elements that may be impacted by climate change.
- Leave time for review – the potential sensitivities identified in the literature should be vetted with the asset owners/managers to determine their applicability. Reviews can be conducted via email or in a workshop setting.

Specifics on the vulnerability of individual assets in each sector are presented in Appendix A: Individual Asset Profile Sheets. The asset profile sheets classify the vulnerabilities and risks based on characteristics that will help to 1) prioritize management issues, 2) guide the development of adaptation strategies, and 3) highlight where improved coordination is needed in order to implement adaptation strategies (e.g., between public agencies, between the public and private sectors). These asset profiles will be supplemented with additional information during the subsequent adaptation measure development phase in order to clarify and refine the appropriate adaptation response.

It needs to be emphasized that within every sector there is variation in the vulnerability between different assets (e.g., no two roads have the exact same vulnerability due to variations in location, maintenance, and use). A review of the individual asset profiles needs to be conducted before reaching any asset-specific vulnerability conclusions.

Exposure to high heat is not covered in the sections below because exposure is consistent across all assets since temperature is not expected to vary across the Project Area. The one exception is stormwater. Since the stormwater assets are buried underground, they are buffered from changes in air temperature. Assets could be exposed to more frequent extreme temperatures as well as higher average temperatures throughout the century as presented in Table 2.

6.1 Community Facilities and Services

The Community Facilities and Services sector consists of the job centers, residences, schools, emergency facilities, recreation areas, and public buildings that together support and define neighborhoods. This assessment of community facilities and services considers the vulnerability and risk to people in a number of areas: where they live and work; the property they may own or rely on; and the key services and facilities that support and maintain the social and economic interactions that tie communities together.

The particular community facilities and services included in this vulnerability assessment are:

- Commercial Centers:

    - Downtown commercial areas
    - Benicia Industrial Park
    - Benicia Arsenal[12]
- Residential Neighborhoods:
    - Portside Village townhomes
    - Rancho Benicia mobile home park[7]
- Community Buildings and Services
    - Benicia Public Schools
    - Police Station (200 East L Street)
    - Fire Station (150 Military West)
    - Benicia Community Center (370 E L Street)
    - City Hall (250 E L Street)
- Recreation Areas
    - Fitzgerald Field
    - Benicia Marina

Understanding the overarching vulnerability and risk across such a broad and varied range of assets is necessary for planning purposes but also challenging to communicate. A high level summary of the vulnerability findings is presented in Table 3. This table is meant to be informative and serve as a jumping-off point for discussion rather than a definitive assessment of all assets within this sector.

The findings presented in this section and in the individual asset profiles (see Appendix A: Individual Asset Profile Sheets) will be used to inform the subsequent development of cross-sectorial adaptation strategies in order to develop community-wide resilience.

Table 3: Community Services and Facilities Key Vulnerabilities

Exposure
• The number of high heat days (over 92.4°F) is projected to increase by 36-48 days by mid-century and 44-83 by end-of-century • The average summer temperature is projected to increase by 4-5°F by mid-century and 5-9°F by end-of-century • 515 homes are projected to be in the 2100 sea level rise inundation zone • Commercial centers (e.g., downtown 1st street, the port, portions of the Benicia Industrial Park) are projected to be inundated on a daily basis by the end of the century; however, they will be impacted by storm events within the mid-century time frame • City services (e.g., fire, police, community center) are not projected to be exposed to sea level rise and storm surge
Sensitivity
Physical/Functional Sensitivities • Essential mechanical and electrical equipment in buildings are highly water and salt sensitive and are often located below-grade or on the ground floor. • Most buildings are constructed of water and heat sensitive materials such as wood and plaster. **Management Sensitivities** • Certain populations are especially sensitive to heat events and flooding. This includes children,

[12] ICF did not receive a completed survey response for this asset. All vulnerability information provided on this asset is derived from the ICF Team's professional experience.

the elderly, people without vehicles, those with pre-existing medical needs, renters, and those below the poverty line. • Communities of residents and businesses are informal networks that are easily severed during extreme weather events. Areas with strong social networks and may be less sensitive to extreme weather events. • Many emergency plans do not account for the impacts of sea level rise and extreme heat events. **Information Sensitivities** • Information on the location of residents with specific needs is not tracked and accessible for response during extreme weather events.
Adaptive Capacity (Select examples)
• **Redundancy:** Existing fire and police stations in Benicia can serve as back-up support in the event of weather-related emergency. • **Planned response:** While called by different names, a Continuity of Operations Plan specifies actions to take to preserve worker and workplace safety in the event of any number of scenarios. This plan would likely recommend temperatures at which it is unsafe to continue work or at which additional breaks are required, as well as instructions on shutting down and protecting equipment in the event of dangerous temperatures or flooding. • **Cooling centers:** The Benicia Community Center is one example of a location that could be used as a public cooling center which, during high heat events, could shelter and cool residents. A general protocol for implementing shelters is outlined in the Benicia Emergency Operations Plan[13], although the plan does not specifically indicate procedures for heat events. (See individual asset profiles for information on back-up cooling centers.)

Extreme Temperature

Sensitivity

The following characteristics affect the sensitivity of Community Facilities and Services, as well as residents, to extreme temperatures:

- **Lack of acclimatization to high temperatures:** High temperatures can be more damaging than most people realize. Even though heat-related deaths are largely preventable, many people are injured or even die from heat every year. A 10-day heatwave in California in 2006 resulted in more than 650 heat-related deaths[14]. Benicia historically has had a moderate climate influenced by cooling winds off the Bay. Unfortunately, this means that residents are not acclimatized to high heat conditions and are therefore more sensitive to heat and more likely to be affected by high temperatures.
- **Vulnerable populations:** Heat-related illnesses can include heat cramps, heat exhaustion, and heat stroke. The elderly and the very young, in addition to those predisposed to medical conditions, are the most likely to be affected by heat-related illnesses. Other vulnerable

[13] City of Benicia, California Emergency Operations Plan. 2007. Accessible at http://www.ci.benicia.ca.us/vertical/Sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7BFFAF7365-1029-485A-B5FF-8ECD7951574C%7D.PDF.

[14] Data from the California Heat Adaptation Workgroup report, "Preparing California for Extreme Heat". Accessible at: http://www.climatechange.ca.gov/climate_action_team/reports/Preparing_California_for_Extreme_Heat.pdf

populations include those that have to or choose to physically exert themselves on high heat days (e.g., indoor and outdoor workers, athletes).

- **Air conditioning:** Due to the age of buildings within the Project Area (some being constructed as early as the 1850's with a second boom in construction following the 1950's), as well as the current coastal breeze, the vast majority do not have air conditioning units. This lack of universal cooling systems increases the sensitivity of the public and businesses to high heat conditions.
- **Urban heat island:** Temperatures are commonly higher in urban, paved areas due to the urban heat island effect, whereby the pavement and buildings in an urbanized area absorb sunlight and heat. This effect may become more pronounced in built up areas such as downtown and the Benicia Industrial Park.
- **Building materials:** Buildings themselves can be affected by high temperatures–paint is more likely to become brittle and chip, business equipment filters and sealants may need to be replaced more frequently, and concrete pavement may crack if there are an insufficient number of expansion joints. However, none of the community facility and service asset owners identified high heat as a concern for continued operation.
- **Socioeconomic factors**: A variety of socioeconomic factors affect the sensitivity of a community. For example, economic status, level of education, health and physical mobility, ownership of a home or car, and proficiency in English can all affect a resident's sensitivity to climate change. Within Benicia, some the older neighborhoods (some with structures dating back to the 1850's) have a higher concentration of sensitive residents. This will need to be taken under consideration when developing emergency response plans and when providing general assistance to residents to adapt their personal homes to become more resilient to climate change.
- **Renters:** Individuals that rent housing and businesses buildings may be particularly sensitive, as they may not be able to influence the owners to improve the property to better withstand high temperatures, for example by installing air conditioning units.
- **Local Breezes:** Benicia is fortunate to be located in a breezy, coastal location, which decreases the "real feel" of the temperature, reducing the sensitivity of the area. While the effects of climate change on these wind patterns is unknown, if they continue into the future, then they will decrease the effects of high heat days within the Project Area.

Adaptive Capacity

The following measures affect the adaptive capacity of Community Facilities and Services, as well as residents, to extreme temperatures:

- **Back-up facilities:** Existing fire and police stations outside of the Project Area can serve as back-up support in the event of weather-related emergency.
- **Continuity of Operation Plans:** While called by different names, a plan of this sort specifies actions to take to preserve worker and workplace safety in the event of any number of scenarios. This plan would likely recommend temperatures at which it is unsafe to continue work or at which additional breaks are required, as well as instructions on shutting down and protecting equipment in the event of dangerous temperatures.
- **Cooling centers:** The Benicia Community Center is one example of a location that could be used as a public cooling center which, during high heat events, could shelter and cool residents. A

general protocol for implementing shelters is outlined in the Benicia Emergency Operations Plan[15], although the plan does not specifically indicate procedures for heat events. (See individual asset profiles for information on back-up cooling centers.)

- **Community groups:** A neighborhood with a strong social network that is tied together by individual relationships will have a lower overall sensitivity and higher adaptive capacity than a neighborhood where residents either do not know each other, or are not invested in the overall community good. Although the Benicia Citizens Corps and Emergency Response Team (BERT), whose mission is to "recruit, train and coordinate volunteers wishing to prepare themselves, their families, their neighborhoods and their businesses to be self-sufficient in the aftermath of future disasters and other emergencies affecting Benicia," currently do not address high heat or flooding, their existence still increases the adaptive capacity of the City of Benicia.
- **Business associations:** The Benicia Chamber of Commerce, Benicia Industrial Park Association, and the Benicia Main Street Program offer adaptive capacity by increasing coordination, communication, and assistance to businesses.
- **Funding flexibility:** The City of Benicia Capital Improvement Plan may have the ability to prioritize funding for resiliency projects. This increases the adaptive capacity of the community.

Consequence

The potential consequences of high heat affecting Community Facilities and Services, as well as residents, include:

- **Decreased economic activity:** High heat may decrease leisure shopping as people try to stay indoors. However, if people do not have air conditioning at home, then they may seek out air conditioned businesses in order to cool themselves.
- **Loss of heat sensitive inventory:** Stores may have to dispose of portions of their inventory if it is exposed to high temperatures for too long. For example, produce may spoil faster under high temperatures. This could represent a large economic loss to the business owner.
- **Decreased air quality:** Increased temperatures can also "cook up" local pollution levels (e.g., ground level ozone and secondary air pollutants), which disproportionately affect the very young, the elderly, and those with existing cardiopulmonary issues.
- **Heat stroke:** High temperatures increase the risk of heat-related illness, such as heat stroke and heat cramps.
- **Infectious disease:** Warming temperatures open up new regions (such as California) to the effects of insect carried infectious diseases such as Lyme disease and Valley Fever.

Sea Level Rise/Storm Surge

Exposure

A number of Community Facilities and Service assets within the Project Area are projected to be exposed to sea level rise within the next century. Although there is uncertainty in the exact timing of daily inundation, assets are projected to be exposed to daily or at least frequent inundation within the time frames identified in Table 4.

[15] City of Benicia, California Emergency Operations Plan. 2007. Accessible at http://www.ci.benicia.ca.us/vertical/Sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7BFFAF7365-1029-485A-B5FF-8ECD7951574C%7D.PDF.

Table 4: Community Facilities and Services Exposure to Sea Level Rise based Flooding

Asset	Currently Floods during Heavy Rain Events due to Inadequate Drainage	12 Inch Total Water Level (daily inundation at mid-century)	24 Inch Total Water Level (daily inundation at late mid-century to early end-of-century)	60Inch Total Water Level (daily inundation at end-of-century)	Not Projected to be Inundated this century
Benicia Marina (landside infrastructure)	X	X	X	X	
Downtown Commercial Area				X	
Portside Village Townhomes	X			X	
Rancho Benicia Townhomes	X*			X	
Benicia Industrial Park				X	
Fitzgerald Field	X			X	
Benicia Public Schools					X
Police Station					X
Fire Station					X
Benicia Community Center					X
City of Benicia Buildings					X

**Rancho Benicia has historically flooded but it has not flooded in the last six years due to the new ability to divert flood water away and the 1997 Marina Storm Drain Project (although those pumps are now considered undersized).*

The historic records of flooding within the downtown area indicate that sea level rise is only a part of the flood risk story. Benicia's gravity-fed stormwater system has low-lying outfalls that are submerged during extreme high tides and storm events. When stormwater outfalls are submerged, inland rainfall is not able to drain into the Carquinez Strait. Stormwater backs up onto community streets and public spaces, where the water remains until the tides subside and the water can drain. Due to improvements in the last decade, the City of Benicia is now able to divert some flood water away from downtown and Rancho Benicia by storing the water on Fitzgerald Field (a retention pond area); however, during the most extreme rain storms, this measure is not sufficient to divert all flood water from downtown (it has been sufficient for preventing flooding at Rancho Benicia). For this reason, it is indicated in Table 4 that the greater downtown area is known to flood during rain events due to inadequate drainage and that this issue will continue unless the drainage system is improved; however, with the exception of the Marina's landside infrastructure, these properties are not anticipated to be directly flooded from the coast due to sea level rise and storm surge until the end of the century. As the sea rises, the stormwater outfalls could be submerged more frequently, which would result in more frequent inundation from smaller rainfall events long before the end-of-century daily inundation occurs. This means that the annual flooding of Fitzgerald Field and some neighboring areas (e.g., Rancho Benicia, downtown) may increase from an annual occurrence to a regular impact. This increase in tidal flooding events is already evident during King Tide events. Options to reduce or eliminate the occurrence of more frequent flooding due to the storm drain outfalls will be developed during the subsequent adaptation scoping process.

As demonstrated in Table 4, residential and commercial areas are projected to be exposed to sea level rise, while community services (e.g., fire and police buildings) are not projected to be exposed to sea level rise impacts. For this reason, the sensitivity, adaptive capacity, and consequence sections focus on residents and businesses.

In addition to assessing the exposure of these key assets, the ICF team conducted a Project Area-wide analysis of the population, homes, property value, and total land exposed to sea level rise, using the Surging Seas Tool, developed by Climate Central. This tool overlays sea level rise mapping data with current U.S. Census data to provide projected socioeconomic impacts of sea level rise. The tool does not project future changes in population, land use, or property values. This analysis provides the residential and commercial impacts summarized in Table 5.

Table 5: Project Area Exposure to Sea Level Rise

	12" Total Water Level (daily inundation at mid-century)	24" Total Water Level (daily inundation at late mid-century to early end-of-century)	60" Total Water Level (daily inundation at end-of-century)
Population	75	115	836
Property Value (Millions)	$31	$64	$213
Homes	41	62	515
Land (Acres, not including saltwater marsh)	50	118	402

Source: Climate Central Surging Seas Tool, http://sealevel.climatecentral.org/

Sensitivity

The following characteristics affect the sensitivity of Community Facilities and Services, as well as residents, to sea level rise and flooding:

- **Construction Materials:** In general, most buildings are not designed or constructed to withstand flooding or rising groundwater.
    - **Drywall/Plaster:** Buildings with drywall are particularly sensitive because drywall wicks water upward, meaning damage can occur well above the actual level of flooding. In addition, drywall and other materials, such as plaster, can become fragile if exposed to water for long periods of time, and even if dried, they cannot easily be decontaminated and generally must be demolished and replaced.
    - **Wood:** Wood may not suffer structural damage from flooding, but mold and other organisms can flourish in the wet, post-flood environment.

Spotlight – Benicia Marina

- Fixed structures such as the entrance jetties, the harbormaster's office, fueling tanks, boat launch ramp, and parking are sensitive to sea level rise
- Wave protection structures will require improvements to continue to provide the same level of protection
- Access from the landside may be impacted by rising sea levels as improvements to the shoreline will change access to the berths
- Landside support facilities are presently subject to periodic flooding from extreme storm events
- The floating dock has high adaptive capacity since, to a certain degree, it can rise with the seas

- **Underground features:** Higher groundwater levels that may result from rising sea level could affect buildings that have underground components such as electrical and mechanical systems.
- **Ground floor mechanical and electrical systems:** Buildings with mechanical and electrical equipment on the ground floor (e.g., HVAC units, elevator controls) are more sensitive to flooding.
- **Salt sensitive components:** Vegetation at parks and surrounding structures may survive freshwater flooding but will likely die if inundated with saltwater.
- **Socioeconomic factors:** A variety of socioeconomic factors affect the sensitivity of a community. For example, economic status, level of education, health and physical mobility, ownership of a home or car, and proficiency in English can all affect a resident's sensitivity to climate change. Within Benicia, some the older neighborhoods (some with structures dating back to the 1850's) have a higher concentration of sensitive residents. These demographics will need to be taken under consideration when developing emergency response plans and in providing general assistance to residents to adapt their personal homes to become more resilient to climate change.
- **Historical Landmarks:** Benicia has eight properties listed in the National Register of Historical Places[16], and many more old structures that add to the character of the City. These unique structures cannot easily be moved, and, due to their age and construction materials, are more likely to be sensitive to flooding.
- **Renters:** Individuals who rent housing and businesses that rent buildings may be particularly sensitive because they may not be able to influence the owners to improve the property to better withstand flooding, or to respond to a flood event, for example by quickly drying and replacing damaged materials. Residential renters may also lack insurance that could provide assistance with replacing damaged personal items or providing an alternative place to live.
- **Sandbags:** Stockpiling sandbags allows residents, business owners, and property managers to protect properties from temporary flooding events, thus reducing their sensitivity. Again, this is not a long-term solution, but sandbags can provide relief until a more permanent solution is developed.

Spotlight – Benicia Industrial Park (BIP)

- Existing flooding currently occurs in parts of the BIP which will only become more frequent with time.
- Due to the large area and varied terrain of the BIP, some areas will be more sensitive than others (e.g. those fronting the Bay which are presently flooded by extreme high tides and waves)
- The adaptive capacity is moderate as there is some space along the waterfront for improvements to be made though it is restrained by existing roadways, railway and competing uses for the waterfront land.

- **Water pumps:** Schools and City facilities (e.g., police and fire stations) have small pumps to clear some flood water. These pumps are not sized to manage large flooding events or groundwater issues but do reduce sensitivity.
- **Shoreline protection:** If the existing shoreline protection system—shoreline protection structures (e.g., levees, flood walls) and natural shoreline areas (e.g., marshes)—is maintained, it will reduce sensitivity by attenuating the effects of storm surge and sea level rise.

Adaptive Capacity

[16] National Park Service. List of Properties on the National Register. 2014. Accessible at: http://www.nps.gov/nr/research/.

The following measures affect the adaptive capacity of Community Facilities and Services, as well as residents, to sea level rise and flooding:

- **Socioeconomic factors:** The ability to move to new areas and afford temporary housing situations (e.g., hotels) increases adaptive capacity. While this is not a long-term solution to flooding, it can provide temporary relief.
- **Continuity of Operation Plans:** While not always called the same thing, these plans dictate the appropriate response to flood events. Benicia public schools have long-term improvement plans and emergency management plans that identify where classes would take place if a particular site becomes compromised.
- **Telecommuting policy:** While telecommuting is not appropriate to all types of jobs, permitting and enabling telecommuting can enable employees to continue working in the event of workplace flooding.
- **Community groups:** A neighborhood with a strong social network that is tied together by individual relationships will have a lower overall sensitivity and higher adaptive capacity than a neighborhood where residents either do not know each other, or are not invested in the overall community good. The Benicia Citizens Corps and Emergency Response Team, whose mission is to "recruit, train and coordinate volunteers wishing to prepare themselves, their families, their neighborhoods and their businesses to be self-sufficient in the aftermath of future disasters and other emergencies affecting Benicia, "increases the adaptive capacity of the City of Benicia.
- **Business groups:** For businesses, the collaborative Benicia Chamber of Commerce, Benicia Industrial Park Association, and the Benicia Main Street Program offer adaptive capacity by increasing coordination, communication, and assistance to businesses.
- **Funding flexibility:** The City of Benicia Capital Improvement Plan may have the ability to prioritize funding for resiliency projects that are linked to Council approved priorities. This increases the adaptive capacity of the community.

Consequence

The potential overarching consequences of sea level rise and flooding affecting Community Facilities and Services, as well as residents, include:

- **Reduced sales and property tax:** Damage to businesses would affect sales and damage to residential and commercial properties could reduce property values and therefore reduce property tax revenue for the City of Benicia.
- **Increased insurance rates:** As flooding becomes more common over time, the rates for flood insurance could increase. This would have a larger effect on low-income communities.
- **Loss of businesses and residents:** Damages to businesses could result in long lasting or permanent closure, limiting Benicia resident access to goods and reducing the quality of life within the City. Damage to homes may cause residents to leave Benicia altogether.
- **Unsafe environments:** Mold-damaged homes and businesses could create unsafe living and working environments.
- **Loss of childcare:** School closures would affect parents' ability to work due to increased childcare demands.
- **Loss of recreation:** The flooding of Fitzgerald Field affects the ability of residents to play recreational baseball.

- **Loss of personal belongings:** Flooding can damage or destroy sensitive personal information and family heirlooms. These possessions may be irreplaceable.

6.2 Transportation

The Benicia Project Area is served by a network of local roadways, recreational trails, select bus routes, connections to major freeways, and rail lines. The transportation focus of the vulnerability assessment is on a subset of the local roads and recreational trails within the Project Area. These roads were selected based on their previous flooding damage as well as the access they provide to essential services and places of employment in the City of Benicia. They are not comprehensive of all roads that have historically flooded or will flood in the future. The assets include:

- **East B Street and East 2nd Street** – serve a residential neighborhood and provide spillover parking for 1st Street (a commercial district). Also provide access to the waterfront and commercial areas.
- **East 5th Street** – serves residential neighborhoods and provides access to the WWTP.
- **Bayshore Road** – provides access to the Port of Benicia and continues along Sulphur Springs Creek.
- **Industrial Way** – provides access to the Benicia Industrial Park, follows along Sulphur Springs Creek and abuts the natural marsh along the Suisun Bay.
- **Bay Trail** – a recreational biking and walking trail that circumnavigates the Bay on paved and unpaved paths and roads.

The sensitivity of the roadways to extreme heat and sea level rise is fairly consistent across the selected assets. This indicates that the findings are also applicable to other roadways within the City that may be exposed to climate change impacts. Likewise, the findings for the Bay Trail are representative of the potential affects to other coastal trails.

Although the Union Pacific (UP) railroad tracks were not fully assessed for their vulnerability, they were assessed for their exposure to sea level rise. It is projected that portions of the track near Sulphur Springs may be exposed to daily inundated with 24 inches of sea level rise (high range of the mid-century projections). Under the high range of the end-of-century sea level rise projections (60 inches), significant portions of the tracks that pass to the East of the Benicia Industrial Park, and adjacent to the port will be inundated on a daily basis.

A high level summary of the vulnerability findings is presented in Table 6. This table is meant to be informative and serve as a jumping-off point for discussion rather than a definitive assessment of all assets within this sector.

Table 6: Transportation Key Vulnerabilities

Exposure
• The number of high heat days (over 92.4°F) is projected to increase by 36-48 days by mid-century and 44-83 by end-of century • The average summer temperature is projected to increase by 4-5°F by mid-century and 5-9°F by end-of-century • Many of the transportation assets currently flood during extreme high tide events (in part due to local drainage issues) • All transportation assets covered by this assessment are projected to be partially exposed to daily inundation by mid-century
Sensitivity
Physical/Functional Sensitivities • Roadways located at grade, making them susceptible to flooding • Ancillary support (e.g., stop lights) may be sensitive to salt water flooding • Asphalt mix may soften and rut in extreme temperatures • Closed roadways could interfere with emergency response/evacuation procedures **Management Sensitivities** • The number of agencies involved in allocating funding for roadway repairs and improvements could complicate the planning and implementation process moving forward; however, they may also bring additional funding and support • There is a lack of financing to plan for the impacts of sea level rise and high heat events on transportation assets • Planning needs to be coordinated between transportation agencies and the surrounding land owners and stakeholders • Roadway repair workers are sensitive to high heat work environments and may require additional breaks until temperatures cool **Information Sensitivities** • There is a lack of detailed, easily accessible transportation data (e.g., cost, elevations, construction date, settlement measurements)
Adaptive Capacity (Select examples)
• **Redundancy:** Through traffic may be able to use alternate routes, but access to specific residences and businesses is dependent on the operability of specific roads • **Routine Repair:** Existing routine repair schedules and Public Works Maintenance Crews can be quickly dispatched to respond to physical damage • **Lifespan and Cost:** The relatively short lifespan and low cost of roadway overlays provides opportunities for rehabilitation projects to include adaptive measures. However, significant structural changes (e.g., raising the roadway) would significantly increase costs.

Extreme Temperature

Sensitivity

The following characteristics affect the sensitivity of transportation assets to extreme temperatures:

- **Asphalt mix:** Sustained high temperatures can cause asphalt pavement to soften, resulting in rutting and shoving. Asphalt binder is designed to withstand temperatures up to a certain

threshold. Pavement binder may exhibit sensitivity beginning at 108°F, particularly if combined with truck traffic. Incremental temperature increases up until that point is not likely to cause much damage. Higher temperature threshold asphalt mixes are available at increased costs.

- **Concrete joints:** Concrete pavement can heave at the joints if they are spaced too far apart. When high heat is accompanied by drought conditions, asphalt concrete pavement can crack, making it more vulnerable to water damage when it does rain.
- **Worker and equipment safety:** Health and safety risk as well as possible engine and equipment heat stress begins at around 85°F, but the situation becomes more critical at 105-110°F. Restrictions limiting the number of hours that road crew maintenance can work begin at 85°F. At 110°F, operations are generally halted.

Adaptive Capacity

The adaptive capacity of transportation assets is affected by:

- **Routine pavement repair:** Benicia's established Public Works Maintenance Crews can be utilized to quickly repair roadway damage after it occurs.
- **Asphalt lifespan:** The short lifespan of concrete paving provides opportunities for adopting a new asphalt mix before temperatures significantly increase. This action would have to be coordinated with other transportation agencies.
- **Asphalt cost:** Repaving roads and repairing potholes is a relatively low-cost repair; however, as impacts become more frequent, these costs can add up.

Consequence

Consequences of high temperatures affecting transportation could include:

- **Increased roadway repairs**: Increased roadway repairs would lead to temporary, localized increases in dust and air pollution. Repairs could also require detours, increasing traffic and decreasing access to the Project Area. However, most roadway repairs can be conducted at night to minimize these affects.
- **Higher construction costs**: More frequent repairs and transitions to less temperature sensitive materials could increase the cost of construction and roadway repairs.

Sea Level Rise/Storm Surge

Exposure

Similar to Community Facilities and Services, Transportation assets are affected by flooding during simultaneous rainfall and high tide events. These impacts could become more common with sea level rise, increasing the frequency and severity of roadway flooding. However, as can be seen in Table 7, most of these roadways are not projected to be impacted by flooding from the coast (without a simultaneous rainfall event) until there is 24 to 60 inches of sea level rise/storm surge. At that point, most roadways in the project area could be at least partially inundated on a daily basis by the middle of the century. The Bay Trail, which runs along the coast in several locations, will likely be affected even sooner. As the seas continue to rise, the inland extent of the flooded roadway could increase.

Table 7: Transportation Exposure to Sea Level Rise

Asset	Currently Floods during Heavy Rain Events due to Inadequate Drainage	12 Inch Total Water Level (daily inundation at mid-century)	24 Inch Total Water Level (daily inundation at late mid-century to early end-of-century)	60 Inch Total Water Level (daily inundation at end-of-century)
East 2nd St./East B St.	**X**		**X***	**X**
East 5th St.	**X**		**X**	**X**
Bayshore Road			**X**	**X**
Industrial Way			**X**	**X**
Bay Trail	**X**	**X**	**X**	**X**
Union Pacific	**Unknown**		**X**	**X**

** Implementation of the Waterfront Master Plan may reduce flooding in this area due to the construction of an 18 inch elevated green/seawall. However, full engineering design of this strategy has not yet been completed.*

Sensitivity

The following factors may affect the sensitivity of the transportation network to sea level rise and storm surge:

- **Elevation:** All of the roadways under analysis are at grade (i.e., at ground level) and are constructed of asphalt.
- **Level of flooding:** According to the ART project, a road becomes impassable when covered in one foot of water.
- **Unpaved trails:** Portions of the Bay Trail are unpaved. While unpaved trails are more susceptible to damage during flooding events, they are also less costly to repair.
- **Ancillary support:** Signals and stoplights may be shorted out if their electrical equipment is not adequately protected from floods.
- **Existing pavement cracks**: Existing cracks in pavement can allow flood water to leak in under the pavement and damage the subgrade, which is very sensitive to moisture levels. This could accelerate the deterioration of the roadway.
- **Pavement design:** The sensitivity of pavements depends on the type of pavement design. Thin bituminous pavements are more sensitive to water than other types since because if moisture breaches the subgrade from the pavement shoulder, it can deform the subgrade which is then subjected to high stress loads during traffic. In thick bituminous pavements, the thicker pavement layers help prevent the transmission of stress to the subgrade—the pavement is therefore less sensitive to moisture in the subgrade. However, over time, changes in temperatures and high traffic loads can result in cracking damage in even thicker pavements, which can then be susceptible to accelerated damage from flooding events.
- **Liquefaction:** Roads may be more sensitive to liquefaction (i.e., soils that will behave like a liquid during an earthquake) with increased groundwater levels.

- **Combined stressors:** Flooding works in concert with other variables, such as temperature changes and traffic loading, to shorten the working life of pavement.

Adaptive Capacity

The following attributes may affect the adaptive capacity of the road network to sea level rise and storm surge:

- **Alternate routes:** Alternate routes provide some adaptive capacity; however, by the end of the century, many of the neighboring roads could also be affected by sea level rise. For this reason, area-wide adaptation strategies should be considered.
- **Routine pavement repair:** Benicia's Public Works Maintenance Crews can be utilized to quickly repair roadway damage after it occurs (once the water has subsided). However, the more frequently the roadway floods, the more the integrity of the subbase will be undermined and there will be increased occurrence of cracks and potholes. Additionally, Public Works will not repair the surface of lightly damaged roads when an underlying issue is not being addressed. For example, current flooding on East B Street is due to a clogged stormwater outfall at the base of the road, Public Works will not repair the street until the underlying issue of the clogged storm drain, which leads to the flooding, is repaired.
- **Storm preparation:** Public Works Maintenance Crews use barricades to close roads and set up sandbags in advance of storms to prevent water from spreading. This activity is undertaken without any formal training.

Consequence

Sea level rise effects to the transportation network may have the following consequences for the surrounding communities:

- **Disruptions:** More frequent and serious disruptions to traffic flow could have economic and social consequences. The disruption of truck access to the port, disruption of access to Benicia Industrial Park businesses and access to the Marina could affect the City's economic development, as well as people's access to their homes, places of employment, and shopping locations. There may also be disruptions to the access road to the waste water treatment plant.
- **Maintenance costs:** Some of the common damage from moisture includes surface defects, surface deformations, and cracking. Repairing this damage could increase City maintenance costs.
- **Safety**: Flooded residential roadways may affect the ability of emergency personnel to evacuate those in need, particularly the elderly and low-income households.
- **Public agency coordination**: Planning transportation requires significant interagency coordination, between different levels of government (local, county, regional, state, federal), and different types of agencies (funding, operating, regulatory). The necessity of coordination will only increase with sea level rise affects.

6.3 Port of Benicia

The Port of Benicia is privately owned and operated by Amports; however, the underlying land is owned by the City of Benicia. AMPORTS' lease on the land will sunset in 2032 and until that time, Amports is responsible for all maintenance and upgrades to the property. The port spans 645 acres within the

4,000-acre Benicia Industrial Park, with 140,000 square feet of vehicle processing buildings and a 38-foot deep shipping channel. The 2,400-foot long deep-water pier has the capacity to berth 3 ships, while on-terminal rail access from Union Pacific can potentially utilize 170 railcars. The Port of Benicia is a trading hub with Japan, South Korea, and Australia, and handles general cargo. The port is the Northern California hub for domestic distribution of Ford and Chrysler, and Toyota delivers to Northern California solely through the Port of Benicia. The port also exports oil from the Valero Benicia Refinery.

A high level summary of the vulnerability findings is presented in Table 8. This table is meant to be informative and serve as a jumping-off point for discussion rather than a definitive assessment of all vulnerabilities within the port.

Table 8: Port of Benicia Key Vulnerabilities

Exposure
• The number of high heat days (over 92.4°F) is projected to increase by 36-48 days by mid-century and 44-83 days by end-of century • The average summer temperature is projected to increase by 4-5°F by mid-century and 5-9°F by end of century • Currently protected from flooding by levees; however, water traveling up Sulphur Springs Creek may flood the port property
Sensitivity (select examples)
Physical/Functional Sensitivities • Mechanical equipment is sensitive to flooding and high heat conditions • Paved areas sensitive to high heat and flooding • Shoreline protection, back-up power, and sump pumps reduce the properties sensitivity **Management Sensitivities** • The port is surrounded by other assets with which it will have to coordinate to address flooding issues. These include the Valero refinery, Union Pacific, local roads, and Sulphur Springs Creek • The port is privately owned but the land is leased from the City, which will require coordination on adaptation strategies. According to the lease, Amports is responsible for all property maintenance and upgrades. • Temperature sensitive cargo is sensitive to extreme heat days • Port employees are sensitive to high heat work environments and may require additional breaks until temperatures cool **Information Sensitivities** • Additional information is needed on the temperature design thresholds of port equipment
Adaptive Capacity
• **Redundancy:** The port has some excess storage capacity that could be used in the event of flooding within their standard storage areas • **Planned response:** The port has protocols in place to manage flooding events, thus providing for a faster response and reopening of the property

Extreme Temperature

Sensitivity

The following components of the Port of Benicia may be sensitive to high temperatures:

- **Paved surfaces:** The Port of Benicia has a significant paved area for storage of import cargo. Higher temperatures and extreme heat can cause these paved surfaces to deteriorate more quickly.
- **Metal equipment:** Structures made from metals, such as handling cranes and warehouses, are sensitive to temperature; increased temperature and more extreme heat events can necessitate design for higher maximum temperatures in replacement or new construction of these structures. Most cranes are designed for the normal range of temperatures encountered at sea world-wide (14°F to 95°F). However, cranes can be designed to withstand temperature extremes, such as up to +113°F.
- **Worker safety:** Temperatures over 90°F can cause heat exhaustion for workers and overheating of equipment. Heat exhaustion is likely at 105°F.
- **Temperature sensitive cargo:** It is unknown if the Port of Benicia processes any temperature sensitive cargo that may spoil if exposed to higher temperatures.
- **Air conditioning/refrigeration:** Air conditioning and refrigeration increase worker safety and protect goods from spoilage, thus reducing sensitivity.

Adaptive Capacity

The effects of exposure and sensitivity of the port to high temperatures may be balanced by the following adaptive capacity measure:

- **Continuity of Operations Plan:** A plan that specifies the appropriate response to high temperatures would allow the port to properly shut down and protect sensitive equipment.

Consequence

If the port were to be affected by high temperatures, the following consequences would impact the port and the City of Benicia:

- **Loss of business:** Business may shift to other ports of call if there are issues at the port. This could reduce economic prosperity and potentially lead to a loss of jobs within Benicia.
- **Higher operating costs:** Higher temperatures could result in higher energy consumption and increased costs for refrigerated warehouses or "reefer slots" (electrical plug-ins for containers with on-board cooling units). Electricity outage during extreme heat events can spoil refrigerated goods.
- **Coordination:** The leased structure of the port land will require coordination between the City and AMPORTS to determine an appropriate path towards resiliency.

Sea Level Rise/Storm Surge

Exposure

The very nature of a seaport requires its placement in a low-lying, coastal location. However, the port's landside areas need not be exposed to sea level rise. The Port of Benicia has invested in a levee system to protect it from coastal storms. These levees are identified in the sea level rise maps; however, the vertical accuracy and horizontal extent of the levees in the sea level rise mapping tool may not be an exact match for what is on the ground. Detailed engineering field work, mapping, and modeling would need to be conducted to determine weak spots in the levee network.

The sea level rise mapping conducted for this study indicates that the levee system would begin to be overtopped in the 24 inch total water level scenario with complete overtopping in the 60 inch total

water level scenario. This roughly corresponds with the port's records of coastal flooding occurring approximately three times over the past 30 years.

Behind the levees is a large, flat, paved cargo storage area. Once flood water enters this area, it could immediately begin to spread and inundate large swaths of the storage area.

To the west of the Port of Benicia property is a non-occupied parcel of land, frequently referred to as the Yuba parcel. While this property is currently outside of the Port's boundaries (as indicated in the Bay Plan), parts of the parcel used to function as part of the port. Even today, this property is subject to regular tidal flooding; with most of the area south of the abandoned rail corridor inundated at under 24 inch total water levels.

Sensitivity

The Port of Benicia may be sensitive to sea level rise and storm surge for the following reasons:

- **Changing water level:** The waterside structures are designed to deal with a known range of water level variation with an anticipated maximum. As that maximum increases, the function of the facility can be affected.
- **Pavement condition and materials:** The same way that asphalt roads are sensitive to water (increased deterioration), the low lying, flat, asphalt area used for the storage of cargo is highly sensitive to rising sea levels.
- **Landside access:** The landside portion of the port requires protection to keep from flooding during extreme high tides and waves. Damage to the rail lines and/or roadway would affect operations.
- **Erosion**: While erosion can weaken supports, most channels and waterways are built to withstand erosion. However, increased erosion rates may not be adequately planned for and could thus affect port support structures. The port's levee system is also subject to erosion from wind/wave forces.
- **Electrical equipment:** Damages from flooding can completely destroy electrical equipment, preventing normal port operations. Saltwater can increase metal corrosion. Even the water pumps designed to remove flood water are sensitive to inundation.
- **Drainage system**: Higher sea levels increase the risk of the port's drainage systems being overwhelmed by heavy precipitation and contribute to surface flooding. The port's drainage system is already stressed during precipitation events due to flooding along Sulphur Springs Creek.
- **Dredging:** The Port of Benicia currently has to dredge its ship channels to maintain their depth. Sea level rise may increase the natural depth of the channel, which would reduce dredging maintenance requirements. However, changes in rates of coastal erosion and deposition can lead to changes in sedimentation rates.
- **Liquefaction:** The port area is already susceptible to earthquake induced liquefaction (i.e., the soils behave as a liquid rather than a solid). Increased groundwater intrusion may increase this sensitivity.
- **Equipment Type**: Some equipment is more sensitive to saltwater exposure. For example, some studies report that engines that run on diesel are more resilient against saltwater exposure than electricity-powered engines.[17]

[17] Smythe, T. 2013. Assessing the Impacts of Hurricane Sandy on the Port of New York and New Jersey's Maritime Responders and Response Infrastructure. Quick Response Report No. 238: Final Report to the University of Colorado Natural Hazards Center.

- **Levees:** The port's levee system offers an increased level of protection from coastal flooding, reducing the sensitivity.
- **Back-up generators:** The port maintains emergency generators that can be utilized in the event of a power outage.
- **Storm pumps:** The port has storm pumps on top of its levees that can remove water that collects behind the levees. Diesel back-up generators can also power these storm pumps.
- **Coordination:** The leased structure of the port land will require coordination between the City and AMPORTS to determine an appropriate path towards resiliency.

Adaptive Capacity

The port has already begun to balance its sensitivities with the following sea level rise and storm surge adaptive capacity measures:

- **Excess capacity:** The port has excess storage capacity that can be used to shift cargo to locations that are not affected by flood waters. This is a temporary solution for short term flooding events rather than a permanent storage option.

Consequence

If the port were to be affected by sea level rise and storm surge, the following consequences may come to bear on the port and the City:

- **Temporary closure:** Past flooding events have resulted in short duration (approximately one day) closures of the port.
- **Loss of business:** Business may shift to other ports of call if there are issues at the port. This could reduce economic prosperity and potentially lead to a loss of jobs within Benicia.

6.4 Wastewater

The City of Benicia Wastewater Treatment Plant (WWTP) provides secondary treatment of residential, commercial, and industrial sewage in the city (except process waste from the Valero Benicia Refinery) before discharging it in the Carquinez Strait.

The WWTP on East 5th Street was built in 1958 and has been upgraded and expanded several times. In 2000, the City completed a $20 million upgrade of the WWTP. Since 2000, the City has implemented extensive infiltration/inflow rehabilitation improvements at critical locations in the collection system to limit the amount of stormwater that enters the system, thus reducing the quantity of water that needs to be processed during storm events. In 2005 the City completed a $15 million wet weather upgrade of the treatment plant and collection system.

The plant is maintained and operated by the Public Works' Wastewater Operations Division. The plant has a permitted dry weather capacity of 4.5 million gallons per day and a short-term hydraulic capacity of 24 million gallons per day.

The sewer system is managed by the City of Benicia Public Works Department. The collection system consists of 24 lift stations (used for lifting wastewater from a lower to a higher elevation), approximately 150 miles of sewer pipelines, a 3-mile wet weather relief (interceptor) pipeline, and 6 wet weather

control structures (the wet weather system provides storage to ensure the WWTP is not overwhelmed during a rain storm). The treated water discharge system consists of a 1,100-foot long outfall pipeline and a 150-foot long outfall diffuser pipeline that discharges into the Carquinez Strait. The system's design and construction standards follow the department's Engineering Design Standards and Standard Plans[18] developed in December 1992 with adopted revisions.

The Valero refinery also operates a wastewater treatment plant in the City of Benicia; it specifically processes water used and collected on the Valero property. Although the Valero property was not comprehensively assessed for vulnerability, several stakeholders have expressed concern over the location of the Valero WWTP pools. These pools are located directly east of the Sulphur Springs creek and are thus vulnerable to water backing up the creek due to sea level rise or a storm event. According to the NOAA sea level rise mapping tool, these pools could be very close to flooding with 24 inches of increased total water levels and would be fully inundated under 36 inches of increased total water levels. It is currently unknown if these pools are surrounded by flood walls or any other type of barrier that would minimize the potential for flooding. If the pools were to be flooded, they could release contaminants into the surrounding area and into the Carquinez Strait.

A high level summary of the City of Benicia WWTP vulnerability findings is presented in Table 9. This table is meant to be informative and serve as a jumping-off point for discussion rather than a definitive assessment of all assets within this sector.

Table 9: Key Wastewater Treatment Plant Vulnerabilities

Exposure
• The number of high heat days (over 92.4°F) is projected to increase by 36-48 days by mid-century and 44-83 days by end-of century • The average summer temperature is projected to increase by 4-5°F by mid-century and 5-9°F by end of century • Flood walls will likely protect the WWTP from mid-century flooding but water is projected to travel up East 5th Street and circumnavigate the flood walls, resulting in daily inundation by the end of the century and earlier during extreme storm events (e.g. 50 to 100 year flood)
Sensitivity (select examples)
Physical/Functional Sensitivities • No heat sensitive elements have been identified at the WWTP • Mechanical equipment is sensitive to flooding. Existing pumps offer some capacity to remove water but they may be undersized for future events • The floodwall provides protection from shore side flooding but does not protect against landside water intrusion • The WWTP outfall may not operate properly with additional sea level rise • The wet weather relief system provides storage during rainfall and coastal flooding events to reduce excess load at the WWTP • The WWTP is a large, expensive, and complex system with little to no redundancy within each

[18] City of Benicia, Public Works Department, Engineering Design Standards and Standard Plans. December 1992. Accessible at: http://www.ci.benicia.ca.us/vertical/sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7B281B84C5-B8BA-4E49-B363-DFA95B5DB02F%7D.PDF

system • Rising sea levels could cause rise in groundwater levels around ageing sewer pipes resulting in groundwater intrusion into the pipes and thus loss in sewer pipe capacity **Management Sensitivities** • The existing commitment to monitoring sea level rise (reviewing literature at least every 5 years) and planning to adapt reduces the sensitivity of the WWTP **Information Sensitivities** • There is a need for additional information on the rate of change in groundwater levels and the impact it would have on increased total dissolved solids and flow to the WWTP
Adaptive Capacity
• **Redundancy:** There are no other WWTPs that serve the City of Benicia • **Planned response:** The WWTP holds supply contracts with multiple companies, which helps to ensure the availability of treatment chemicals after an extreme weather event • **Expansion:** The WWTP is geographically constrained, which limits the adaptive measures that could be used to protect the property • **Pumps:** The WWTP has small pumps to remove flood water during storm events

Extreme Temperature

The Vulnerability Survey responses revealed no WWTP sensitivities to temperature extremes. This may not be the case at other WWTP that use different processes (e.g., aerobic ponds).

Sea Level Rise/Storm Surge

Exposure

On the exposure maps, the WWTP appears to be inundated in the 24 inch and 60 inch total water level maps; however, these maps do not account for a sheet piling sea wall constructed as part of the 1998 plant improvements. The wall runs along the south facing edge of the plant, and the engineering drawings indicate a top sea wall elevation of at least 6 feet above ground level. In the 24 inch total water level scenario, this is sufficient to protect the WWTP from flooding. However, by the end-of-century, 60 inch sea level rise scenario, water would encroach high enough up bordering East 5th Street to circumvent the wall and flood over half of the WWTP property from the west. The Waste Water System Master Plan acknowledges the risks of sea level rise and staff is actively engaged in monitoring and updating the sea level rise data and planning element.

Figure 6: WWTP Flooding under 60 Inch Total Water Level

Sensitivity

The following attributes may affect (positively or negatively) the sensitivity of the WWTP to sea level rise:

- **Outfall**: The outfall is highly sensitive to changes in sea level as it could affect the ability of the outfall to discharge treated wastewater, requiring additional pumping to maintain existing performance.
- **Rising groundwater**: If the water table were to cover the sewer pipelines, there could be significant water infiltration into the sewage system. This additional load could impact the WWTP. Additionally, if the groundwater contains salts, then the increased total dissolved solids in the sewage could put additional stress on the system and may hinder sludge settling and overall plant performance.
- **Electrical equipment:** The WWTP main electrical systems, which are key to the plants continued operation, are located underground and are highly sensitive to even low levels of flooding. Equipment with electrical components such as motors, instrumentation, and motor control centers are particularly sensitive to storm events or tidal inundation, and would cease to operate if they were to get wet.
- **Seawalls:** The WWTP is surrounded by flood walls that rise to an elevation of six feet above grade. This elevation will protect the plant from near-term sea level rise scenarios, thus reducing the sensitivity.
- **Pumps:** The WWTP has two storm water pump stations that remove water from the plant headworks for treatment. The below ground electrical vaults also have sump pumps to remove ground water. However, these are small pumps made to remove only small volumes of water during infrequent, short duration flooding events. These pumps do not have significant capacity for frequent and heavy intensity events.
- **Design:** The WWTP was designed to withstand a 20 year storm event which will likely protect the WWTP from the mid-century 12-24 inches of sea level rise.
- **Wet weather relief:** The wet weather relief system provides storage during rainfall and coastal flooding events to reduce excess load at the WWTP. Increased loads can be caused by infiltration into deteriorating sewer lines.
- **Redundancy:** Some elements of the WWTP have built-in system redundancies. However, this is not consistent across all internal systems, and reliance on those redundancies would likely limit the operating capacity of the plant.
- **Planning:** The WWTP System Plan acknowledges the risk posed by sea level rise and requires staff to consider sea level rise and adaptive measures in future planning for major asset rehabilitation and design of WWTP improvements. Additionally, the System Plan requires new sea level rise projections to be reviewed every five years and the City should keep up-to date records on facility elevations and measurements of total dissolved solids in the WWTP influent.

Adaptive Capacity

The WWTP has a number of adaptive capacity measures in place to help reduce the impacts of sea level rise. However, other aspects of the WWTP design limit the adaptive capacity of the plant.

- **Limited room for expansion:** The expansion of the existing system is limited by the available land area and competing uses.

- **Redundancy:** No other WWTP services the City of Benicia.
- **Power:** The WWTP relies upon electricity to operate, which could be interrupted due to flooding or storm events. While backup power is available from portable or on-site generators, these units require fuel resupply to operate beyond a short period.
- **Back-up supplies**: If the on-site generators fail, there are two local companies that can bring portable generators to the plant. There is an existing plan for this procedure. Additionally, the WWTP uses various chemicals to treat the wastewater. In the event that the primary vendor is unable to meet their needs the WWTP has another vendor they could use.
- **Treatment Capacity:** The treatment plant can handle some additional wet weather capacity, but excessive flooding may overwhelm the system, resulting in operational failures, overflows, and backups. Changes to the treatment plant would require expensive modifications to the treatment plant as well as permitting.

Consequence

If the WWTP were to be affected by sea level rise and storm surge, the following consequences may affect the City:

- **Replacement and repair costs**: In general, wastewater treatment components have moderate to high capital replacement costs (e.g., sewer lines, sewer lifts, pump stations, stop gates, interceptors, outfall flow regulator, all electrical and mechanical components, filters), moderate to high operating and maintenance costs (e.g., treatment chemicals, power, staff), and, depending on the extent of the impact, would require significant financial resources to be returned to full function after damage.
- **Fines**: If the WWTP violates its discharge permit (e.g., if groundwater rise or coastal flooding overwhelmed the WWTP and led to the release of untreated sewage), they City could be fined. Fines vary depending on severity and duration of violation, ranging from several thousand to millions of dollars. The Bay Area Air Quality Management District may also levy similar fines.
- **Local Economy**: Failure of the wastewater system could not only affect residential communities and commercial enterprises, but also would adversely affect industrial facilities that require sewer service to operate. The overall economic consequences due to loss of industrial production and employment disruption could be quite significant depending on the duration and extent of the shutdown.
- **Community services**: Access to community services and facilities could be affected, leading to significant cumulative impacts.
- **Pathogens**: Disruption of sewer service or failure of particular wastewater system components could result in backups in the community collection system or sewer laterals that may result in overflows of raw sewage into basements and streets. The result may be exposure of the public to disease-causing microorganisms (pathogens), requiring decontamination, cleanup, and repair or rehabilitation of affected areas.
- **Recreation:** Overflows or discharges of treated or partially treated wastewater could result in limitations on the use of shoreline recreational resources such as the Marina and boat launches, as well as contact recreation such as swimming or boating in areas near the discharge location.
- **Aquatic Resources:** If sewage overflows occurs into the nearshore waters of the Bay at low tide when there is minimal dilution or mixing, the consequences could be significant for the Bay

ecosystem. Pathogens, organic loading, nutrients, and toxics in untreated wastewater could cause a variety of adverse effects on the Bay's aquatic resources.

6.5 Stormwater

The City stormwater system is designed to minimize flooding. Over the last several years, the City has worked to decouple all identified storm and sewer system cross-connections.

Stormwater runoff is generated when rain flows over land or impervious surfaces and does not infiltrate into the ground. Stormwater infrastructure consists of storm drains that collect urban runoff and underground pipes that carry water to the Bay.

While precipitation and associated stormwater can cause flooding directly, this assessment addresses only the affects from the interaction of sea level rise with the stormwater management at the outfalls that discharge stormwater to the Bay. This chapter does not address the potential effects of precipitation based flooding because changes in intensity of precipitation events are projected to be minimal within the Project Area; however, extreme rainfall events may occur slightly more frequently (from the current five times per year to six times per year). See the Task 2 Summary Report for additional information.

The City provides annual reports on its Storm Water Management Plan (SWMP)[19], adopted in 2003, which outlines storm water reduction and control measures, including routine maintenance of infrastructure, removal of blockages and cleaning inlets and basins, and preventative activities such as street sweeping, public outreach, and inspections for illicit discharge.

A high level summary of the vulnerability findings is presented in Table 10. This table is meant to be informative and serve as a jumping-off point for discussion rather than a definitive assessment of all assets within this sector.

Table 10: Stormwater System Key Vulnerabilities

Exposure
• Due to the sub-grade nature of the stormwater system, it will only experience minimal temperature fluctuations • The stormwater outfalls at East 2nd Street and East 5th Street (other outfalls were not assessed) are currently submerged during high tide and extreme storm events and will likely be permanently submerged by mid-century
Sensitivity (select examples)
Physical/Functional Sensitivities • No heat sensitive elements have been identified in the stormwater outfalls • Groundwater intrusion from degraded pipes and rising groundwater levels may decrease the stormwater system capacity • The gravity-fed outfalls are will not operate when submerged, resulting in flooding up the line • Sea level rise and storm surge driven erosion and scour may undermine the stormwater outfalls **Management Sensitivities**

[19] City of Benicia Storm Water Management Plan. 2003. Accessible at: http://www.ci.benicia.ca.us/vertical/Sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7BE61263F5-2CD8-4246-95EB-F4105923D226%7D.PDF.

• The most recent Stormwater Management Plan was adopted in 2003 and only contained an implementation plan that ran through 2008; the City plans to update this document within the next 3 years. • The stormwater system and the WWTP are intrinsically liked (e.g., reducing versus managing wet weather flows) and will need to coordinate in response to climate change **Information Sensitivities** • There is a lack of detailed, easily accessible, and well-coordinated information on the current capacity, design, elevation, and condition of the stormwater system which is needed for site-specific vulnerability assessments • The location of cross-connections between the storm and sewer lines (if any) are unknown—many connections have been eliminated over time
Adaptive Capacity
• **Maintenance:** Routine maintenance of the stormwater system (e.g., cleaning out the pipes) allows for some monitoring and response as changes in climate occur

Extreme Temperature

The Vulnerability Survey responses revealed no stormwater sensitivities to temperature extremes. The underground nature of the system buffers it from temperature extremes.

Sea Level Rise/Storm Surge

Exposure

The focus of the stormwater system assessment is on the storm drain outfalls into the Carquinez Strait. Information from City staff indicates that outfalls at the base of E 2nd Street and E 5th Street are essentially at sea level and currently become inundated during storm events. When the outfalls are submerged, the storm drain system becomes surcharged and rainfall runoff backs up into the community.

Previously, this would cause significant flooding in residential areas, but now the storm water is redirected to the Fitzgerald baseball field which serves as a catchment basin for the water. This level of flooding tends to occur on an annual basis.

With as little as one foot of sea level rise, East B Street and the shoreward portions of East 2nd Street and East 5th Street could begin to flood. This indicates that by the middle of the century, any significant rain event could result in inland flooding due to the storm water outfalls being permanently submerged.

Sensitivity

The following sensitivities affect the vulnerability of the stormwater system to sea level rise and storm surge.

- **Gravity-driven system:** The stormwater system is gravity-driven and has been noted to be under sized for present demand. As sea levels rise, there will be less of a gradient between the source of the stormwater and its eventual destination, and some of the outfalls could be below sea level during high tide or a storm event. This means that Carquinez Strait water could enter the stormwater systems and travel up creeks, channels, and pipes. If elevated Carquinez Strait levels

coincide with a precipitation event, the presence of Bay water in stormwater infrastructure could reduce the system's capacity to store and convey stormwater, which could result in stormwater backing up and causing inland flooding.

- **Location:** The two stormwater outlets analyzed as part of this vulnerability assessment are located essentially at sea level. As sea levels rise, the outlets could be submerged more frequently, increasing inland flooding issues.
- **Soil levels**: Depending on outfall location with respect to Carquinez Strait water levels, the storm system outfalls can be affected by increased erosion or sedimentation, which can impact the stability of the pipelines or their ability to convey stormwater, respectively.
- **Saltwater**: If saltwater travels up the outfall pipes, it could corrode or otherwise damage infrastructure that was only designed to process freshwater.
- **Redirect water:** The City has the ability to reroute stormwater during high tide events to minimize flooding in residential neighborhoods. This minimizes the sensitivity of the area to SLR; however, the future viability of this strategy as sea levels rise, causing more frequent flooding, is unknown.

Adaptive Capacity

The City has limited adaptive capacity measures in place to mitigate the effects of sea level rise and storm surge on the stormwater system.

- **Routine maintenance:** Regular maintenance of stormwater infrastructure, such as keeping storm drains clear of debris and trash, contributes to adaptive capacity. Such maintenance is required in NPDES permits.

Consequence

In the event of impact, the following consequences would occur:

- **Repair costs:** The submersion of the stormwater outfalls increases inland flooding which requires cleanup and costly repairs to structures and landscapes damaged by flooding.
- **Access:** Since the stormwater outfall inundation exacerbates inland flooding, an indirect economic consequence is the business or productivity that could be lost due to commercial buildings being inaccessible if they or the roads required to reach them are flooded. Additionally, residents would be affected if they do not have access to their homes or places of employment.
- **Emergency response:** Flooding could impede emergency response, important not only for immediate problems that could be caused by flooding, but also for related medical or other issues that require urgent attention.
- **Disease**: If floodwaters are not removed quickly, they could become breeding grounds for mosquitoes and other disease vectors.
- **Contaminants**: Flooding can cause the redistribution of contaminants that water picks up from the land surface. An impaired stormwater system would distribute contaminated runoff differently – rather than flowing directly to the Bay, pollutants could be deposited wherever the floodwaters flow.

6.6 Natural Areas/Shoreline Protection

The natural shorelines in the Project Area include:

- The Benicia State Recreation Area,
- The marsh along the Benicia Industrial Park, and
- The marsh adjacent to the Marina and the Waterfront Park area.

These marshes provide ecosystem functions such as wave energy dissipation, flood protection, water filtration, and carbon sequestration, as well as ecological benefits and habitats. Arts Benicia is currently creating an educational public art display on the benefits of biofiltration (i.e., a pollution control technique that uses living material to capture and biologically degrade pollutants). This piece of art will be on display at the Benicia Waterfront.

A high level summary of the vulnerability findings is presented in Table 11. This table is meant to be informative and serve as a jumping-off point for discussion rather than a definitive assessment of all assets within this sector.

Table 11: Natural Areas and Shoreline Protection Key Vulnerabilities

Exposure
• The number of high heat days (over 92.4°F) is projected to increase by 36-48 days by mid-century and 44-83 days by end-of century • The average summer temperature is projected to increase by 4-5°F by mid-century and 5-9°F by end of century • The low lying, natural areas are currently exposed to storm surge events and will be exposed to any changes in sea level
Sensitivity (select examples)
Physical/Functional Sensitivities • Tidal marshes will not keep up with sea level rise on their own due vertical accretion and they are constrained from shifting landward due to hardened infrastructure. This will result in a change in the type of habitats provided by mid-century and an extreme loss of marsh areas by end-of-century • Local plants and animals are sensitive to changes in extreme temperatures and migratory patterns will likely change **Management Sensitivities** • The natural areas are owned, managed, and permitted by a variety of agencies (e.g., CA State Parks, CA Fish and Wildlife, the City of Benicia, BCDC) which will have to coordinate in their response to climate impacts • Existing funding levels are insufficient for planning and implementing large scale responses to climate change vulnerabilities
Adaptive Capacity
• While natural systems have some ability to self-repair, the anticipated changes in temperature and sea level rise will outpace their ability to respond

Extreme Temperature

Sensitivity

The following elements of Benicia's marshes are sensitive to extreme temperatures:

- **Vegetation:** For the most part, marsh vegetation has evolved to withstand a wide range of temperatures. However, changing temperatures could affect plant life cycles and extreme temperatures could threaten natural species and provide advantages to invasive species.
- **Wildlife:** Certain wildlife may be forced out of the area due to changing temperatures and environment**.** For example, adult striped bass only resides locally when water temperatures are sustained below 64.4° F. Larger animals and birds can easily relocate while smaller, less mobile animals may have difficulty relocating to a more hospitable environment.

Adaptive Capacity

The adaptive capacity of the marshes includes:

- **Natural systems:** Natural systems may be able to adjust to small changes in temperature by changing the mix of flora within the marsh. It is unknown how effective this response will be in Benicia.

Sulphur Springs Creek

- There used to be a tide gate approximately 0.4 miles from the Bay to prevent tides from propagating upstream; however, this feature was removed.
- Existing constrictions (e.g., bridge crossings, culverts, beaver dams) in the creek result in bank overtopping.
- Overtopping will increase in frequency and intensity with changes in sea level rise and precipitation.
- The creek flow capacity is restricted due to significant vegetation growth within the creek and on its banks.
- The adaptive capacity is low as the creek is restrained by the industries along the banks as well as the many bridge crossings and several culverts which convey the flow of the creek.

Consequence

Loss of the marshes could impact the community, economy, and species conservation in the following ways:

- **Shoreline protection:** The complete or partial loss of marsh systems would reduce the wave attenuation benefits of natural shoreline protection which could place shoreline residents and businesses at a greater risk of flooding.
- **Recreation:** The community may also face loss of aesthetics and opportunities for outdoor recreation, which may diminish the value of Benicia as a desirable place to live.
- **Habitat:** Downshifts (e.g., changes in classification from mid to low marsh) and loss of marsh habitat could impact plants and animals including several state-listed or federally threatened and endangered species that rely on tidal marsh for breeding, foraging, and high tide refugia.
- **Environmental quality:** Loss of tidal marsh could decrease the potential for carbon sequestration and water quality improvement.

Sea Level Rise/Storm Surge

The vulnerability of the marshes to sea level rise was evaluated through the use of the Point Blue Conservation Science online decision support tool, Future San Francisco Bay Tidal Marshes (hereafter referred to as the Future Tidal Marshes tool)[20]. Marshes are dynamic systems and their response to sea level rise will depend on factors including the rate of sea level rise, their current elevation relative to the tidal frame, mineral sediment availability, and the rate of organic matter accumulation. These factors

[20] Future San Francisco Bay Tidal Marshes: A Climate–Smart Planning Tool is available at: http://data.prbo.org/apps/sfbslr/

are incorporated into the Future Tidal Marshes tool, making it a more suitable approach to assessing marshes compared to the NOAA Digital Coast sea level rise maps (used to assess the other asset categories in this study) which do not take into account marsh accretion dynamics. The marsh accretion modeling that forms the basis of the tool have been published in a peer-reviewed journal.[21]

Exposure

By nature, these marshes are low-lying and exposed to tidal flows. When evaluating these areas, the most important question is not whether they will be exposed but rather, how they will naturally respond to changes in exposure.

Sensitivity and Adaptive Capacity

The marsh sensitivity and adaptive capacity was assessed for two time frames, mid-century (2050) and end-of-century (2100), based on the following parameters:

- The tool's "high" rate of sea level rise, 5.41 feet over 100 years from the 2010 baseline, which approximately corresponds (±2 inches) to the sea level rise scenarios of 24 inches by 2050 and 60 inches for 2100 used for the other assets in this assessment. Selecting the exact same rate of sea level rise was not an option provided by this tool.
- Assumed low and high suspended sediment concentration (SSC) values of 50 milligrams per liter (mg/L) and 100 mg/L respectively, determined based on the location within the South Suisun Marsh biogeomorphic subregion (as determined by the tool default values)
- Assumed low and high organic matter (OM) accumulation rates of 2 millimeters per year (mm/yr) and 3 mm/yr respectively, determined based on the marshes' location within the South Suisun Marsh biogeomorphic subregion (as determined by the tool default values)

Historically, under sufficient suspended sediment concentrations, tidal marshes have been able to respond to sea level rise by accumulating mineral sediment and organic material (i.e., vertical accretion), and/or by migrating landward (i.e., upland transgression). This requires a sufficiently high sediment suspension rate and/or there to be inland areas to migrate to. These natural adaptive capacity processes reduce the vulnerability of wetlands to sea level rise. However, these natural shorelines could face difficulties in utilizing accretion of mineral sediment and organic matter to maintain elevation relative to future rates of sea level rise. Even in scenarios with high amounts of sediment and organic matter available, the marshes could downshift in habitat type (e.g., from mid to low marsh to mudflat) as sea level rises. The marshes are especially sensitive to future sediment availability; under the low sediment scenario by 2100, the habitats could significantly transition, including to subtidal in some areas. The marshes are also impeded from inland migration due to limited space between the marshes and adjacent development.

The Benicia State Recreation Area is currently composed of upland, mid marsh, and high marsh around the park's intermittent stream, which runs on a mudflat (see Figure 7). By mid-century, the marsh could downshift to mid marsh and low marsh (see Figure 8 for a graphic representation of two potential mid-

[21] Diana Starlberg, Matthew Brennan, John C. Callaway, Julian K. Wood, Lisa M. Schille, Dennis Jongsomjit, Maggi Kelly, V. Thomas Parker, and Stephen Crooks. November 2011. "Evaluating Tidal Marsh Sustainability in the Face of Sea-Level Rise: A Hybrid Modeling Approach Applied to San Francisco Bay." Accessible at: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0027388

century scenarios). By end-of-century, most of the marshes could convert to mudflat. The park's intermittent stream could become sub-tidal in the end-of-century scenario due to low suspended sediment concentration. Marsh upland transgression will be constrained by I-780 and Dillon Point Road by end-of-century (see Figure 9 for a graphic representation of two potential end-of-century scenarios).

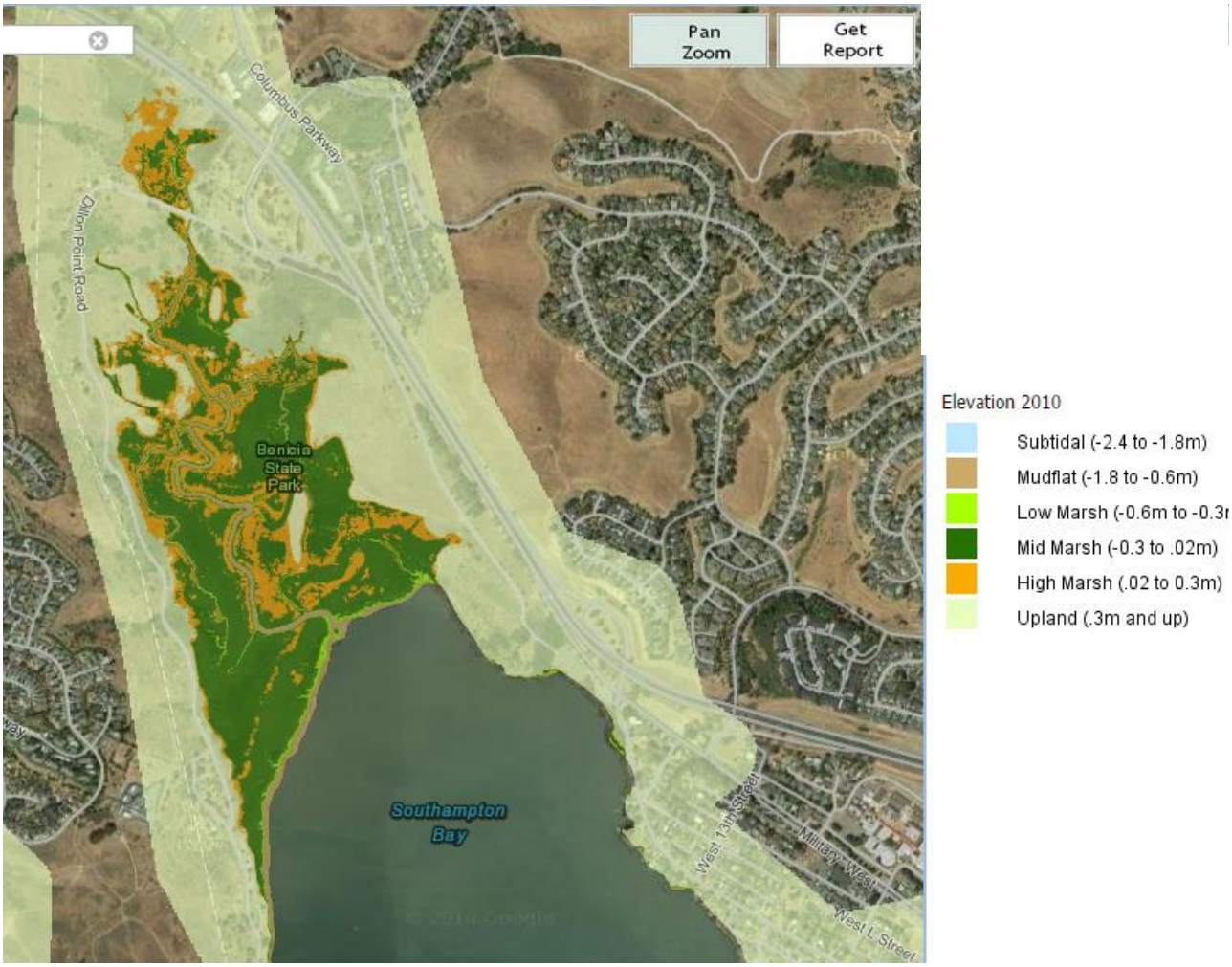


Figure 7: Current Benicia State Park Marsh Conditions

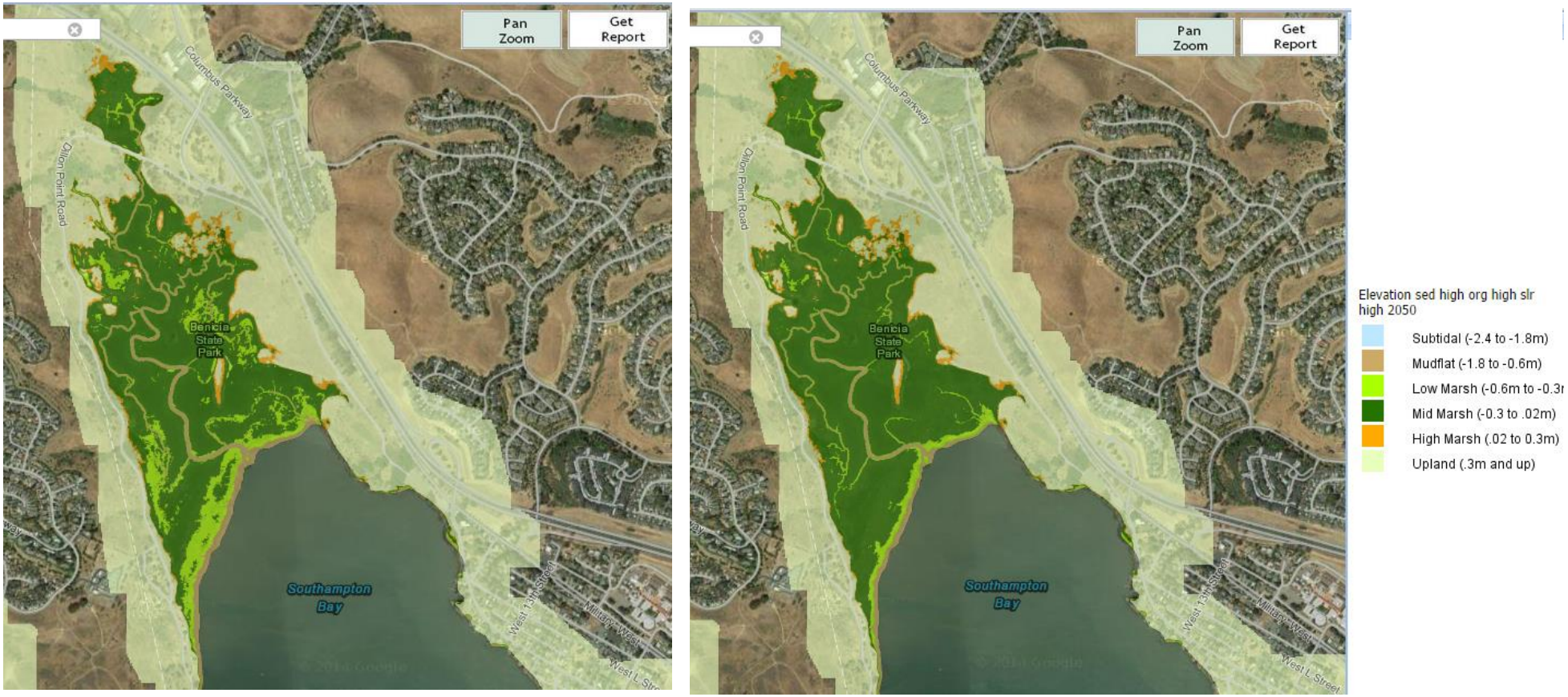


Figure 8: Benicia State Park in 2050, low vertical accretion (left), high vertical accretion (right)

Figure 9: Benicia State Park in 2100, low vertical accretion (left), high vertical accretion (right)

The area in front of the Industrial Park is currently composed of a mosaic of mudflats, low marsh, mid marsh, and a few patches of high marsh (see Figure 10). By mid-century, the marsh could transition to a higher percentage of mudflat and low marsh. Some inland migration is expected to occur but is mostly constrained by built infrastructure (see Figure 11 for a graphic representation of two potential mid-century scenarios). The marsh could transition to mostly mudflat by end-of-century, and some areas could become subtidal under the low suspended sediment concentration scenario (see Figure 12 for a graphic representation of two potential end-of-century scenarios).

Figure 10: Benicia Industrial Park Current Marsh Conditions

Figure 11: Benicia Industrial Area in 2050, low vertical accretion (left), high vertical accretion (right)

Figure 12: Benicia Industrial Area in 2100, low vertical accretion (left), high vertical accretion (right)

The marsh area in the front of the Marina is currently comprised of alternating bands of mudflat, high marsh, mid marsh, and low marsh and is directly adjacent to roads (see Figure 13). In the mid-century scenario, the mudflat area could increase and high marsh will decrease (see Figure 14 for a graphic representation of two potential mid-century scenarios). At the end-of-century, the marsh could downshift to entirely mudflat, and some areas could become subtidal under the low suspended sediment concentration scenario (see Figure 15 for a graphic representation of two potential mid-century scenarios). The maps, below, have been cropped to edit out a modeling shortcoming of the tool The tool indicates that, barring human interference, portions of the community would be converted to tidal marshes. This is a limitation of the modeling system and in no way represents current or future plans of the City.

Figure 13: Benicia Marina Current Marsh Conditions

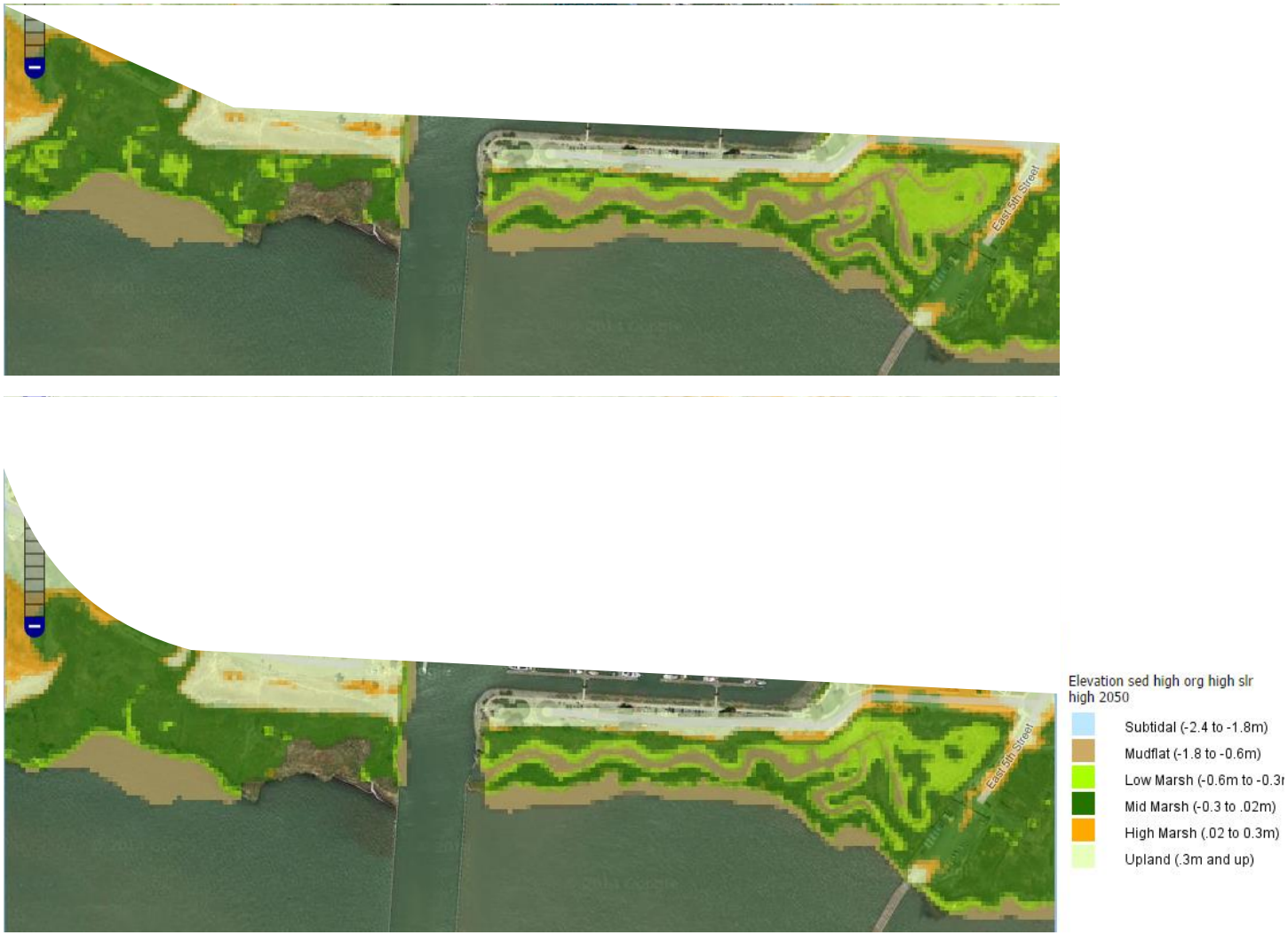


Figure 14: Benicia Marina in 2050, low vertical accretion (top), high vertical accretion (bottom)

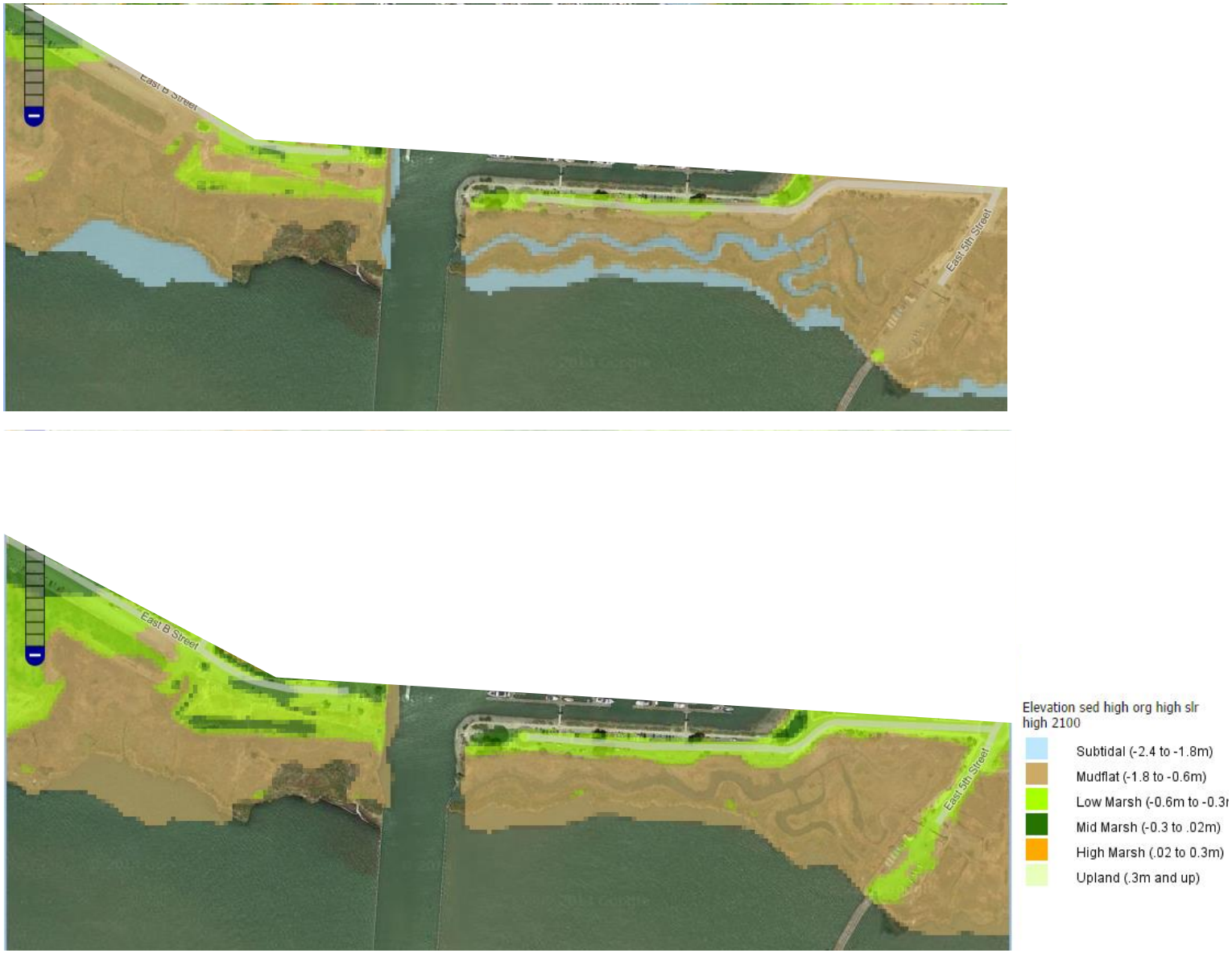


Figure 15: Benicia Marina in 2100, low vertical accretion (top), high vertical accretion (bottom)

Consequences

Loss of the marshes would affect the community, economy, and species of conservation concern.

- **Shoreline protection:** The complete or partial loss of marsh systems would reduce the wave attenuation benefits of natural shoreline protection, which would place shoreline residents and businesses at a greater risk of flooding.
- **Economic impact:** The reduction of shoreline protection would have a major economic impact on the Marina and the Benicia Industrial Park, where flooding could require increased maintenance, repair, and upgrade of expensive assets.
- **Recreation:** The community may also face loss of aesthetics and opportunities for outdoor recreation, which may diminish the value of Benicia as a desirable place to live.
- **Habitat:** Downshifts and loss of marsh habitat would affect plants and animals including several State-listed or federally threatened and endangered species that rely on tidal marsh for breeding, foraging, and high tide refugia.
- **Environmental quality:** Loss of tidal marsh would decrease the potential for carbon sequestration and water quality improvement.

6.7 Energy and Pipeline Infrastructure

PG&E is currently the energy provider for the City of Benicia; however, Benicia recently joined Marin Clean Energy (MCE), which supplies customers with an electricity energy mix either 51% or 100% renewable sources. MCE optional services have not yet been rolled out to residents and businesses (service begins May 2015), users will be able to elect to keep their existing PG&E account as well (customers have five chances to opt out). Once MCE is fully operational, they will use PG&E's transmission infrastructure to provide clean energy to their users; therefore, this analysis focuses on the vulnerability of PG&E infrastructure.

PG&E representatives are aware that climate change poses risks to their infrastructure and are internally conducting vulnerability assessments. The City of Benicia is actively working with PG&E to coordinate on developing an appropriate response to climate change vulnerabilities. However, PG&E is sensitive to publicly sharing specifics on their systems vulnerabilities. Due to these concerns, this section only provides a summary of generic risks that heat and sea level rise pose to energy infrastructure, with a few specifics as permitted by PG&E.

Electricity is carried from where it is generated via high-voltage transmission lines, which can be overhead or underground, while natural gas is transported via underground pipelines. Substations link the energy transmission system to the distribution system, transforming power from the high voltage at which it is generated to a lower voltage for distribution to individual homes and businesses via overhead and underground utility lines. There are two substations within the city of Benicia, one of which is owned by PG&E.

Table 12: Energy Infrastructure Key Vulnerabilities

Exposure
• The number of high heat days (over 92.4°F) is projected to increase by 36-48 days by mid-century and 44-83 days by end-of century • The average summer temperature is projected to increase by 4-5°F by mid-century and 5-9°F by end of century • Based on an analysis by PG&E, the two electrical substations in Benicia are not projected to be impacted by sea level rise within the project timeframe
Sensitivity (select examples)
Physical/Functional Sensitivities • Transmission lines are sensitive to high temperatures which may cause line sag and decrease their transmission capacity • Older substations may be sensitive to extreme temperatures due to their design • PG&E actively upgrades their infrastructure to be more resilient to high temperatures • Electrical components are sensitive to corrosion from saltwater **Management Sensitivities** • Increased temperatures will increase energy demand for cooling, thus adding additional stress to the grid • Coordination between public and private companies will be required to address changing demands and vulnerable infrastructure • Emergency operating procedures decrease sensitivity but may need to be updated to prepare for additional extreme heat days and more frequent flooding **Information Sensitivities** • Data sharing between MCE, PG&E, and the City will be required to inform an appropriate response to climate change vulnerabilities
Adaptive Capacity
• **Redundancy:** The electrical grid is highly redundant and loss of any one particular substation is unlikely to have an impact on the City of Benicia • **High Heat Upgrades:** Annual high heat peak load assessments are conducted and equipment is replaced as needed to meet demand • **Influencing Demand:** PG&E operates several demand-response programs to reduce energy demands on hot days

Extreme Temperature

Sensitivity

Energy and pipeline infrastructure is sensitive to high heat conditions in the following ways:

- **Underground pipelines:** Temperature shifts are not expected to have direct or indirect impacts on underground pipelines because pipelines are already designed to accommodate significant temperature variations and the soil that covers the pipelines moderates the temperature effects.
- **Increased demand:** Increased temperatures increase electricity demand, which can overburden the network. This can result in brownouts and rolling blackouts.
- **Mechanical equipment:** Older substations may be damaged by extreme high temperatures.

- **Transmission lines:** Thermal expansion of transmission and distribution power lines causes line sag, decreasing the amount of power that can be securely transported through lines.
- **Planning processes:** PG&E is working to expand their collaboration with cities, counties, and businesses to be better prepared for the impacts of climate change. MCE's core operating mission is to reduce emissions that contribute to climate change.
- **Installing Intelligent Switches:** PG&E installed automated "intelligent" switches on more than 500 electric distribution circuits in 2013. This smart grid technology dramatically reduces the amount of time it takes to restore power to customers. Instead of waiting for a crew to arrive on scene to restore circuits manually, the new devices do it automatically, often within minutes.
- **Enhanced Substations and Circuit Interconnectivity:** PG&E replaced and upgraded substation equipment and added circuit capacity to maintain or restore service when electricity needs to be rerouted during an outage. These upgrades also enable their system to handle increases in demand, such as on hot summer days.

Adaptive Capacity

PG&E and MCE's adaptive capacity is affected by:

- **Redundancy:** The electricity grid is a highly interconnected system. The loss of any particular substation may have no effect on individual energy availability. This is due to the highly interconnected nature of the electrical grid.
- **Emergency power:** MCE has capacity to meet overall peak demand plus a 15% reserve margin that are procured from local reliability areas. This reserve margin can provide temporary relief during high heat events.
- **High Heat Upgrades:** PG&E has a structured process in place to mitigate the impacts of hot weather on their system. On an annual basis, their planning process includes the use of a sophisticated model and past summer season data to forecast peak load on their system relative to system capacity, so that they can take the necessary steps to meet customer demand – from reconfiguring the system to installing new equipment.
- **Influencing Demand:** For heat events, PG&E's demand-response programs (e.g., SmartRate, Peak Day Pricing, SmartAC) help to mitigate peak demand, while PG&E's customer energy efficiency programs help to reduce energy demand on an ongoing basis.

Consequence

In the event of an impact, the following consequences may occur:

- **Loss of power:** If power cannot be shifted, the areas served by affected substations would lose power until any damaged or moved equipment is repaired or replaced.
- **Long-term outages:** Sustained outages could result in a loss of productivity and economic losses due to workplaces and schools being closed. Additionally, businesses may not reopen after being closed for significant periods of time.
- **Loss of vital services:** Telecommunications components and pumps, which are vital during an emergency, could be forced out of service unless backup power is available.

Sea Level Rise and Storm Surge

Exposure

PG&E has conducted a GIS analysis and determined that the two substations located within the Benicia study area are not at risk of flooding between now and mid-century. They assessed the substations using 1) the FEMA 100-year flood zone map, and 2) the projected sea level rise by 2050 (provided by the ICF team). In both cases, the substations are outside of the flood risk area. PG&E did not assess flooding in 2100 because it is beyond their planning horizons.

Sensitivity

Based on academic literature on the potential impacts of climate change on energy infrastructure, PG&E may be sensitive (positively or negatively) to:

- **Corrosion:** Electrical components and pipes that are exposed to sea water are susceptible to damage or destruction due to the corrosive nature of salt water.
- **Underground pipelines:** Waves and storm surge generally do not damage either aboveground or belowground pipelines (e.g., natural gas); however, damage can occur from changes in water tables or soil stability due to sea level rise and from wave action and storm surge, particularly for submerged or low-elevation pipelines.
- **Overhead electric lines:** Overhead electric lines are not sensitive to flooding, unless waves or currents are so strong that they affect pole foundations or cause poles to topple.
- **Groundwater**: Electricity assets are not sensitive to rising groundwater, unless they have underground components – such as a belowground floor of a substation with sensitive equipment that could be exposed to groundwater seeping into the building.
- **Temporary protection:** On-site protection measures such as sandbags or pumping can keep water away from sensitive equipment and reduce sensitivity.
- **Operating procedures:** Substations can be shut down to prevent major damage from floodwaters such as corrosion to transformers, capacitors, switches and other equipment. The proper shutdown of power plants takes time, however, which adds to the sensitivity.

Adaptive Capacity

PG&E and MCEs system adaptive capacity is influenced by:

- **Redundancy:** The electricity grid is a highly interconnected system. The loss of any particular substation may have no impact on individual energy availability. This is due to the highly interconnected nature of the electrical grid.

Consequence

The following consequences could affect the City of Benicia in the event of a sea level rise and storm surge based power outage:

- **Loss of power:** If power cannot be shifted, the areas served by flooded substations would lose power until any damaged or moved equipment is repaired or replaced.
- **Loss of vital services:** Telecommunications and pumps, which are vital during an emergency, could be forced out of service unless backup power is available.

- **Long-term outages:** Sustained outages could result in a loss of productivity and economic losses due to workplaces and schools being closed. Additionally, businesses may not reopen after being closed for significant periods of time.
    - The economic impacts of power outages can be calculated using a spreadsheet calculator tool developed for the Silicon Valley 2.0 project[22]. This tool was not used for this project because the substations are not projected to be impacted by sea level rise.

Table 13: 2012 Cost per Outage Event Estimates by Region and Customer

Region	Outage Duration	Residential ($/Event)	SMB ($/Event)	Large Business ($/Event)
Bay Area	5 minutes	$8.18	$585.2	$761,784
	1 hour	$13.22	$2,679.4	$861,359
	4 hours	$19.59	$6,607.7	$1,073,743
	8 hours	$26.63	$16,463.6	$1,080,310
	24 hours	$37.83	$33,780.9	$2,252,293

Source: Freeman, Sullivan, et al. (2012). Pacific Gas & Electric Company's 2012 Value of Service Study. Available at: http://www.caiso.com/Documents/AttachmentB_ISOResponsesCommentsDraft2012-2013TransmissionPlan.pdf

[22] For more information, see the project website at: http://www.sccgov.org/sites/osp/SV2/Pages/SV2.aspx

7 Next Steps

Following the approval of this report, the City of Benicia and the ICF team will work with the asset owners/managers to confirm the identified vulnerabilities. This finalized information will then be used to inform the development of adaptation strategies. These strategies may be designed to increase the resiliency of an individual asset or a suite of assets. The strategies will include physical changes, management changes, and information gathering and monitoring strategies.

The draft adaptation strategies will be presented at a public meeting and will be available online for public comment. The strategies will be refined, evaluated, and presented to the advisory groups for additional input.

Following the completion of the adaptation plan, ICF will conduct an individual adaptation case study for one business in the Benicia Industrial Park and develop an adaptation effectiveness monitoring plan.

Appendix A: Individual Asset Profile Sheets

The asset profile sheets provide an overview of the asset and a concise summary of the vulnerability to and consequence of climate change impacts on individual assets. The vulnerability data is broken into three key components—exposure, sensitivity, and adaptive capacity—while the vulnerability statements are further classified into physical/functional vulnerabilities, governance vulnerabilities, and informational vulnerabilities. The consequences are divided into economic, environment, and equity consequences.

The purpose of the asset profiles is to act as an information source and tool for the development and prioritization of adaptation strategies for the agencies responsible for each asset. The asset profile sheets contain summarized information collected from the asset owner surveys regarding the vulnerability of specific assets. In some locations, that information is supplemented with the ICF Team's professional experience.

Asset profiles were only created when a completed vulnerability survey was submitted; however, additional information from the ICF Team's professional experience has been used to supplement the survey responses.

Benicia Wastewater Treatment Plant

General Information	
Asset Name	Benicia Wastewater Treatment Plant (WWTP)
Asset Type	Wastewater
Asset Owner/ Managing Agency	City of Benicia
Location	614 East 5th St.
Existing Conditions	
Physical Characteristics	• Built in 1958; remaining service life is undefined. • Major upgrade projects in 1978, 1991, 2000, 2003 • A sheet pile flood wall was constructed in 2000 around the lower perimeter of the WWTP • Preventative and corrective maintenance frequently performed, structural maintenance occurs less frequently • Plant is constructed on bay mud, but the structures are pile supported and do not move
Management Status	• Required to comply with various Federal, State, and local regulatory requirements mainly relating to water quality • Required to inform various agencies about discharges during emergency situations because it is considered a small hazardous waste generator
Public Health and Safety Value	• Vital for public health; treats incoming sewage from domestic and industrial discharges
Community and Economic Value	• Vital public service for the community
Vulnerability	
Exposure	• Although the maps indicate exposure to daily inundation under 24 inches of sea level rise (high, mid-century; low end of century timeframe) and 60 inch of sea level rise (high end of century), they do not take into account the sheet pile flood wall around the structure that will delay

	exposure to sea level rise • By 60 inches of sea level rise, water will travel up East 5th Street and circumnavigate the flood walls • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Contains subgrade water and salt sensitive components, including main plant electrical systems, process piping, and concrete process structures • Minimal sensitivity to high temperatures; some equipment fails to operate at temperatures exceeding 120° F (as estimated by WWTP staff) • A sheet pile flood wall around the lower perimeter of the WWTP prevents water from entering during severe storms and high tides • In-plant stormwater pump stations and sump pumps can remove water from the premises during flooding events • Back-up power generators are available for WWTP and sewage lift stations • Underground process pipes are designed to withstand small earth movements
Adaptive Capacity	• WWTP has additional operating capacity to serve future demand • Information from previous studies (e.g., soil studies, process heights) is available • Some redundant operational processes are in place to activate in the event of damage • If back-up generators fail, protocols are in place for two local companies that can bring portable generators to the plant • Emergency food and water is available for staff • WWTP Master Plan calls for monitoring and recording sea level rise, and to incorporate problems/solutions into future projects • Backup chemical supply providers and back-up generator providers increases likelihood of access during climate events • Standard Operating Procedures covers emergency response to flooding
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Wastewater flows increase during severe storms. Historically, such flows have not exceeded capacity but future flows are unknown • Groundwater infiltration may affect subgrade water and salt sensitive components, including main plant electrical systems, process piping, and concrete process structures • Below ground electrical vaults sump pumps only have capacity to remove small quantities of water • Stormwater pump stations may be undersized for future flooding levels • Lack of redundancy throughout the plant

	• This is the only water treatment plant that serves the City of Benicia • Many processes rely on electricity which may fail during flooding events. Off-site emergency generators are available but not feasible for long-term use • Contracts with back-up providers for treatment chemicals increases adaptive capacity
Governance Vulnerabilities	• Permitting and oversight involves many agencies (e.g., BCDC, NPDES, Regional Water Quality Control Board, Bay Area Air Quality Management District)
Informational Vulnerabilities	• Informational vulnerabilities are not apparent at this time
Consequences	
Equity	• The community would be affected if WWTP service is interrupted, as the WWTP receiving waters connect to the community; this could pose a health risk • Shoreline and recreational water activities could be affected depending on severity of chemical/sewage spill
Environment	• Raw or partially treated sewage can be released if the asset fails, affecting public health and the surrounding ecosystem. There is a small potential that chemicals could be released
Economy	• Fines can be levied against the WWTP if it violates water quality permits. Fines vary depending on severity and duration of violation. • If surrounding area and receiving waters were affected by damaged asset, police and/or fire department or outside clean-up firm may be required to assist with emergency response • If the asset failed and affected the receiving waters, the Marina, First Street business owners, and boat launch ramps would face economic impacts because they would have to close during cleanup and remediation

Turnbull Park

General Information	
Asset Name	Turnbull Park
Asset Type	Natural area
Asset Owner/ Managing Agency	City of Benicia
Location	Located at the end of East 5th Street, at the Southeast entrance of the Benicia Marina
Existing Conditions	
Physical Characteristics	• 0.5 acres • Features a small turf area, picnic tables, benches, art piece, and lighted pathway that is part of the San Francisco Bay Trail • Built in 1992; expected remaining life service is indefinite • Last major improvement was pathway lighting replacement (200x) • Cleaned daily; mowed weekly and pruned every six months
Management Status	• Repairs may require permits from SF Bay Conservation & Development Commission, Regional Water Quality Control Board, and Army Corps of Engineers
Public Health and Safety Value	• Contributes to public health and welfare
Community and Economic Value	• Small neighborhood park for the community • Features pathway that is part of the Bay Trail, an important community asset
Vulnerability	
Exposure	• Minimal exposure to tidal erosion under current conditions • May be exposed to daily inundation under 12 inch sea level rise (low, mid-century projection), 24 inch sea level rise (high, mid-century; low end of century), and 60 inch sea level rise (high end of century) • Extreme temperatures projected to increase by 5-10°F
Sensitivity	• Vegetation is sensitive to high temperatures and salt water • Below-ground electrical systems for pathway lighting are water-sensitive • Location on waterfront makes asset sensitive to erosion forces
Adaptive Capacity	• Communications within the department and with outside agencies are adequate • Low redundancy at the asset site but recreational functions can be replaced or recreated in other areas if needed
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Vegetation is sensitive to high temperatures and salt water • Below-ground electrical systems for pathway lighting are vulnerable to ground water intrusion and flooding • Location on waterfront makes the park sensitive to erosion forces • Limited marshes to serve as natural shoreline defense

	• Park serves as protection to the Marina. Damage or loss of the park could put the Marina at risk
Governance Vulnerabilities	• Long-term asset management plans have not been developed • Funding sources and asset management plans that can be used to assess vulnerability or improve asset resilience are not available • Sea level rise and more frequent storm impacts may change the needs at some parks, and resource reallocation may be needed to accommodate shifts in management demands • Changes to the park shoreline or park use to address sea level rise and storm events will require coordination with multiple regulatory agencies, and numerous stakeholders
Informational Vulnerabilities	• Planning-level information is not available for this asset
Consequences	
Equity	• Loss of public access to the shoreline at this location
Environment	• No environmental consequences have been identified
Economy	• Minimal economic consequences to the asset. However, there could be a loss or damage to the Marina and personal property if park is eroded and marshland is reduced

Portside Village Townhomes

General Information	
Asset Name	Portside Village Townhomes
Asset Type	Community Assets
Asset Owner/ Managing Agency	Individual townhouse structures are independently owned, but are required to participate in the Portside Village Owners' Association. The City of Benicia owns the land beneath the townhouses and the storm drain infrastructure
Location	East E Street
Existing Conditions	
Physical Characteristics	• Residential community consisting of 116 luxury townhomes • Provides access to Marina and Bay Trail • Built circa 1997; expected useful life of 50 years with proper operations and annual maintenance • Settlement varied throughout the property ranging from tenths of an inch up to 18 inches. Refurbished in 2013 to address settlement and water damage issues • Regular maintenance includes landscaping, painting, and minor repairs (HOA's responsibility)
Management Status	• The City owns and maintains the land and the drainage system while the individual homeowners maintain their homes.
Public Health and Safety Value	• None identified
Community and Economic Value	• Provides access to Marina and the Bay Trail, a public amenity • Homes are of high economic and community value
Vulnerability	
Exposure	• Property directly fronts the Marina; exposed to daily inundation under 60 inch of sea level rise (high end of century scenario) • Storm drain system is below ground • Additional settlement may increase exposure to sea level rise • During previous extreme weather events, flooding originating from exceedance of capacity of the City's storm drains from off-site properties resulted in stormwater inundation of the asset's properties. The frequency is anticipated to occur during a 5-year storm event or greater • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Wood structures may be sensitive to high temperatures, thermal variations, and/or high humidity • Structures and electrical equipment sensitive to flooding • Improvements were made to correct settlement issues
Adaptive Capacity	• No redundant or alternative assets exist to maintain capacity, function, or level of service • Homeowners association provides a resource for coordinating residents to respond to communal challenges • Full architecture and environmental information and technical evaluations/studies are available
Vulnerability Statements/Key Issues	
Physical and Functional	• Flooding from exceedance of capacity of the City's storm drains from off-site properties resulting in stormwater inundation. The

Vulnerabilities	frequency is anticipated to occur during a 5-year storm event or greater • Wood structures are not waterproofed and vulnerable to rot/mold following flood conditions • Wood structures under high temperatures can experience structural and non-structural issues • Lack of redundant power systems • Residents would be displaced in the event of flooding • Residences and facilities housing animals are functionally vulnerable because evacuation requires special equipment, trained personnel, and appropriate temporary shelter or permanent relocation sites. • Neighborhood function depends on the relationship between individuals within them, and among these individuals and the services they rely on. These informal connections are easily severed during disasters and are often difficult to rebuild once disrupted
Governance Vulnerabilities	• The City's Waterfront Master Plan and the City's Storm Drain Master Plan may contain strategies/projects that could reduce vulnerability. • Permits are required by the City for home repair • Improvements to the land or storm drain infrastructure would be led/managed by the City • Permits from various Federal, State and Local agencies may be required depending on the type and scope of the improvements
Informational Vulnerabilities	• Real-time information for the location and specific needs of homeowners, which is critical to emergency response activities, is difficult to collect and maintain and therefore is generally not available or easily accessible when needed
Consequences	
Equity	• Flooding from lack of storm drain capacity may cause the water to enter into the sewer systems, causing comingling and overloading the sewer system pipelines and treatment systems (as occurred in 2005). Untreated discharge may have negative health impacts
Environment	• Flooding from lack of storm drain capacity may cause the water to enter into the sewer systems, causing comingling and overloading the sewer system pipelines and treatment systems (as occurred in 2005). Untreated discharge may have negative impacts on flora and fauna
Economy	• Damage to assets could decrease home values • Flooding may damage personal property and require paying for emergency shelters • Residents may move away from the City if flooding is frequent/persistent • Insurance rates may increase with increased flooding events and updates to FEMA flood zone maps • Residents may not be able to get to their places of employment or may not be able to conduct their business if operated from home • Local, regional and statewide elements funded by the asset's

property taxes would be affected

Port of Benicia

General Information	
Asset Name	Port of Benicia
Asset Type	Port
Asset Owner/ Managing Agency	Owned and managed by AMPORTS - APS West Coast Inc. and the Benicia Port Terminal Company, a wholly owned subsidiary; land is leased from the City of Benicia (expires 2023). Amports is responsible for all maintenance and upgrades to the property.
Location	1007 Bayshore Rd, extending North and West beneath the Benicia-Martinez bridge
Existing Conditions	
Physical Characteristics	• Comprised of 645 acres with 140,000 square feet of vehicle processing buildings within the Benicia Industrial Park • Deepwater pier measures 2,401 feet in length and is capable of berthing three vessels simultaneously
Management Status	• Transportation links to the port are managed by different agencies such as Union Pacific and the City of Benicia
Public Health and Safety Value	• None identified at this time
Community and Economic Value	• Vital for port processing and logistic support for import and export automobiles • Provides jobs for the local economy
Vulnerability	
Exposure	• While the maps indicate that the port would be exposed to daily inundation under 24 inches of sea level rise (high mid-century scenario; low end of century) and 60 inches of sea level rise (high end of century), these maps do not accurately represent the port's levee system which will delay exposure to sea level rise. • Extreme temperatures projected to increase by 5-10°F; may also increase exposure to dock fires
Sensitivity	• Levees, levee pumps, and pier are sensitive to water • Dredging is conducted annually • Electric storm pumps and diesel backup are available
Adaptive Capacity	• Port has other property available should storage areas become temporarily unusable
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Several areas experienced flooding in the past (3 events over the past 30 years), resulting in disruptions lasting about 1 day • Levees have minor erosion issues • Road access to the seaport may be sensitive due to its location near the shoreline
Governance Vulnerabilities	• AMPORTS will need to coordinate with various entities that manage the transportation links to the port to develop and implement adaptation strategies
Informational Vulnerabilities	• Planning-level information is not available to assess vulnerability

Consequences	
Equity	• Disruption may affect employment
Environment	• Contaminants at the site (e.g., oil, gasoline) could be released with floodwaters
Economy	• Disruption would affect the port's capacity to ship and receive goods and resulting economic revenue

Downtown Commercial Area

General Information	
Asset Name	Downtown commercial area
Asset Type	Community asset
Asset Owner/ Managing Agency	Generally owned by individuals or companies and leased to businesses. Some properties are owned by the businesses that operate in them
Location	First Street, from Military East to the Carquinez Strait
Existing Conditions	
Physical Characteristics	• Most buildings constructed from early 1900s to the present. Several buildings constructed in the mid-1800's. • Most structures have been updated and continue to be viable. Many businesses update the property interiors regularly; exterior renovations occur less often but is well maintained • Streets, access to businesses, and outdoor properties occasionally experience flooding from the combination of high tide and stormwater runoff
Management Status	• Development and building permit information is managed by the City of Benicia Community Development Department • The Benicia Business Owners Association works closely with key local and regional commerce and economic development departments and associations
Public Health and Safety Value	• Features park space and waterfront access
Community and Economic Value	• Businesses contribute extensively to the local community and economy
Vulnerability	
Exposure	• Streets, access to businesses, and outdoor properties currently exposed to flooding from the combination of high tide and stormwater runoff • Exposed to daily inundation under 60 inch of sea level rise (high end of century scenario) • Extreme temperatures projected to increase by 5-10°F
Sensitivity	• Structures and electrical equipment sensitive to flooding • The businesses frequently undergo reinvestment
Adaptive Capacity	• City's Capital Improvement Program has some but limited capacity to assist with asset management or improvement • OneBayArea Grants and other regional funding sources are available for technical assistance, planning assistance, and transportation infrastructure funding to support smart growth and increased development in Downtown Benicia.
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Occasionally affected by flooding that result from the combination of high tide and stormwater runoff. Streets, access to businesses, and outdoor properties are impacted

	• Properties that rely on electric or mechanical components that are located below grade or on the ground floor may not be able to function when wet
Governance Vulnerabilities	• Owned by various individuals or companies, with limited ability for any given tenant or owner to protect his or her property. May require additional effort to coordinate adaptation actions
Informational Vulnerabilities	• Owned by various individuals or companies; information may not be easily accessible when needed. Communication is also required between the owners and tenants
Consequences	
Equity	• Individual businesses and employment would be affected, resulting in broader impacts to the community
Environment	• None identified at this time
Economy	• Individual businesses may temporarily lose revenue and/or need to pay to repair property damages • Impact to sales and property tax revenue generated to the City of Benicia

Benicia Industrial Park

General Information	
Asset Name	Benicia Industrial Park
Asset Type	Community asset
Asset Owner/ Managing Agency	A large percentage of property is owned by large real estate holding companies and leased to businesses of varying size. Some properties are owned by businesses that use them
Location	Located adjacent to Interstate 680
Existing Conditions	
Physical Characteristics	• Approximately 7,000,000 square feet of industrial and businesses park space on about 3,000 acres • Many properties were constructed between the 1950s and the present day. Some properties date back to the mid-1800s to 1930s, when the lower Arsenal was developed • Most structures have been updated and continue to be viable. Businesses update the property interiors regularly; exterior renovations occur less often but properties are generally well maintained • Adjacent to a marsh that serves as a habitat area
Management Status	• Development and building permit information is managed by the City of Benicia Community Development Department • Benicia Industrial Park Association works closely with key local and regional economic development departments and associations
Public Health and Safety Value	• None identified at this time
Community and Economic Value	• Businesses contribute extensively to the local economy
Vulnerability	
Exposure	• Several key streets, access to selected businesses, and some outdoor properties are currently exposed to flooding from the combination of high tide, stormwater runoff, and impeded drainage • Exposed to daily inundation under 60 inch of sea level rise (high end of century scenario) • Many of the buildings have truck access openings that are "dock high" and at grade level, increasing the interiors' exposure to flooding • Extreme temperatures projected to increase by 5-10°F
Sensitivity	• Access roads, structures, and electrical equipment sensitive to flooding • Industrial equipment sensitive to high temperatures • The businesses frequently undergo reinvestment
Adaptive Capacity	• City's Capital Improvement Program (CIP) has some limited capacity to assist with public infrastructure asset management or improvement (spurring economic activity through investment in

	infrastructure and transit is a key element of the City's CIP)
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Occasionally affected by flooding that result from the combination of high tide and stormwater runoff. Streets, access to businesses, and outdoor properties are affected • Properties that rely on electric or mechanical components that are located below grade or on the ground floor may not be able to function when wet • At grade loading docks may be entry points for flooding in buildings • Rail access would be limited if roads are flooded • Industrial equipment may stop functioning or operate at lower efficiencies under extreme high temperatures • The marsh currently serves as a natural barrier for the Industrial Park, but the marsh's ability to adjust to changes in sea level and future storm conditions is uncertain and may increase the vulnerability of the asset • Power outages due to climate change stressors would impact economic activity as many businesses do not have generators
Governance Vulnerabilities	• Owned by various individuals or companies, with limited ability for any given tenant or owner to protect his or her property. May require additional effort to coordinate adaptation actions
Informational Vulnerabilities	• Owned by various individuals or companies; information may not be easily accessible when needed (e.g., location and operation of critical electrical and mechanical components). Communication is also required between the owners and tenants
Consequences	
Equity	• Individual businesses and employment would be affected, resulting in broader impacts to the community
Environment	• Contaminants at the site could be released with floodwaters (over 80 hazardous material sites exist within the Industrial Park[23])
Economy	• Business operations and production could be severely affected if inundated, affecting business revenue and the local economy • Increased repair costs for buildings and industrial equipment • Impacts to the sales and property tax revenue generated to the City of Benicia

[23] City of Benicia General Plan. Appendix G. 1996. Accessible at: http://www.ci.benicia.ca.us/vertical/Sites/%7B3436CBED-6A58-4FEF-BFDF-5F9331215932%7D/uploads/%7B2C1772BF-228B-4371-9B86-214A487209E5%7D.PDF.

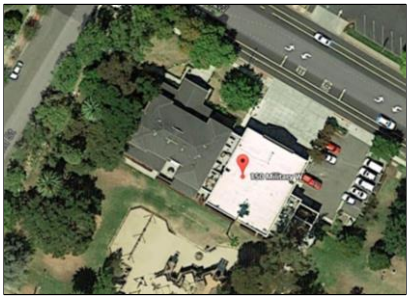
Police Station

General Information	
Asset Name	Police Station
Asset Type	Community asset
Asset Owner/ Managing Agency	City of Benicia
Location	200 E L Street
Existing Conditions	
Physical Characteristics	• Built in 1974 • Houses administrative staff, police officers, detectives, and 911 emergency dispatch center • Consists of meeting rooms, training rooms, two portable buildings, and two holding cells. Locker room and workout room in the basement • Emergency dispatch center recently underwent seismic retrofit
Management Status	• Building permits are required to repair or improve the asset
Public Health and Safety Value	• Vital for police response and public safety
Community and Economic Value	• Police response is important for maintaining a safe community
Vulnerability	
Exposure	• Not exposed to current and future tidal inundation • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Minimal sensitivity to high temperature • Recently completed upgrade to 911 system • Facility frequently maintained • Air conditioning is available • Emergency generator is available • Communication mechanisms are adequate for current needs
Adaptive Capacity	• Back-up dispatch available at Fire Station 11 • As built drawings and existing conditions report available (allows for faster diagnosis of issues and development of appropriate responses)
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Critical 911 dispatch and police response would be affected if the asset was disrupted • Police operations would have to be moved to multiple locations if the asset failed
Governance Vulnerabilities	• Funding sources and asset management plans that can be used to assess vulnerability or improve asset resilience are not available
Informational Vulnerabilities	• Informational vulnerabilities are not apparent at this time
Consequences	
Equity	• Medically dependent and those needing emergency response

		from police would be affected
Environment	•	None identified
Economy	•	None identified

Fire Station

General Information	
Asset Name	Fire Station
Asset Type	Community asset
Asset Owner/ Managing Agency	City of Benicia
Location	150 Military West
Existing Conditions	
Physical Characteristics	• Built around 1995-1996 • Contains a garage for storage of fire trucks and equipment, administrative offices, dormitories for firefighters, a kitchen, workout facility, and living and office areas
Management Status	• Building permits are required to repair or improve the asset
Public Health and Safety Value	• Vital for response to fires and emergencies • The Emergency Operations Center operates out of this location
Community and Economic Value	• Important for maintaining a safe community
Vulnerability	
Exposure	• Asset not exposed to current and future tidal inundation • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Minimal asset sensitivity to high temperature • Communication mechanisms are adequate for current needs • Air conditioning is available • Emergency generator is available and recently rebuilt • Facility and emergency generator frequently maintained
Adaptive Capacity	• A second Fire Station is located north of I-780 • A backup Emergency Operations Center is available in the Police Station • As built drawings and existing conditions report available which allows for a faster response following a damaging event
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Critical fire and emergency response services would be affected if the asset is disrupted • Emergency operations center, administrative staff, and firefighters would need to be relocated if the asset fails
Governance Vulnerabilities	• Long-term asset management plans have not been developed • Funding sources and asset management plans that can be used to assess vulnerability or improve asset resilience are not available
Informational Vulnerabilities	• No informational vulnerabilities apparent at this time
Consequences	
Equity	• Medically dependent and those needing emergency response from firefighters would be affected



Environment	• None identified
Economy	• None identified

Benicia Community Center

General Information	
Asset Name	Benicia Community Center
Asset Type	Community asset
Asset Owner/ Managing Agency	Owned by the Benicia Unified School District. Managed by the City of Benicia
Location	370 East L Street
Existing Conditions	
Physical Characteristics	• Built 1957; major building renovation completed in 2011 (LEED Gold certified); expected remaining service life is indefinite • Office space for the Recreation and Administrative Divisions of the Parks and Community Services Department • Provides space for meetings, classes, and community programs
Management Status	• Benicia Unified School District leases the facility to the City of Benicia (40 year lease with two ten year extensions executed by the City of Benicia)
Public Health and Safety Value	• Building used as a public cooling center during high temperatures • Serves as a shelter during a disaster
Community and Economic Value	• Important space for community gathering including after-school program, pre-school programs, senior programs, youth sports, and girl and boy scout programs
Vulnerability	
Exposure	• Asset not exposed to current and future tidal inundation • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Minimal asset sensitivity to high temperature • Frequently maintained • Communication mechanisms are adequate for current needs • Air conditioning is provided
Adaptive Capacity	• As built drawings and existing conditions report available • An evacuation plan is in place • Community programs could be relocated to other City facilities • Plan in place to refer community members to the Community Action Council or Family Resource Center during flooding events
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Back-up electricity services are not available. The asset would be unable to serve as a cooling center or shelter during emergencies if power is lost and community members would be referred elsewhere
Governance Vulnerabilities	• Managing entity may have limited ability to make changes to the property under the current lease agreement with the Benicia Unified School District. May require additional effort to coordinate adaptation actions • Funding sources and asset management plans that can be used to assess vulnerability or improve asset resilience are not

	available
Informational Vulnerabilities	• No informational vulnerabilities apparent at this time
Consequences	
Equity	• Impact to community programs, especially for seniors and children • Asset would be unable to serve as a shelter or cooling center for at-risk populations • Full-time City workers would have to be relocated and part-time recreation leaders and instructors would be out of work depending on length of disruption
Environment	• None identified
Economy	• Cost to the community would depend on severity of damage and length of disruption

City Hall

General Information	
Asset Name	City Hall
Asset Type	Community asset
Asset Owner/ Managing Agency	City of Benicia
Location	250 East L Street
Existing Conditions	
Physical Characteristics	• Built around 1927 • Contains offices for administrative staff in the Offices of the City Manager, Finance, City Attorney, Community Development, and Public Works • Contains a Council Chambers and several meeting rooms • Two portable buildings on the east side of City Hall for Human Resources • Roof replaced around 2002 • All lighting upgraded in 2011-2012 • 76 MW solar facility supplies power to City Hall and Electric Vehicle Fast Charger • 40 kWh on site battery storage, not building tied, used only for charging presently
Management Status	• Building permits are required to repair or improve the asset
Public Health and Safety Value	• The Office of Public Works housed within City Hall is responsible for managing services essential to public health, including water and wastewater treatment
Community and Economic Value	• The City's administrative offices are vital for the community's operations and finances
Vulnerability	
Exposure	• Asset not exposed to current and future tidal inundation • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Minimal asset sensitivity to high temperature • General maintenance frequently conducted • Communication mechanisms are adequate for current needs • Air conditioning is available
Adaptive Capacity	• As built drawings and existing conditions report available
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• When the City experienced a power outage that lasted for half the day, City Hall was able to partially function – how so? • Services would need to be relocated to other City facilities if the asset were disrupted for a significant period or damaged
Governance Vulnerabilities	• Long-term asset management plans have not been developed • Funding sources and asset management plans that can be used to assess vulnerability or improve asset resilience are not available

Informational Vulnerabilities	• No informational vulnerabilities apparent at this time
Consequences	
Equity	• Citizens throughout the community may experience disruptions to the City's critical operations
Environment	• None identified
Economy	• Cost to the community that relies on City Hall's services would depend on severity of damage and length of disruption

Fitzgerald Field

General Information	
Asset Name	Fitzgerald Field
Asset Type	Community Facilities and Services
Asset Owner/ Managing Agency	City of Benicia
Location	East 2nd and H Street
Existing Conditions	
Physical Characteristics	• 4 acre field containing a single baseball diamond and parking area • Originally constructed in the 1940's; life expectancy is indefinite • Cleaned daily and mowed weekly • Last major improvement was lighting replacements
Management Status	• Building permits are required for electrical or structural improvements
Public Health and Safety Value	• Contributes to public health and welfare by providing exercise facilities • Area used as retention area during high tides/heavy storms
Community and Economic Value	• One of the City's two baseball field complexes located downtown
Vulnerability	
Exposure	• Exposed to daily inundation under 60 inch of sea level rise (high end of century scenario) • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Water-sensitive electrical systems are located underground • Communication mechanisms are adequate for current needs
Adaptive Capacity	• Electrical drawings are available which may facilitate a faster response in the event of climate impacts • Low redundancy at the asset site but recreational functions can be replaced or recreated in other areas if needed
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Flooding can disrupt use of the field during baseball season, depending on how long it takes to dry. Occurs at least once a year. The frequency of use of the field as a flooding retention area may change under future conditions • Safety netting was damaged after a heavy wind and rain storm. Replacement cost was over $2,000
Governance Vulnerabilities	• Funding sources and asset management plan that can be used to assess vulnerability or improve asset resilience are not available
Informational Vulnerabilities	• No informational vulnerabilities apparent at this time
Consequences	
Equity	• Loss of baseball field space for children and adults

Environment	• No environmental consequences have been identified
Economy	• No economic consequences have been identified

Benicia Marina Harbor

General Information	
Asset Name	Benicia Marina Harbor
Asset Type	Community Facilities and Services
Asset Owner/Managing Agency	Owned by the City of Benicia. Managed by the Benicia Harbor Corporation (BHC)
Location	266 East B Street
Existing Conditions	
Physical Characteristics	• Built in 1984; expected service life of 100 years • Features a fuel dock, pump-out station, launch ramp, general store, restrooms and showers, laundry facilities, and secured gates • Upgraded fuel dock in 2009 • Dock maintenance conducted daily
Management Status	• Managed through a long-term lease • BHC has permits to maintain and repair the asset
Public Health and Safety Value	• None identified
Community and Economic Value	• Draws in revenue and contributes to the downtown economy
Vulnerability	
Exposure	• Asset is located on the water • Marina infrastructure (e.g., buildings, fueling facilities, public space, fixed dock elements) may be exposed to daily inundation under 12 inch sea level rise (low, mid-century projection), 24 inch sea level rise (high, mid-century; low end of century), and 60 inch sea level rise (high end of century) • Extreme temperatures projected to increase by 5-10°F • Employees take additional breaks under high temperature conditions to reduce their exposure
Sensitivity	• Asset is built for the water, providing it with lower sensitivity to flooding compared to assets on land • Pipelines that are located below ground are secured so they will not become buoyant
Adaptive Capacity	• Planning-level drawings are available which may allow for a faster response in the event of climate impacts • California Department of Boating and Waterways may serve as a source of funding that can be used to assess hazard risk or vulnerability
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Built to withstand current tidal, wind, and wave conditions, but asset may not be designed to handle future conditions • Tree removal was conducted after a previous weather event. Estimated cost of $10,000 • Breakwall needs major repair

Governance Vulnerabilities	•	Permitting and oversight involves many agencies (e.g., BCDC, City of Benicia, Fish and Wildlife)
Informational Vulnerabilities	•	Mechanisms to share information between departments within the managing agency are not apparent; mechanisms to share information with the California Department of Boating and Waterways are adequate under current conditions
Consequences		
Equity	•	Marina employees may lose their jobs
Environment	•	Damage to the fueling station could result in fuel spills
Economy	•	Loss in revenue to the downtown economy

Transportation Assets

General Information	
Asset Name	Transportation assets including East 2nd Street, East 5th Street, Bayshore Road, East B Street, and Industrial Way
Asset Type	Transportation
Asset Owner/ Managing Agency	City of Benicia
Location	East 2nd Street, East 5th Street, Bayshore Road, East B Street, and Industrial Way
Existing Conditions	
Physical Characteristics	• Assets built around the turn of century • Ongoing maintenance includes street cleaning, repair, and overlay • Assets flood during storms with high tide, winds, and rainfall • The bottom of East 2nd Street and East B Street continue to settle
Management Status	• Financing mechanisms for improving climate resiliency are limited at this time. Transportation assets are often expensive, require lengthy environmental review and involve multiple permitting agencies. Finding strategies that will allow for a quick response will be a challenge
Public Health and Safety Value	• Assets provide access that is critical for public health and safety
Community and Economic Value	• Assets provide access for community members to homes, workplaces, and recreational areas • Assets provide access for transportation of goods
Vulnerability	
Exposure	• Bayshore Road and East 5th Street exposed to daily inundation under 24 inches of sea level rise (high, mid-century scenario; low end of century) and 60 inch of sea level rise (high end of century). East 2nd Street exposed to daily inundation under 60 inches of sea level rise (high end of century). • Extreme temperatures projected to increase by 5-10°F
Sensitivity	• Road asphalt is sensitive to high temperatures • Location on waterfront makes asset sensitive to erosion forces
Adaptive Capacity	• Capital Improvement Plan is a potential funding source in the event of climate damage • In many locations, there are no transit options to provide transportation alternatives
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Temporary or permanent inundation of coastal roads • The bottom of East 2nd Street and East B Street may become especially vulnerable to sea level rise and storm surge as they continue to settle. Settlement is not being measured • Road asphalt deterioration due to prolonged heat • Access for critical services may be impaired • Vehicles have some flexibility to use alternate routes, but these routes may lack the capacity to serve additional traffic and

	heavy congestion • Insufficient capacity on alternate routes results in a lack of redundancy for the network when one section or asset is temporarily or permanently damaged or affected by inundation or storm events • Rising groundwater increases the risk of liquefaction, which could cause damage to road surfaces • In a few instances, there are communities or facilities that are linked by only one or two access ways and these communities and facilities may be isolated if these access ways were compromised.
Governance Vulnerabilities	• Special processes for emergency repairs may not be available • Improvements to increase climate resilience may involve multiple permitting agencies
Informational Vulnerabilities	• Planning level information is not available to assess vulnerability
Consequences	
Equity	• Disruptions to transportation assets would increase traffic and affect commuters • Some communities lack redundancy in transportation alternatives. A loss or re-routing of a bus route or other transportation service could inhibit the ability of those residents to travel • Community members, especially at-risk populations, may become stranded in a flood • Loss of community access to the shoreline
Environment	• The loss of a portion of the transportation network may increase the region's congestion, resulting in greater emissions and lower fuel efficiency
Economy	• Increased maintenance and repair costs • Goods movement via ground transportation would be impaired and affect the local and regional economy • Workers who rely on vulnerable roads may be unable to get to work, affecting their wages and the economy of the region

Stormwater Outfalls

General Information	
Asset Name	Stormwater outfalls at East 2nd Street and East 5th Street
Asset Type	Stormwater
Asset Owner/ Managing Agency	City of Benicia
Location	East 2nd Street and East 5th Street
Existing Conditions	
Physical Characteristics	• Assets built around the turn of the 20th century • Ongoing maintenance includes storm drain cleaning
Management Status	• Permits from local, State, and federal agencies are required for repairs and improvements
Public Health and Safety Value	• Stormwater outflows contribute to stormwater control, which protects public health and safety during flood events
Community and Economic Value	• Stormwater outflows contribute to stormwater control, which protects assets vital for the community and economy, such as homes, businesses, and transportation networks
Vulnerability	
Exposure	• May be exposed to daily inundation under 12 inch sea level rise (low, mid-century scenarios), 24 inch sea level rise (high, mid-century; low end of century), and 60 inch sea level rise (high end of century). Sea level rise inundation mapping likely does not take into account height of outfalls • Hottest temperature projected between 2046 and 2099 is 112°F
Sensitivity	• Sensitive to large volumes of stormwater that the assets are not designed to handle
Adaptive Capacity	• Assets have lacked capacity during previous storm events when rain events coincide with tide tides • Capital Improvement Plan potential funding source • Lack of redundancy
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Capacities of the outflows are currently insufficient to handle stormwater during storm events when rain events coincide with tide tides and causes upstream flooding. Assets may not be designed to handle future stormwater conditions • Mechanisms to control inflow to the system are not in place; where outflows are below the storm event or high tide water level, inflows from storm surge and sea level rise can cause discharge to back up, resulting in flooding
Governance Vulnerabilities	• Permitting and oversight involves many agencies
Informational Vulnerabilities	• Information such as outfall elevations and pipe capacity are lacking, which hinder the evaluation of vulnerability and identification of adaptation strategies.
Consequences	
Equity	• Backup will cause continued flooding in the community
Environment	• Flooding due to backup could redistribute contaminants (e.g., oil

	washed from the roadways), possibly harming sensitive habitats
Economy	• Backup in storm drain pipes can cause flooding and damage, resulting in significant repair costs • Flooding can block access to employment centers and businesses and impact the local economy

Benicia State Recreation Area

General Information	
Asset Name	Benicia State Recreation Area
Asset Type	Natural Area
Asset Owner/ Managing Agency	California Department of Parks and Recreation (CA State Parks)
Location	Located at the eastern edge of Benicia near Interstate 780, on the north shore of the Carquinez Strait and Southampton Bay
Existing Conditions	
Physical Characteristics	• Approximately 469 acres • Features 1.2 mile Marsh Trail and a 0.75 mile bike trail along I-780. Dillon Point Road is also utilized as a bike/pedestrian way • Included within it is the Southampton Bay Natural Preserve which protects the marsh and the endangered plant and animal species that inhabit the area • Regular maintenance includes road and trail improvement, weed control, and natural resource protection through invasive species control and special status species monitoring and reporting
Management Status	• Opened in 1967 and is managed and maintained by the State Parks System • Managed to provide health, education, and opportunities for outdoor recreation while preserving natural resources • Managing agency participates in regional planning discussions as needed and has collaborative relationships with State and local municipalities in the region
Public Health and Safety Value	• Offers recreational opportunities and contributes to public health
Community and Economic Value	• Important community asset that offers recreational opportunities, fishing, and scenic views for the public
Vulnerability	
Exposure	• The majority of the park is bayside • Exposed to daily inundation under 24 inches of sea level rise (high, mid-century scenario; low end of century) and 60 inch of sea level rise (high end of century) • Some areas of the park include natural beach environment and tidal marsh, which are exposed to wave action • Extreme temperatures projected to increase by 5-10°F • Rip rap and other hardened shorelines exist at Dillon Point and Military West areas of the park
Sensitivity	• Plant and animal species within the Park are very sensitive to factors including temperature, salinity, and inundation
Adaptive Capacity	• Elevation details describing portions of the tidal marsh were prepared in the 1990s which may be beneficial in the event of climate impacts • Mechanisms to share information within internal departments and partner agencies are sufficient under current conditions • General Plan for the State Park, which is relevant to asset

	management and improvement, is available • Lack of redundancy of the habitats and trails
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Water level in the marsh is not managed; natural ability of the marsh to adapt to storm surge and sea level rise is unknown • Habitats for native species cannot be replaced if inundated • Plant and animal species would be affected by changes in temperature, precipitation, and sea level rise • Trails may be inundated
Governance Vulnerabilities	• State Parks do not have funding available to assess marsh ecosystem vulnerability to climate change. However, outside funding from regulatory agencies seeking to further protect plants and animals that may be endangered in the future (e.g. USFWS or DFW), may be a source of funding
Informational Vulnerabilities	• Information about marsh migration, temperature thresholds for natural vegetation and wildlife, and water quality impacts is unknown. Funding for research on this is required.
Consequences	
Equity	• Damage to the asset would affect community members who rely on the park for recreation and health maintenance, including the elderly and young families
Environment	• Loss of habitat for the federally threatened or endangered soft bird's-beak (a native herb), California clapper rail, salt marsh harvest mouse, and California black rail. The soft birds beak is particularly at risk, whose populations at this location are some of the largest in existence
Economy	• None identified

Liberty High School

General Information	
Asset Name	Liberty High School
Asset Type	Community Facilities and Services
Asset Owner/ Managing Agency	Benicia Unified School District
Location	350 E K St
Existing Conditions	
Physical Characteristics	• Has been closed during extreme weather events due to power loss
Management Status	• The Department of State Architects is required to evaluate and approve all major facilities repairs and upgrades
Public Health and Safety Value	• Safe schools are important for the health and well-being of students
Community and Economic Value	• Vital community asset for both students and parents
Vulnerability	
Exposure	• Asset not exposed to current and future tidal inundation • Extreme temperatures projected to increase by 5-10°F
Sensitivity	• Children are particularly vulnerable to high temperatures • Sensitive to impacts to external services since schools rely on power, clean water, and food supplies for the safety of students • Small pumps are in place to clear small amounts of water but the asset does not have systems in place for larger groundwater issues
Adaptive Capacity	• A facilities needs assessment was recently completed in 2013 and is available • A school facility plan is available and is part of the general facility plan. Plans are made public at governing board meetings • If the school site were compromised, existing school sites with additional portable classrooms would be used. If more than one school site were compromised, the California Department of Education would assist with alternatives • Short term emergency supplies available • Site safety plans include evacuation plans for young children • Individual plans are in place for students with disabilities
Vulnerability Statements/Key Issues	
Physical and Functional Vulnerabilities	• Although small pumps are in place to clear small amounts of water, they may not have sufficient capacity under future stormwater conditions • Specific temperature thresholds at which to close the schools have not been identified • If the City's sewer system were compromised, school would be unable to serve students without a safe, clean water supply • If the power system were compromised, school would be unable to serve students without reliable power
Governance	• Specific funding sources to increase resilience are not available

Vulnerabilities	
Informational Vulnerabilities	• No information vulnerabilities apparent at this time
Consequences	
Equity	• Children are particularly vulnerable to extreme temperatures and flooding
Environment	• None identified
Economy	• School closures would create a major impact for the community, including parents who need to attend work

Appendix B: Vulnerability and Risk Survey

In order to collect information on asset vulnerability and risk, the following survey was programmed into Google Forms and distributed to asset managers as a weblink and PDF. The PDF allowed users to develop their responses prior to entering them into the online form.

The original set of questions (which closely matches this) was developed by BCDC as part of the ART project. The ICF Team tailored BCDC's questions to the scope of the current project. For example, select questions were removed and questions on the impacts of extreme temperatures were added.

Not all questions were asked of all users; asset managers only saw questions that were tailored to their specific asset sector (e.g., the police station was not asked to provide information on the temperature at which local marsh flora would be threatened). The asset specific questions are identified below with X's identifying the sectors the question is applicable to. The ICF Team was able to implement this process by using Google Forms question skip logic.

Background Questions
Thank you for taking the time to complete the City of Benicia Vulnerability and Risk Assessment Survey. The purpose of this survey is to get your best professional judgment on how sea level rise, coastal storms, and high temperatures will affect the services, facilities, and systems that you plan for, operate and/or manage. The survey has four sections. BACKGROUND information about your area of expertise, and the service, facility or system that you wish to address in the survey. EXISTING CONDITIONS consisting of questions about the ownership, management, maintenance, and past damage to your asset. VULNERABILITY ASSESSMENT consisting of four parts - information vulnerabilities, governance vulnerabilities, physical vulnerabilities, and functional vulnerabilities. These questions also ask about the ability of your asset to manage the vulnerabilities. RISK ASSESSMENT consisting of questions about the consequence or magnitude of effect on social, economic, environmental, and governance systems. Your responses to the following survey are confidential. The City of Benicia will not directly quote any of your information without explicit consent.
What is your name?
What agency or organization do you work for?
What department, section, or unit do you work for within your agency or organization?
What is your job title?
Existing Conditions
Briefly describe the asset and its functions.
Where is the asset located and what is its geographic extent?
Who owns and manages the asset? Note if the owner and manager are different entities.
What year was the asset built and what is its expected remaining service life?
When and what was the last major repair or improvement to the asset?
What is the most frequent type of maintenance and how often is it conducted?

Has the asset been disrupted in the past due to an unplanned event e.g., weather related closure, emergency repair or improvement, work strike, or other event? If yes, how long did the disruption last and was the asset able to continue functioning either partially or fully?
Is the asset currently under consideration for capital improvement or investment, or is it in an area that is planned for future development /redevelopment?
Has there been locally observed land subsidence that could potentially put the asset at greater risk of flooding? If yes describe the location, amount of land motion, and the approximate timeframe over which the subsidence has occurred.
Information Vulnerabilities
Is planning-level or project-level information available to assess vulnerability, e.g., as-built drawings, existing conditions reports, monitoring or inspection reports, etc.?
What mechanisms exist to share information between departments within the managing agency? What mechanism exists to share information with partner agencies, non-governmental organizations, and the public? Are these mechanisms adequate?
Governance Vulnerabilities
Is the asset managed to achieve multiple goals or objectives? If yes, are their conflicts among them, e.g., habitat, water quality, flood control, recreation, shoreline access, etc.?
If the asset owner and manager are different, what is the relationship between them, e.g., a legal agreement such as a lease, right-of-way, access easement, MOU or MOA?
Describe any plans that are relevant to asset management or improvement, e.g., Master Plan, Capital Improvement Plan, and if/how they consider sea level rise.
If the asset is protected from flooding by land or assets owned or managed by others (e.g., structural protection, roadways, rail embankments), what is the relationship between the asset owner/manager and these entities? Do they coordinate information, funding or decision-making?
What types of permits and from which agencies are necessary to maintain, repair or improve the asset? Are there special processes for emergency repairs?
What funding sources currently exist that can be used to assess hazard risk or vulnerability to climate change? To improve asset resilience?
Physical Vulnerabilities
To what extent is the asset exposed to tidal, wind or wave erosion or scour?
How sensitive is the asset to high temperatures?

Sector Specific Physical Vulnerability Questions (x indicates question is applicable to the sector)

	TRANSPORT	STORM WATER & FLOOD CONTROL	WASTE WATER	STRUCTURAL SHORELINES	NATURAL AREAS	COMMUNITY FACILITIES AND SERVICES	PARKS	PORT	ENERGY AND PIPELINES
What water or salt sensitive components of the asset are at-grade or below-grade, e.g., mechanical or electrical equipment, pumps, building heat or power systems, or finished basements?	X	X	X	X		X	X	X	X

Pavement binders are designed to withstand specific temperature thresholds. Asphalt may experience rutting if pavement temperatures exceed the high temperature thresholds. What is the high temperature threshold for this asset?	X							X	
At what temperature do the ponds switch from aerobic to anaerobic digestion? Will this lead to odor problems? Has this happened before? Are there established protocols in place to manage this situation?			X						
Are perishables or other heat sensitive products shipped through the port? Are there enough refrigerated options to prevent the loss of or damage to these items?								X	
Safety regulations might require personnel to take more frequent breaks or work different shifts depending on temperature conditions. At what temperature are additional breaks or stop work orders given?								x	
At what temperature does the natural vegetation and wildlife begin to be impacted? Is there a threshold for heat waves (x temperature over y days) that would cause particularly damaging effects?					x				
At what temperature would your facility have to close? Is there air conditioning available? Would your facility be able to serve as a public cooling center in the event of a heat wave?						x			
At what temperature would equipment fail to operate? Is there cooling equipment currently in place to prevent this from happening?			x			x		x	x
Does the asset have openings that are at-grade or below-grade that are entry points for flooding, e.g., entryways, tubes, tunnels, ventilation grates? If yes, are their barriers (temporary or permanent) that can protect these openings from allowing floodwaters to enter? Are there pumps or other systems in place to remove floodwaters if they do enter?	x		x			x		X	X
Are there existing systems in place to manage groundwater, e.g., pumps or other systems to keep water away from below-grade systems, basements, or foundations? Would these systems if they are in place have adequate capacity to remove greater levels of groundwater?	x		x			x		X	X
Is the asset currently at capacity or does it have additional capacity to meet future conditions, e.g., projected increases in demand, level of service, higher Bay water levels, or elevated groundwater?	x		x						x
For storm water and flood control infrastructure, what recurrence-interval tidal or rainfall event was the system designed for and how was the system constructed, e.g., open or closed, earthen, concrete or conduit? Is the asset currently at capacity or does it have additional capacity to meet future conditions, e.g., projected higher Bay water levels, combined riverine and tide levels, or elevated groundwater?		x							

For tidal channels, what is the approximate location of current mean higher high water (MHHW)? Is there a barrier upstream of current MHHW that would prevent migration of the tide as sea level rises? Is there protection in place to prevent overbank (overland) flooding? Are there protections upstream of current MHHW that would prevent overbank flooding if the tide migrates upstream as sea levels rise?		x							
For tidal channels and storm water outfalls, is there a mechanism to control inflow to the system from the Bay such as a flap gate, tide gate, check valve, etc.? Can these water control structures be adjusted to maintain system function as sea level rises?		x							
For pipelines located belowground, are they secured or tied down in a manner that as groundwater levels rises they will not float or become buoyant?			x					X	x
For structural shoreline protection systems what is the design, e.g., engineered levee or floodwall, engineered shoreline protection (revetment or bulkhead), non-engineered berm or levee? Where is the system location, along the Bay shoreline, outboard or inboard of a natural system such as tidal marsh or managed pond, or along the edge of a tidal channel?				x					
For natural and restored tidal marshes, do current sustainability models predict they will keep up with sea level rise (e.g., accrete vertically)? If so, for how long? Is there space adjacent of the marsh that would allow for inland migration (e.g., horizontal migration)?					x				
For managed ponds and managed marshes, can the water control infrastructure such as berms, levees, and tide gates be adjusted to maintain system function as sea level rises?					x				
Functional Vulnerabilities									
Is the asset is part of a networked system such that damage to other parts of the system would affect the assets ability to function? Describe what alternatives or redundancies exists that could help maintain continuity of service if parts of the system are disrupted.									
If the asset is disrupted or damaged what redundant or alternative assets exist that could help maintain asset capacity, function, or level or service?									
What external services, such as power, clean water, and safe food supplies, does the asset rely on? If these external services were interrupted are there back up supplies and how long would they last?									
Sector Specific Functional Vulnerability Questions (x indicates question is applicable to the sector)									
	TRANSPORT	STORM WATER & FLOOD CONTROL	WASTE WATER	STRUCTURAL SHORELINES	NATURAL AREAS	COMMUNITY FACILITIES AND SERVICES	PARKS	PORT	ENERGY AND PIPELINES

Does the asset serve or house the elderly or very young, mobility or medically challenged individuals, or animals? If yes, describe how and if these services and functions can be protected to ensure continuity of service. What systems or plans are in place to guide either the shelter-in-place or the safe evacuation of the facility if necessary?						X			
Does the asset serve or house community members that are recourse limited, e.g., are they low or very low income, housing or transportation cost burdened, or without a car? If yes, what programs or plans in place to help these members prepare for, respond to, or recover from flooding?						X			
Does the asset serve or house community members that are ethnically or culturally diverse, have limited English speaking capacity, or are non-English speakers? If yes, what programs or plans in place to help these members prepare for, respond to, or recover from flooding?						X			
Does the asset serves as a critical access road, emergency or lifeline route, provide sole or limited access to communities or facilities, or provide service to transit dependent communities? If yes describe the communities, services, facilities the asset serves.	X								
What kind of recreational access and opportunities does the asset provide? Are they limited in the region? Could these functions be easily replaced or recreated in other areas?				X	X		X		
What habitat for threatened or endangered species does the asset provide or protect? Is this habitat scarce in the region? Could this habitat be replaced or recreated in other areas?					X				
Consequences									
What degree and scale of economic disruption would occur if the asset was damaged, disrupted, or failed? Local, regional, state, or national? If based on a past weather event or an unplanned disruption describe the type and duration of that disruption.									
If the asset was damaged, disrupted or failed, how much direct revenue would be lost? For how long?									
What would the water quality impacts be if the asset was damaged, disrupted, or failed, e.g., release of hazardous materials stored on site, pollutants leaching into groundwater as the water table rises?									
What habitat or species benefits would be lost if the asset was damaged or lost? What would the effect of this loss have on local and regional biodiversity and ecosystem health?									
If the asset was damaged, disrupted, or failed, would there be a loss of flood protection or wave attenuation benefits? If yes, what would the effect of this loss be on adjacent assets or communities?									
What critical emergency services would be affected if the asset was damaged, disrupted or failed?									
How would the community, particularly at-risk members, be affected by damage, disruption, or loss of asset function, e.g., hospital, fire station, police station, public gathering space, or emergency shelter that serve those with limited mobility, medically dependent, elderly, very young, low income, renters, limited English, transit dependence?									
If the asset was damaged, disrupted or failed, how many and what type of jobs or employment centers would be affected? For how long?									

If the asset was damaged, disrupted or failed, would there be a loss of public access to the shoreline? Of recreational, educational or interpretation opportunities?

End of Appendices