ATTACHMENT 3 – PROJECT JUSTIFICATION

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ATTACHMENT 3 – PROJECT JUSTIFICATION

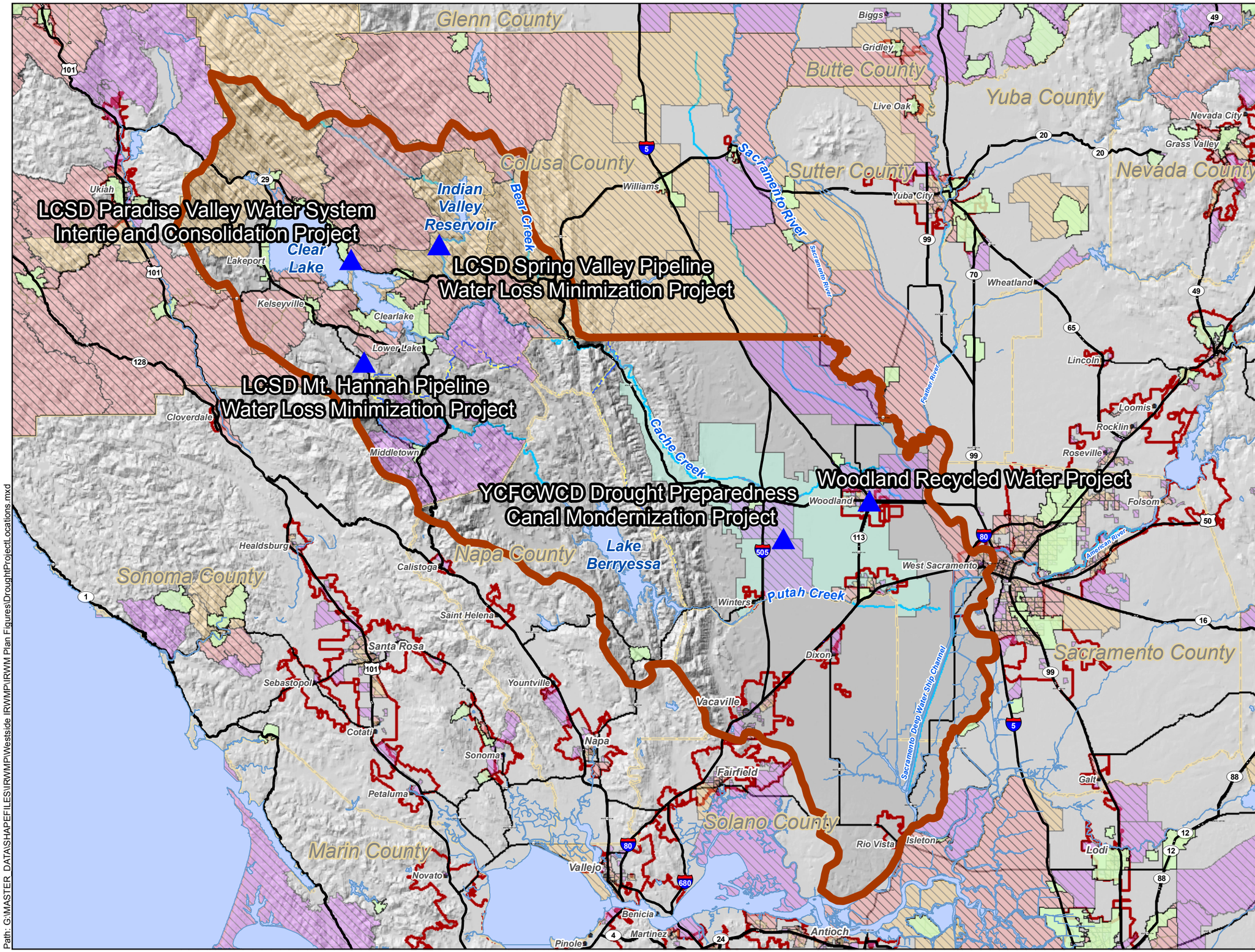
Project Summary Table and Regional Map

Overview of Projects

The project summary table has been completed for all projects and is followed by the Figure 3-1, a Regional Map locating all projects

PSP Table 4 – Drought/IRWM Project Elements (Provided in File 1)						
		YCFCWCD – Canal Modernization	Woodland RW	LCSD – Mt Hannah	LCSD- Spring Valley	LCSD – Paradise Valley
Drought Project Category						
D.1	Provide immediate regional drought preparedness	X	X	X	X	X
D.2	Increase local water supply reliability and the delivery of safe drinking water	X	X	X	X	X
D.3	Assist water suppliers and regions to implement conservation programs and measures that are not locally cost-effective					
D.4	Reduce water quality conflicts or ecosystem conflicts created by the drought.	X			X	X
IRWM Project Element						
IR.1	Water supply reliability, water conservation, and water use efficiency	X	X	X	X	X
IR.2	Stormwater capture, storage, clean-up, treatment and management					
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands					
IR.4	Non-point source pollution reduction, management, and monitoring					
IR.5	Groundwater recharge and management projects	X	X			
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users		X			
IR.7	Water banking, exchange, reclamation, and improvement of water quality	X	X		X	
IR.8	Planning and implementation of multipurpose flood management programs					
IR.9	Watershed protection and management					
IR.10	Drinking water treatment and distribution	X	X	X	X	X
IR.11	Ecosystem and fisheries restoration and protection	X				

Table 4: Drought Explanations and IRWM Project Explanations are in each individual Project description.



Westside-Sacramento 2014
Drought Funding Application

Regional Project Map

K/J 1170019.00
July, 2014

Figure 3-1

Path: G:\MASTER_DATA\SHAPEFILES\IRWMP\Westside IRWMP\IRWM Plan Figures\DroughtProjectLocations.mxd

PROJECT 1: Yolo County Flood Control and Water Conservation District (YCFCWCD) Drought Preparedness Canal Modernization Project

1. Project Summary Table Explanations

a. Eligible IRWM Project Explanation

As summarized in PSP Table 4 above, the YCFCWCD Drought Preparedness Canal Modernization Project is of the following eligible IRWM project types. Explanations as to relevance of each type follows:

IR.1 Water supply reliability, water conservation, and water use efficiency: The YCFCWCD Drought Preparedness Canal Modernization Project implements Agricultural Efficient Water Management Practices (EWMP) of: automating canal control structures and pumps with Supervisory Control and Data Acquisition (SCADA). The project increases the flexibility in timing of water ordering and delivery quantities in alignment with irrigation needs and reducing spills associated with limited ability to control delivery timing, and accurately measures the volume of water delivered to customers through metering. The project also will allow recharge of local stormwater and flood flows as well as future diverted surface water, when available. Water supply reliability will be improved with the construction of two groundwater (GW) recovery wells so that recharged GW can be recovered and delivered when surface water is not available.

IR.5 Groundwater recharge and management projects: Automated canal control structures will allow GW recharge through soft canal bottoms of local stormwater and flood flows in the near-term and with diverted surface water in the long-term. Recharge is in alignment with YCFCWCD 2006 GWMP Qualitative Basin Management Objective (BMO) of "Facilitate GW replenishment and cooperative management projects, including subsidence monitoring". The two GW wells will allow recovery of recharged water to improve conjunctive management of surface water and GW.

IR.7 Water banking, exchange, reclamation, and improvement of water quality: Automated canal control structures will also allow banking of local stormwater and flood flows in the near-term and future banking of diverted surface water through soft canal bottoms. The surface water will be generally of higher water quality and thereby improve the GW quality.

IR.10 Drinking water treatment and distribution: The automated canal control structures facilitate preservation of surface water in storage so less GW is used and also augment GW in storage through recharge which reduces vertical migration of high nitrate water from upper zones to lower potable pumping zones reducing violations of the nitrate Maximum Contaminant Level (MCL) in the YCFCWCD-managed groundwater basin. High nitrate water requires treatment and/or blending prior to delivery or shutting down the well if treatment or blending water is not available. There are about 200 domestic Municipal and Industrial (M&I) wells in Western Yolo County; at least 3 wells in Woodland are impacted by nitrate as discussed in the Project 5 narrative.

IR.11 Ecosystem and fisheries restoration and protection: The water savings from the automated canal control structures will allow more water to be retained water in storage at Indian Valley Reservoir (IVR) that can be used to ensure that the 10 cfs releases for maintenance of fisheries and ecosystem habitat continue along Cache Creek which is a California Wild and Scenic River as of October 2005. In addition, GW recharge will improve GW levels, which facilitates many of the creeks and sloughs to become gaining reaches providing flows for additional ecosystem benefit.

2. Project Description

Implementing Agency: Yolo County Flood Control and Water Conservation District (YCFCWCD)

25 word description: The YCFCWCD Project constructs two wells, 11 automated gates with meters/SCADA and installs SCADA at 44 pumps to improve water delivery/accurate measurement to irrigation customers.

a. Eligible Drought Project Type Explanation

D.1 Provide immediate regional drought preparedness by increasing water savings through improving efficiency of the timing and duration of agricultural (ag) water deliveries thereby reducing spills over the YCFCWCD service area which represents 39% of the ag acreage in the Valley Floor area of the Region. The project thereby retains surface water in IVR for domestic use at Spring Valley (Project 4) and ecological releases during droughts. The facilities also can be used for direct wintertime recharge of stormwater/flood flows as well as future surface water diversions which increases GW in storage for long-term drought preparedness for both ag and municipal/industrial benefit for the most populated portion of the Region.

D.2 Increase local water supply reliability and the delivery of safe drinking water by retaining water in storage at IVR for delivery to the 493 customers of CSA #2 (Spring Valley – Project 4) in Lake County. IVR is the sole drinking water supply for CSA #2 therefore the project provides immediate local water supply reliability for domestic use. In addition, future recharge improves GW in storage for potable uses for the 200 municipal water wells within YCFCWCD in the long-term.

D.4 Reduce water quality conflicts or ecosystem conflicts created by the drought. Lack of surface water has increased GW pumping resulting in rapidly falling water levels that has drawn high nitrate water from shallower aquifer zones down to deeper aquifer to the extent that the nitrate MCL is being exceeded. In addition, lack of surface water creates a risk of insufficient releases from IVR for fishery habitats in Cache Creek, a California Wild and Scenic River.

b. How the Project Alleviates Drought Impacts

As described in Attachment 2, the primary drought impacts are the zero delivery of surface water for 2014 from IVR. This resulted in an additional 150,000 AFY of GW pumping for irrigation which has caused GW level declines of about 49 feet for municipal users, such as Woodland, between April and May 2014. Current GW levels are lower than during the '90-'92 and the '76-'77 droughts. As a consequence, the GW underlying YCFCWCD is:

At risk of not meeting existing drinking water demands. Falling GW levels and increased nitrate has resulted in the loss of production from 6 out of 19 (1/3) of Woodland's wells thus increasing the risk of not meeting drinking water demands in not only Woodland but potentially other municipal and private wells in the Region. Future reductions of IVR releases by improving efficiency of delivered surface water and GW recharge, will increase GW storage to be delivered for drinking water supplies.

Facing drinking water MCL violations. Falling GW levels have resulted in high nitrate water from upper aquifer zones to be drawn downward to deeper pumping zones exceeding the nitrate MCL of 45 mg/L in 3 Woodland wells which have been taken off line. The project will alleviate this drought impact by reducing the demand on GW through more efficient surface water use and increasing GW recharge which will reduce the rate of GW level decline and resulting vertical migration of nitrate from upper aquifer zones to deeper pumping zones.

Risk of groundwater basin overdraft. The lack of surface water deliveries which is a significant source recharge has resulted in increased GW pumping of about 150,000 AFY. Increased pumping has resulted in rapidly falling GW levels that, as of May 2014, are lower than during the '76-'77 drought. Continued pumping in the summer of 2014 will increase the risk of basin overdraft.

Other drought related adverse impacts. Lower GW levels increases energy for pumping as the pump is lower and operating off of its optimal, most efficient curve. In addition, falling GW levels increases the risk of land subsidence which was up to 5.4' between Dixon north to Zamora from GW pumping in the 1950s – 1980s (Ref. 1 Woodland GWMP, p. 2-8). Land subsidence monitoring through the local Subsidence Monitoring Project is now an integral part of the local GWMP implementation. Recent DWR extensometer data provided on an informal basis has shown changes in ground surface elevations.

Expedited funding is needed. The lack of surface water and resulting decline of the GW table has already put wells out of service for water quality and/or level issues and jeopardized the agricultural economy of the Region. YCFCWCD has suffered significant loss of revenue from zero surface water delivery. Expediting funding is need to install these Ag EWMPs in order to provide modest short-term water savings, GW recharge, and GW recovery and be able to provide more significant future long-term GW recharge opportunities to benefit both the municipal GW users as well as ag water users, thereby preserving economic benefits to YCFCWCD customers and local municipalities.

3. Project Map

Figure 3-2, a map of the YCFCWCD Project follows.

4. Project Physical Benefits

Overview of Benefits of Project 1

The YCFCWCD Drought Preparedness Canal Modernization Project has several quantifiable physical benefits, detailed below, including:

A. Water savings of 7,000 acre-feet/year (AFY) because of reduced spills through improved precision of the timing and control over water deliveries to agricultural customers.

B. Increased GW Production to 7,600 AFY

C. Save 972 gallons of gasoline for truck travel

D. Reduced staff time of 250 hrs/year from automation

The project also has several non-quantifiable benefits that are detailed in Section 5 that include:

- Increased recharge using local stormwater and flood flows
- Reduces vertical migration of nitrate to deeper GW in Woodland and Davis by raising GW levels through surface water savings and GW recharge
- Overall GW quality improvement because the local stormwater and flood flows are likely to be lower nitrate, chrome VI; and selenium than recharge water
- Ecological and recreational/economic benefits of having more surface water to release. Additional flows can enhance the rafting season on Cache Creek which attracts tens of thousands of visitors a year.
- Annual diesel savings and associated greenhouse gas (GHG) emission reductions from reduced on-farm pumping which is attributable to improved delivery flexibility with SCADA and automatic gate facilities allowing for early shut offs when irrigation needs are complete.
- Increased availability of surface water will reduce energy use and associated GHG emission reductions because the equivalent quantity of water is not pumped from GW.
- Increased energy savings and GHG emission reductions resulting reduced pumping costs from rising GW levels through GW recharge with local stormwater and flood flows in the near-term; and diverted surface water in the long-term.
- Avoided electrical usage and GHG emissions from installation of solar panels and battery for SCADA and gate operation of each gate.

Benefit A: 7,000 AFY of estimated savings

The project will save an estimated 7,000 AFY on average of diverted surface water starting in early 2016 after installation of the gates and SCADA controls. The estimated useful life for the gates is 20 years therefore a 20 year analysis starting in 2016 is provided in PSP Table 5A that follows.

Benefit B: Increase GW Production to 7,600 AFY

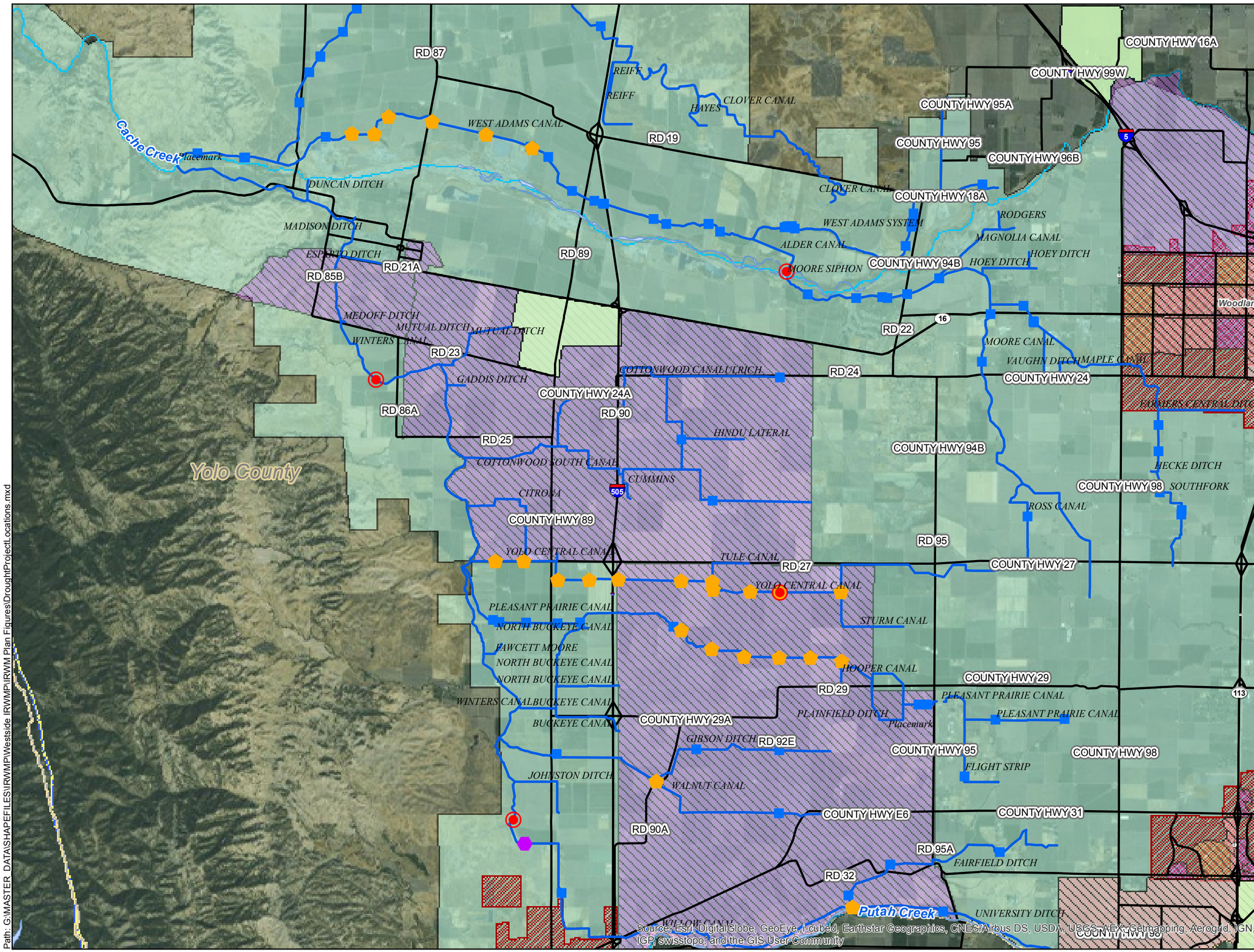
The project is estimated to allow for the production of 7,600 AFY (2,500 GPM per well) from the two new YCFCWCD wells. The estimated useful life for the wells is 20 years therefore a 20 year analysis starting in 2016 is provided in PSP Table 5B that follows.

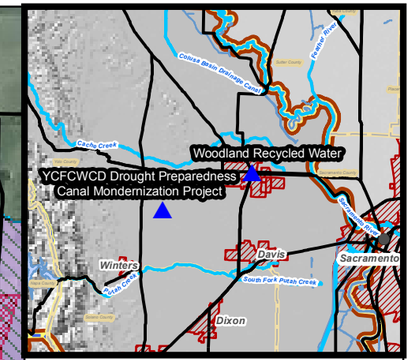
Benefit C: Save 972 gallons of gasoline//8,531 kg of Co2e GHG emission reduction from reduced truck travel

The project is estimated to save 972 gallons per year of gasoline from reduced truck travel resulting from canal automation. The installation of the gates and SCADA controls is estimated to be complete by the end of 2015 and the estimated useful life for the gates of 20 years. Therefore a 20 year analysis starting in 2016 is provided in PSP Table 5C1 that follows. There is an associated GHG reduction of 8,531 Kg/year of CO2e reduction from these gasoline savings which is tabulated in PSP Table 5C2.

Benefit D: Reduced staff time of 250 hrs/year, staff work on other projects

The project is estimated to save 250 hours per year of staff time that can be used for other purposes from reduced travel time to open/close gates and read meters resulting from canal automation. The installation of the gates and SCADA controls is estimated to be complete by the end of 2015 and the estimated useful life for the gates of 20 years. Therefore a 20 year analysis starting in 2016 is provided in PSP Table 5D that follows.





Legend

- 4 Potential Well Locations - 2 to be installed
- 30 Potential Gate Locations - 10 to be installed
- 89 Potential Flow Meter Locations - 35 to be installed
- Chapman Reservoir Outlet
- Canals
- City Boundaries
- Planning Areas
- YCFCWCD District Boundary
- Streams
- Water Bodies
- DACs (Census Places)
- DACs (Census Tract)
- DACS (Census Blocks)

N

0 1.5 3 Miles

Kennedy/Jenks Consultants

Westside-Sacramento 2014 Drought Funding Application

YCFCWCD Drought Preparedness Canal Modernization Project

K/J 1170019.00
July, 2014

Figure 3-2

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Table 5A – Annual Project Physical Benefits			
Project Name: YCFCWCD Drought Preparedness Canal Modernization Project Type of Benefit Claimed: Surface Water Saved Units of the Benefit Claimed : Acre-feet per year (AFY) Additional Information About this Benefit: This assumes reducing a portion of the 5% estimated losses.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	0
2015	0	0	0
2016	0	7,000	7,000
2017-2035	0	7,000	7,000
2036	0	7,000	7,000
Total		140,000	140,000
Comments: This is an average annual surface water saved from reduced spillage from more precise timing of delivery allowing for early shutoff as needed			

Table 5B – Annual Project Physical Benefits			
Project Name: YCFCWCD Drought Preparedness Canal Modernization Project Type of Benefit Claimed: GW Production Units of the Benefit Claimed : Acre-feet per year (AFY) Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	0
2015	0	0	0
2016	0	7,600	7,600
2017-2035	0	7,600	7,600
2036	0	7,600	7,600
Total	0	152,000	152,000
Comments: This is an average annual GW production which includes consideration of hydrology			

Table 5C1 – Annual Project Physical Benefits			
Project Name: YCFCWCD Drought Preparedness Canal Modernization Project Type of Benefit Claimed: Gasoline Saved Units of the Benefit Claimed : gallons/year Additional Information About this Benefit: This is based on reduced travel to 20 gate locations to open/close gates and take meter measurements.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	0
2015	0	0	0
2016	0	972	972
2017-2035	0	972	972
2036	0	972	972
Total	0	19,440	19,440
Comments:			

Table 5C2 – Annual Project Physical Benefits			
Project Name: YCFCWCD Drought Preparedness Canal Modernization Project Type of Benefit Claimed: GHG Emissions reduced Units of the Benefit Claimed : Kg CO2e/year Additional Information About this Benefit: This is based on reduced travel to 20 gate locations to open/close gates and take meter measurements.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	0
2015	0	0	0
2016	0	8,531	8,531
2017-2035	0	8,531	8,531
2036	0	8,531	8,531
Total	0	170,620	170,620
Comments:			

Table 5D – Annual Project Physical Benefits

Project Name: YCFCWCD Drought Preparedness Canal Modernization Project

Type of Benefit Claimed: Labor saved

Units of the Benefit Claimed : Hours/year

Additional Information About this Benefit: This is based on reduced staff time manually opening and closing gates and taking meter measurements

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	0
2015	0	0	0
2016	0	250	250
2017-2035	0	250	250
2036	0	250	250
Total	0	5,000	5,000

Comments:

5. Technical Analysis of Physical Benefits Claimed

a. Technical basis of the Project including description of Physical Benefit A – 7,000 AFY of savings

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

The YCFCWCD is responsible for delivering surface water supplies from IVR and Clear Lake on Cache Creek to about 200,000 acres of agriculture through 165 miles of canals and manually operated gates to direct water to customer fields in western Yolo County. The YCFCWCD normally has about 225,000 AFY available in storage to deliver to customers. Due to the severity of the current drought, YCFCWCD informed its customers in 2014 that no (zero) Cache Creek surface water deliveries would be available. Similar drought conditions and lack of delivery occurred in 1977 and 1990. Since 2013, YCFCWCD has embarked on projects to improve water delivery efficiency and provide water savings from reducing spills

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Canal Modernization Project, water waste/spills would continue to occur because gate tenders would not be able to quickly respond if farmers finish irrigating early. While all efforts are made to reuse the water at downstream farms using tailwater pumping and other methods, it is difficult to control with the current manual systems available and any water that is not used for irrigating will be spilled. No other projects are likely to be undertaken if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

The methods used to estimate the savings of 7,000 AFY of surface water are the 5% loss estimate provided by the YCFCWCD General Manager who has over 25 years of experience in water and irrigation management. The YCFCWCD loss estimate is corroborated by the 2010 Truckee Carson Irrigation District (TCID) Water Conservation Plan which estimated that 17,000 AFY out of 307,653 AFY (or 5.5%) of water is spilled (Ref. 2, TCID Water Conservation Plan, p. 1-11 and 3-11). TCID has a system similar to YCFCWCD which is gravity fed with manual operation gates. 5% of YCFCWCD's average and wet season delivery of 200,000 AFY is 10,000 AFY of spill losses. A reduced value of 3.5% of the total 200,000 AFY average delivery or 7,000 AFY is used because 100% reduction of the losses is not possible and because only the higher flow and therefore priority gates which represents the majority of the losses will be replaced with this project.

These estimates will be verified using of available metered information including both manual measurements and the SCADA based measurements of both water delivered and water diverted at key locations in the system. Manual measurements are expected to result in order of magnitude estimates; as more locations become automated, the precision and accuracy of the estimates will improve.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The new facilities required to obtain the physical benefits of water savings from the project, other include new SCADA Flow meters at 40 on-farm locations and new automated canal gates at about 30 locations. All locations will use solar panels and batteries to provide power.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. sedimentation from the gate installation, and noise from construction equipment. No permanent adverse physical effects are anticipated. These projects are all Categorically Exempt from CEQA as they replace existing gates.

b. Technical basis of the Project including description of Physical Benefit B – Increased GW production up to 7,600 AFY

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

The recent and historical conditions that support the production of 7,600 AFY of groundwater production are that recharge groundwater in the range of 18,000 AFY – 64,000 AFY occurs from canal losses that are estimated at 25%. At present, YCFCWCD has no groundwater pumping facilities to recover this recharged water.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Drought Preparedness component of the project which consists of two 2,500 gpm wells, the groundwater which is lost through the canals and recharged from the Canal Modernization component could not be pumped and delivered to YCFCWCD customers, which also makes up some of the revenue lost when there is no surface water delivery. No other projects are likely to be undertaken if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

The estimate of 7,600 AFY of groundwater production is based on both the losses that occur as well as the typical pumping rates that occur from agricultural wells in the YCFCWCD service area. The 2012 Enhanced Canal Recharge Feasibility Report provides an estimate of canal system losses based on the difference between diversion vs sales. The losses ranged from 18,000 to 64,000 AFY and averaged 38,000 AFY from 1970 – 2009 and are largely recoverable as the majority of these losses recharge the groundwater (Ref 3, 2012 Enhanced Canal Recharge Feasibility Study, P. 11).

As with Benefit A, a conservative estimate of 20% of the average loss of 38,000 AFY or 7,600 AFY can be recovered through the two 2,500 gpm (4,000 AFY/each – maximum) wells in the project.

The methods to be used to monitor the physical benefits include meters at the pump discharge of each well.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The elements of the Project that will contribute to obtaining the benefits of groundwater recovery are the two wells planned for 600 ft depth, 16-inch diameter and 2,500 gpm pumping capacity.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. dust from the trucks/drill rig travelling to the well sites, and noise from the drilling equipment and well pumps which are in a rural area. No permanent adverse physical effects that cannot be mitigated are anticipated.

c. Technical basis of the Project including description of Physical Benefit C – Savings of 972 gallons of gasoline/8,531 kg of Co2e GHG emission reduction

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

The recent and historical conditions for this benefit are the driving that is required for the ditch tenders to manually open and close the various gates on the 165 miles of canals in the YCFCWCD during irrigation season.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Canal Modernization Project, the additional truck will be driven during the irrigation season to meet the ditch tending needs. No other projects are likely to be undertaken to achieve this savings if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

YCFCWCD provided the following estimate of the required driving. Typically, during a non-drought year, the YCFCWCD gate systems needs 6 field staff on two shifts, 7 days a week to operate canal gates in ditches during the irrigation season. YCFCWCD estimates that one field staff person equivalent can be removed from ditch tending duties with the Canal Modernization Project. For the 2011 irrigation season (May to September) which is before droughts reduced deliveries, 5830 gallons of gasoline were used in the six pickup trucks driven by the field staff. The fuel use per truck is 972 gallons per irrigation season, reducing use by one truck would save of 8,531 kg of CO2. (Ref 4. YCFCWCD WUE Application, 2012) The methods to be used to monitor the physical benefits include the time/mileage that the truck is not in use during the irrigation season for ditch tending. Gasoline usage solely for ditch tending is difficult to measure as trucks are used for multiple purposes during the day.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The elements of the Canal Modernization Project that will contribute to obtaining the benefits of gasoline savings include new SCADA Flow meters

at 35 on-farm locations and new automated canal gates at about 30 locations. All locations will use solar panels and batteries to provide power. Data from on-farm flow meters and canal gates will be provided via SCADA rather than manual collection by ditch tenders.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. sedimentation from the gate installation, and noise from construction equipment. No permanent adverse physical effects are anticipated. These projects are all Categorically Exempt from CEQA as they replace existing gates.

d. Technical basis of the Project including description of Physical Benefit D – 250 hrs/year of labor savings

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

The recent and historical conditions for this benefit are the time required for driving and opening/closing gates that is required for the ditch tenders on the 165 miles of canals in the YCFCWCD during irrigation season.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Canal Modernization Project, the additional staff person will be needed to drive and to meet the ditch tending needs during the irrigation season. No other projects are likely to be undertaken if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

YCFCWCD provided the following estimate of the required staff time. Typically, during a non-drought year, the YCFCWCD gate systems needs 6 field staff on two shifts, 7 days a week to operate canal gates in ditches during the irrigation season. YCFCWCD estimates that one field staff person equivalent can be removed from ditch tending duties with the Canal Modernization Project which equates to 250 hrs during the irrigation season. (Ref. 4, YCFCWCD WUE Application, 2012) The methods to be used to monitor the physical benefits include the staff time recorded during the irrigation season for ditch tending before and after the project.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The elements of the Canal Modernization Project that will contribute to obtaining the benefits of labor savings include new SCADA Flow meters at 35 on-farm locations and new automated canal gates at about 30 locations. All locations will use solar panels and batteries to provide power. Data from on-farm flow meters and canal gates will be provided via SCADA rather than via ditch tenders.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. sedimentation from the gate installation, and noise from construction equipment. No permanent adverse physical effects are anticipated. These projects are all Categorically Exempt from CEQA as they replace existing gates.

e. Non-Quantifiable Benefits Description

The project also has several non-quantifiable benefits that are detailed below:

- Increased recharge using local stormwater and flood flows. The Canal Modernization facilities can be used to direct local stormwater and flood flows into the 165 miles of canal within YCFCWCD. If only 5% of the average 12-inches of rainfall from December through March from the 190,000 Acres within the YCFCWCD service area (Ref. 5, 2013 AWMP, p. 11) is captured and recharged in areas where GW storage exists, an estimated 9,500 AFY of additional GW in storage could result. There is some uncertainty in the percent of rainfall that could be captured, and so this benefit is not physically quantified for purposes of this grant application.
- Reduced vertical migration of nitrate to deeper GW in the Woodland area by raising GW levels through surface water savings and GW recharge. While not quantified, as GW levels recover through reduced pumping as more surface water is available for delivery and through enhanced recharge, the head and the flux/flow differences between the shallower and deeper aquifers will decrease and therefore reducing the vertical migration of nitrate to deeper aquifers.
- Overall GW quality improvement because the local stormwater and flood flows are likely to

be lower nitrate, chrome VI; and selenium than recharge water. The GW has anthropogenic nitrate and naturally occurring chrome VI and selenium all of which have the potential to result in drinking water or wastewater discharge violations. The water that is recharged is stormwater and flood flows in the near-term and diverted surface water, when available, in the long-term and will likely have lower concentrations these constituents. As a result of the recharge, the concentrations of these constituents will likely also decline over time.

- Ecological and recreational /economic benefits of having more surface water to release. As more water is available for storage in IVR, these flows are available for release later in the season. In addition to the ecological benefits, YCFCWCD coordinates releases with local rafting companies to improve/maintain conditions that attract tens of thousands of visitors a year on Cache Creek, a Wild and Scenic River with associated economic benefits to the Region.
- Annual diesel savings and associated GHG emission reductions from reduced on-farm pumping. Farmers pump the delivered water to distribute it on their farms. As the project SCADA and automatic gate facilities improve delivery flexibility allowing for early shut offs when irrigation needs are complete, the farmers can stop pumping earlier and save diesel fuel and reduce GHG emissions.
- Increased availability of surface water because saved water remains in surface storage will reduce energy use and associated GHG emission because the water does not need to be pumped from GW.
- Reduced energy usage and GHG emissions will result from rising GW levels because the total dynamic head will be reduced. Rising GW levels are an outcome of both surface water saved for future delivery rather than pumping GW and GW recharge with local stormwater and flood flows in the near-term and diverted surface water in the long-term.
- Avoided electrical usage and associated GHG emissions from installation of solar panels and battery for SCADA and operation of each gate. If grid electricity were used to operate the gates, additional energy would be used, most likely with a higher GHG emission than the use of solar panels.

6. Cost Effective Analysis

Table 6 – Cost Effective Analysis

Project Name: Yolo County Flood Control and Water Conservation District (YCFCWCD) Drought Preparedness Canal Modernization Project

Question 1

Types of benefits provided as shown in Table 5

- Benefit A: Saving 7,000 AFY of surface water - Pressurize 165 mile Canal System and Alternative gates
- Benefit B: Increased GW production of 7,600 AFY – Alternative is same as Project
- Benefit C: 972 gallons of fuel saved – No alternative
- Benefit E: 250 hrs of labor saved – No alternative

Question 2

Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes.

If no, why? Not Applicable

If yes, list the methods (including the proposed project) and estimated costs.

Alternatives Description	Estimated Costs (Capital and O&M)	Describe studies, plans, or documents that identify alternatives and costs of those alternatives.
Proposed project	$2.783m of Capital and $350,000/year O&M cost $66/AFY for 7,600 AFY	Project budget and YCFCWCD/consultant estimates
A. Pressurize Canal system in pipeline	$520m of capital for 165 miles of large diameter pipeline and 100 cfs pump station and $1.32m/yr of pumping costs for 100 cfs; $186/AFY for 160,000 AFY of delivery	YCFCWCD/consultant Estimates
B. Alternative Gates	$1.1m capital for 10 – 11 gates vs $800k for selected plus at least $3,600 $/yr of extra O&M $70/AFY for 7,600 AFY of delivery	YCFCWCD Staff estimates

Question 3

If the project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any benefits of the project that are different from the alternative project(s) or methods. Not applicable, the project is the least cost alternative.

Comments:

As summarized above, the proposed project has estimated capital of $2.783 million and an estimated Operations and Maintenance (O&M) of $350,000/year mostly to pump groundwater. The alternatives presented would achieve the same primary benefit of water savings but the proposed project has a wider array of benefits than some of the options considered. When compared to the other alternatives presented in the table, this is the least cost alternative that meets similar objectives of water savings and groundwater recovery.

Alternatives That are Not Feasible:

One of the alternatives that was considered but discarded as infeasible was the purchase and delivery of additional surface water. There are no more unallocated water rights from Clear Lake or IVR on Cache Creek, therefore other senior agricultural water rights from elsewhere would be required, if available. A surface water right would be a lower reliability and at a much higher cost than the

Table 6 – Cost Effective Analysis

Project Name: Yolo County Flood Control and Water Conservation District (YCFCWCD) Drought Preparedness Canal Modernization Project

proposed project. For comparison purposes, Woodland's municipal surface water right is $4,040/AF as described in Project 2 Project Justification. In addition, even if surface water from the Sacramento River, for example, were available, there is no pipeline/canal infrastructure to deliver it to YCFCWCD. For these reasons, this alternative was considered infeasible because it did not meet the project objectives.

In addition, constructing wells in a different location is the same as Benefit C and was not analyzed further.

Alternative A – Additional Narrative

One alternative to deliver water savings (but not GW recharge) is to pressurize the 165 miles of canals by constructing pipelines that would need to deliver 800 cfs at the upstream end; about 500 cfs at the Winters diversion, and 100 cfs at the West Adams diversion as well as a 100 cfs pump station to pressurize the pipeline when head becomes insufficient for water to flow to flow. Pipeline diameters range from about 144" down to 51" diameter. Planning-level cost estimates for this alternative were prepared using unit cost, pipeline length, and flow assumptions and include:

- 8 miles of 144" pipeline at a cost of $50.5 million
- 24.75 miles of 114" pipeline at a cost of $119.7 million
- 132 miles of 51" inch pipeline at a cost of $285 million
- 100 cfs (64 MGD) pump station at a cost of $64.4 million

For a total capital cost of $520 million and a pumping energy cost of about $1.32m/year

With an expected life of 50 years and an estimated delivery of 160,000 AFY, which is an average surface water delivery for YCFCWCD, results in an annual water cost of $187/AFY.

Alternative B – Additional Narrative

This alternative was studied by YCFCWCD before selecting the gates by Mopac, Langemans, and Watch Tech that are proposed for this Project. YCFCWCD spent 7-8 years conducting field studies of gates by various manufacturers. One of the vendors was Rubicon whose gates were about 20% more than the selected gates ($100,000/gate vs $80,000/gate). In addition, to the higher initial capital expense, the Rubicon automated gate broke down frequently where additional time was spent nearly every day troubleshooting and repairing the gate which required additional staff time, resulted in water waste, and non-delivery of water to the farmer. In addition, the gate had a proprietary SCADA controller which required additional staff time to program and integrate. For these myriad reasons, these more expensive, higher operations and maintenance cost gates were not selected and the lower cost gates were selected by YCFCWCD.

With an expected life of 50 years and an estimated delivery of 7,600 AFY, which is the average savings for gate automation, results in an annual cost of $70/AFY.

References:

1. Woodland GWMP, 2006.
2. Truckee Carson Irrigation District Water Conservation Plan, 2010.
3. YCFCWCD Enhanced Canal Recharge Feasibility Report, 2012
4. YCFCWCD WUE Grant Application, 2012.
5. YCFCWCD AWMP, 2013.

These references are provided in the file labelled Att3_DG_ProJust_2of4.pdf.

PROJECT 2: Woodland Recycled Water (RW) Project

1. Project Summary Table Explanations

a. Eligible IRWM Project Explanation

As summarized in PSP Table 4 above, the Woodland RW project is of the following eligible IRWM project types. Explanations as to relevance of each type follows:

IR.1 Water supply reliability, water conservation, and water use efficiency – The Woodland RW project reduces demands on the potable water system by initially delivering 1,280 AFY of RW from the existing tertiary wastewater treatment plant thereby increasing reducing potable water demands and increasing overall supply reliability. The pipeline allows, with expanded infrastructure, additional RW deliveries in the future to provide both near-term and long-term supply reliability. Recycled water will directly offset groundwater (GW) pumping in an aquifer that has had significant recent water level declines from 9 feet below MSL to 58 feet below MSL from April to May 2014.

IR.5 Groundwater recharge and management projects – The Woodland RW project meets this IRWM project type by providing both in-lieu recharge from reduced pumping and will allow for future direct recharge of wintertime surface water, when available, after 2016 when the Woodland-Davis Clean Water Program surface water diversion, treatment and conveyance facilities are completed. It is a GW management project that meets the Woodland 2011 GWMP and Yolo County FCWC 2006 GWMP Basin Management Objectives (BMOs). The Woodland BMO is to maintain GW elevations that result in a net benefit to basin GW users (Ref. 1, Woodland GWMP, p. ES-3) and will prevent the trigger of ¾ wells within 25% of lowest water recorded which is the Yolo BMO (Ref., 2, Yolo GWMP, p. 12)

IR.6 Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users – The Woodland RW Project meets this IRWM project type by providing the conveyance for immediate distribution of 1,280 AFY of reclaimed water.

IR.7 Water banking, exchange, reclamation, and improvement of water quality – The Woodland RW project meets this IRWM project type because it allows for both for in-lieu and direct water banking and is a reclamation project that exchanges potable GW for RW for irrigation and industrial uses.

IR.10 Drinking water treatment and distribution – The Woodland RW project is, indirectly, a drinking water treatment and distribution project type because the use of RW reduces reliance and demand on the drinking water provided by GW. It also preserves GW (and surface water after 2016 when it becomes available); and frees up capacity in potable water treatment and distribution. It also allows for increased storage of drinking water via both in-lieu recharge and future direct winter-time recharge of surface water that would otherwise be used by the RW customers through the aquifer storage and recovery wells.

2. Project Description

Implementing Agency: City of Woodland (Woodland)

25 word description: The Woodland Recycled Water Project constructs a pump station and distribution system to provide 1,280 AFY of reliable water supply to industrial and irrigation customers.

a. Eligible Drought Project Type Explanation

D.1 Provide immediate regional drought preparedness by delivering existing tertiary-treated RW to meet several large industrial and irrigation demands thereby retaining GW for other uses in the southern part of the Region for near-term and long-term drought preparedness. The RW project is a Regional project consistent with CWC §10537 by improving water quality by matching water quality to water use.

D.2 Increase local water supply reliability and the delivery of safe drinking water by providing a highly reliable RW supply that can be used to meet non-potable demands in Woodland thereby allowing potable GW to remain for drinking water, particularly to meet daily and peak demands.

b. How the Project Alleviates Drought Impacts

The primary drought impacts described in Attachment 2 for Woodland are the precipitous GW level declines experienced between April and May 2014. The average GW elevation in Woodland's wells dropped from -9 feet MSL (mean sea level) in May to -58 feet MSL as shown in Attachment 2. Current GW levels are worse than those during the 1990-1992 drought period and similar to those of the 1976-1977 drought. As a consequence, Woodland is:

At risk of not meeting existing drinking water demands: Falling regional GW levels, often associated with increased agricultural GW pumping, have resulted in nitrate contamination of 3 of the 19 Woodland wells which are now off-line. Of the wells that remain in service, wells are pumping off of the pump curves as water level decline and are delivering 30% less flow which severely restricts Woodland's ability to meet peak drinking water demands and fire flows. The project will alleviate this impact by providing a constant supply of RW to several key industries and parks that will allow the GW to be conserved and delivered for drinking water supplies.

Facing Drinking water MCL violations: Falling GW levels have also resulted in high nitrate water from upper aquifer zones to be drawn downward to deeper pumping zones. Nitrate levels have increased from 36 mg/L as N03 as of 7/1/2009 to 43 mg/L as N03 as of 7/1/2011 and have resulted in 3 wells being taken off line because of exceedances of the nitrate MCL of 45 mg/L as NO3. Two other wells are nearing the 45 mg/L as N03 MCL and are at risk of being taken off line. Woodland has limited alternative supplies with which to blend this water to meet drinking water MCLs. The project will alleviate this impact by reducing the demand on GW, reducing the rate of GW level decline and resulting vertical migration of nitrate from upper aquifer zones to deeper pumping zones.

Risk of Groundwater basin overdraft: The falling water levels from increased agricultural GW pumping, are the result of loss of surface water deliveries (which constitute a significant source of recharge) which increases the risk of GW basin overdraft. The GW levels are lower than during the 1976-1977 drought for May 2014 and continued pumping will increase the risk of basin overdraft. It should be noted that even with average or above average rainfall, GW level recovery can take 2- 3 years. The Woodland and Yolo GWMPs have BMOs to address the risks of overdraft.

Other drought related adverse impacts: Lower GW levels has resulted in increasing energy for pumping because of lower efficiency as the pumps are operating off of their optimal curve. (Ref. 3, Woodland Well 13 Pump Curve, 2014) In addition, falling GW levels increases the risk of land subsidence. Historically subsidence of up to 5.4' from large volume GW pumping from the 1950s – 1980s has occurred between Dixon north to Zamora which includes Woodland (Ref. 1, Woodland GWMP, p. 2-8). Land subsidence monitoring is now an integral part of the Woodland and Yolo GWMP implementation through participation in the Yolo Water Resources Association Yolo Subsidence Monitoring Project. YCFCWCD staff noted that recent DWR extensiometer data that was provided on an informal basis has shown dramatic changes in ground surface elevations.

Expedited funding is needed. The rate of decline of the GW table has already put three wells out of service for water quality and has resulted in the remaining 16 out of 19 Woodland wells at reduced pumping capacity and efficiency because the pumps are no longer pumping on their design curves as a result of falling water levels. Expedited funding is needed to provide RW for non-potable uses in order to reduce the GW pumping and rate of decline of the water levels to maintain pumping capacity and to preserve GW in storage for Woodland potable water users, some of whom are in DAC. RW will also allow valuable industries to continue operating and provide economic benefit to Woodland, and parks to remain open for recreation for Woodland's citizens.

3. Project Map

Figure 3-3, a map of the Woodland RW Project follows.

4. Project Physical Benefits

Overview of Benefits of Project 2

The Woodland RW Project has several quantifiable physical benefits, detailed below, including:

A. Delivery of 1,280 AFY of RW with the initial connections.

The project also has several non-quantifiable benefits which are detailed in Section 5 including:

- Reduced vertical migration of nitrate to deeper GW when GW levels stabilize and increase from reduced pumping which results with RW delivery
- Reduced energy usage and associated GHG reduction for lower head RW as compared to GW pumping for an equivalent quantity of water.
- Reduced energy usage and associated GHG reduction for GW pumping as GW levels increase.
- Provides increased economic development potential in Woodland by improving overall water supply reliability.
- The use of RW avoids surface water diversions, especially during drought, when available after 2016 which increases future ecological benefits in the Sacramento River delta.

Benefit A: Delivery of 1,280 AFY of RW with initial connections

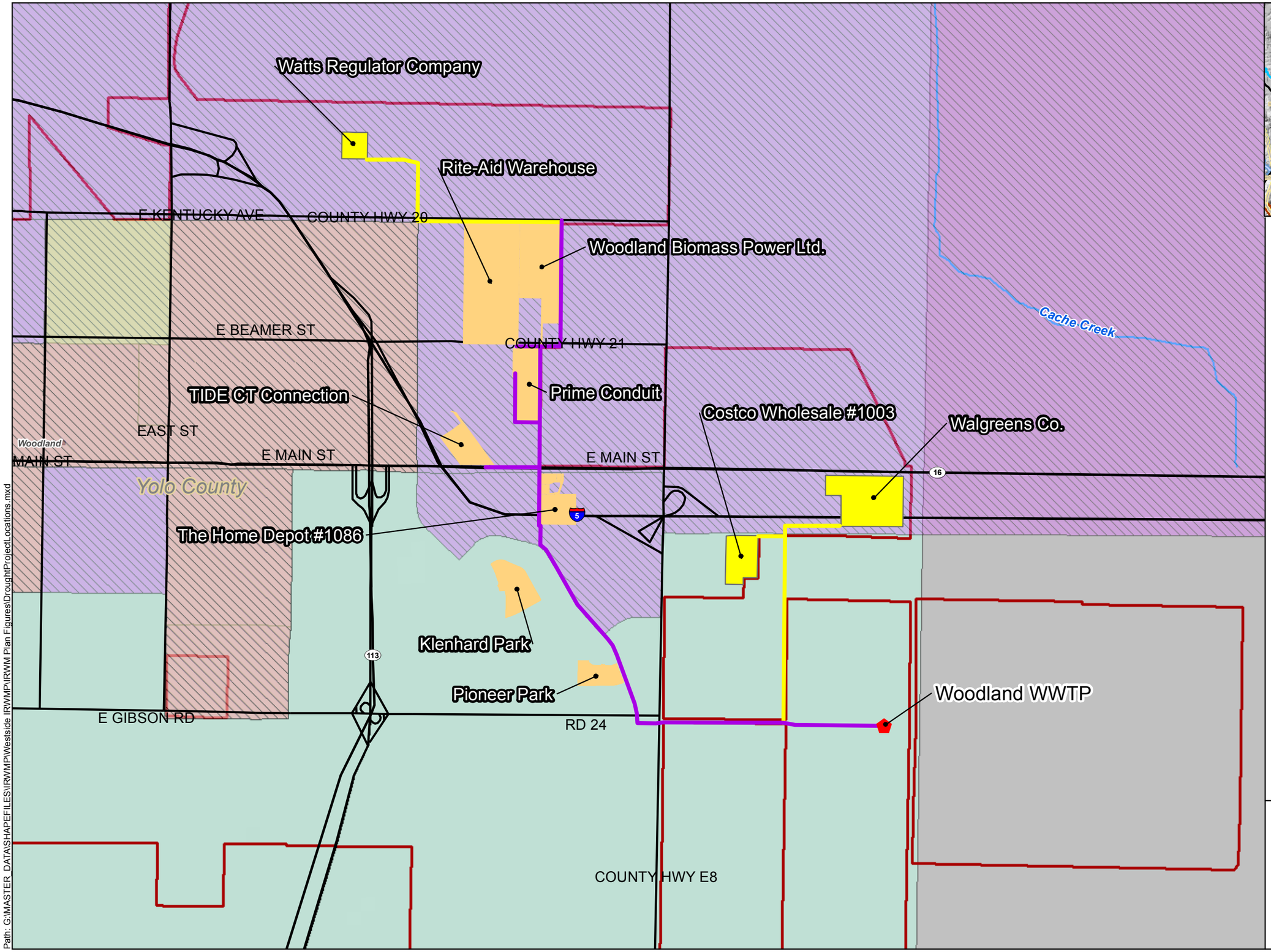
The project will deliver 1,280 acre-feet per year (AFY) of RW starting in early 2016 and the estimated useful life for the pipeline is at least 50 years. Therefore a 50 year analysis starting in 2016 is provided in PSP Table 5A that follows.

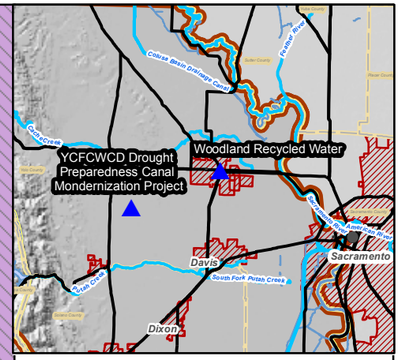
Table 5A – Annual Project Physical Benefits

Project Name: Woodland Recycled Water Project
Type of Benefit Claimed: Recycled Water Delivered for beneficial use
Units of the Benefit Claimed: Acre-feet per year (AFY)

Additional Information About this Benefit: This benefit is an initial benefit from the RW pipeline, in the future, additional RW delivery will occur through this pipeline with the construction of additional pipeline delivery infrastructure.

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014			
2015			
2016	0	1,280	1,280
2017-2065	0	1,280	1,280
2066	0	1,280	1,280
Total	0	64,000	64,000
Comments:			





Legend

- Woodland WWTP
- Project Pipelines
- Future Alignment Pipelines
- Initial Project Customers
- Future Project Customers
- City Boundaries
- Project Location
- County Boundaries
- YCFCWCD District Boundary
- Streams
- Water Bodies
- DACs (Census Places)
- DACs (Census Tract)
- DACS (Census Blocks)

N

0 0.4 0.8 Miles

Kennedy/Jenks Consultants

Westside-Sacramento 2014 Drought Funding Application

Woodland Recycled Water Project

K/J 1170019.00
July, 2014

Figure 3-3

Path: G:\MASTER_DATA\SHAPEFILES\IRWMP\Westside IRWMP\IRWM Plan Figures\DroughtProjectLocations.mxd

5. Technical Analysis of Physical Benefits Claimed

a. Technical basis of the Project including Description of Physical Benefit A – delivery of 1,280 AFY of RW

In 2013, Woodland prepared a draft Recycled Water Opportunities Evaluation (Ref. 4, Brown and Caldwell, 2013) which studied the use of approximately 2,700 gpm (4,355 AFY) of tertiary treated Title 22 effluent from the Woodland's Water Pollution Control Facility (WPCF). Currently, the tertiary effluent is discharged to the Tule Canal which eventually drains, after 8 miles to the Yolo Bypass. There is limited recharge of tertiary effluent because of the shallow low permeability soils that lies immediately below the Tule Canal.

Woodland has a large industrial area northwest of the WPCF which includes several large water users that are eager to use the RW for cooling of various industrial processes. In addition, there are two City Parks along the RW pipeline alignment that would use the water for irrigation. The proposed sites that would be included in this initial phase of the City's Water Recycling Project are as follows:

User Category	Phase	Site Size (Acres)	Recycled Water Use	Annual Use (Acre Feet)
City Park Uses	1	27	Landscape irrigation	80
Industrial Uses	1	37	Industrial cooling	549
City Services	1	78	Landscape irrigation	116
Golf Courses	1	36	Landscape irrigation	135
Public Schools	1	121	Landscape irrigation	400
Total	**-**	**299**		**1,280**

Woodland has additional large agricultural and industrial users that could be added to the RW system in the future that could include up to 577 acres with annual water use of 1,481 acre feet/year. In the future, Woodland intends to fully utilize the 4,355 AFY of RW available; the pipeline constructed with the project is part of the backbone RW transmission infrastructure and is a necessary first step to full-scale RW delivery.

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

The recent and historical conditions that support the use of 1,280 AFY of RW are of GW level declines that limit available water supplies and the discharge of tertiary treated RW to Yolo Bypass rather than being used for beneficial use.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Woodland RW project, it is anticipated that there will be further declines of GW levels; the degree of which is unknown as the current water levels in Woodland are lower than occurred during the 1976-1977 drought (see Att. 2 for hydrograph) which is the most severe drought event for which there are data. Without the project, Woodland would need to construct a new well with wellhead treatment for nitrates and chromium 6 in the future at a cost of $7-8M with an annual O&M cost of approximately $0.5M in 2014 dollars. Without the project, the discharge of 4,355 AFY of tertiary treated RW to Yolo Bypass would continue and not be put to beneficial use.

iii. Provide a description of methods used to estimate physical benefits.

Woodland estimated the amount of RW use for this project based on the Recycled Water Opportunities Evaluation (Ref. 4, Brown and Caldwell, 2013, pg. 28). That study estimated the irrigation and cooling requirements of customers likely to be added to the RW system. Those customers by category, the parcel size and water use are shown 5.a. above. The methods that will be used to monitor the physical benefit of RW delivered will be to meter data at the point of delivery to each of the customers.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

Delivery of the RW produced by the existing tertiary facilities will require a new 20,000 LF 12" diameter pipeline and installation of 2,500 gpm of additional pumping capacity at an existing pump station at the WPCF. The pump station was originally constructed with space to add additional pumps therefore does not require extensive construction to add the 2,500 gpm of new RW pumping capacity. In addition, some

piping modifications including cross-connection control facilities in accordance with the California Department of Public Health (CDPH) requirements will be necessary at each use site to segregate the potable from the RW water facilities. Individual facilities will also include meters to record actual RW usage.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. traffic from the pipeline installation, dust from excavation and disturbed soils, and noise from construction equipment. A California Environmental Quality Act (CEQA) mitigated negative declaration will be prepared for this project and no permanent adverse physical effects that cannot be mitigated are anticipated.

b. Non-Quantifiable Benefits Description

- Accelerated pumping and reduced natural recharge during past droughts has caused vertical migration of nitrates in the groundwater aquifer. As more RW is delivered, less GW is pumped and GW levels should stabilize and/or increase, which will reduce the difference in head between the higher nitrate shallow GW and the lower nitrate deep GW which is the source of potable supply. The reduction in head will reduce the vertical migration of nitrate from shallow to deep aquifer.
- Reduced energy usage and associated GHG reduction for lower head RW as compared to GW pumping for an equivalent quantity of water. For an equivalent quantity of water, RW requires less energy to delivery than GW. It is estimated that delivery of RW reduces 21,380 kilowatts (kW) per year of energy used compared to GW pumping and reduces 1.8 kg of CO2e per year of Greenhouse Gas (GHG) production from energy savings
- Reduced energy usage for GW pumping as GW levels increase. As GW levels stabilize and rise with increased RW use and increased recharge, total dynamic head will decrease so that less energy is required for GW pumping.
- Provides increased economic development potential in Woodland by improving overall water supply reliability. RW provides a highly reliable supply for valuable industries that will stay in Woodland and continue to provide tax revenue to Woodland.
- The use of RW avoids surface water diversions, when available after 2016, especially during drought, which increases future ecological benefits in the Sacramento River delta. In the future, with an alternative RW supply, Woodland can reduce its reliance on surface water during drought, thus leaving valuable surface flows during drought for ecological benefit.

6. Cost Effective Analysis

Table 6 – Cost Effective Analysis

Project Name: Woodland Recycled Water (RW) Project

Question 1	Types of benefits provided as shown in Table 5 Benefit A: Delivery of 1,280 AFY of RW
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes.
	If no, why? Not Applicable
	If yes, list the methods (including the proposed project) and estimated costs.

Alternatives Description	Estimated Costs (Capital and O&M)	Describe studies, plans, or documents that identify alternatives and costs of those alternatives.
Proposed project	$5,445,740 Capital and $50,000/yr O&M ($309/AF)	City of Woodland budget and Kennedy/Jenks O&M Estimate
A. Purchase of additional senior Surface Water rights	$21,732,432 for 5,379 AF of water rights or plus $29,611,000 capital and $806,560/yr for O&M for 5,379AF for diversion, treatment and conveyance cost. Total Water rights plus treatment = $4,195/AF	Woodland Surface Water Purchase Contract (Ref. 5, p. 6) ; CDPH loan for Woodland portion of diversion, treatment, and conveyance cost for delivery to Davis Clean Water Agency Surface Water Project; 2014 (Ref. 6, p. 4)
B. Drill new, deeper well with Nitrate/selenium /Chrome VI treatment of GW	$7.3 million capital for well plus treatment ($5,703/AF) plus $450,000/year for treatment, electricity, and chemicals	2013 Woodland Well 28 construction costs (Ref. 7) and 2013 WRF Study (Ref. 8)

Question 3	If the project is not the least cost alternative, why is it the preferred alternative? In Table 8, provide an explanation of any benefits of the project that are different from the alternative project(s) or methods. Provide sufficient justification for selection of the project. Based on the alternatives presented and detailed in Comments below, the proposed alternatives do not provide the full benefits of the project and cost more than the project. Therefore the project is the least cost alternative.

Comments:

As summarized in the Table above, the proposed project has estimated capital cost of $5,445,740 and an estimated Operations and Maintenance (O&M) of $50,000/year mostly to pressurize the RW pipeline. The alternatives presented would achieve the same primary benefit of water delivery but the proposed project has a wider array of benefits than some of the options considered. When compared to the other alternatives presented in the table, this is the least cost alternative that meets similar objectives of water savings and groundwater recovery

The RW delivery pipeline is expected to have a useful life of more than 50 years. Using 50 years as the assumed useful life, the present value of RW delivery Capital and O&M costs totals $6,233,833 in 2014 dollars. The RW pipeline will provide 64,000 AF of water over the 50-year project lifetime. With a total present value cost of $6,233,833, this project will provide water supply at a rate of $97/AF ($6,233,833/64,000 AF)

Table 6 – Cost Effective Analysis

Project Name: Woodland Recycled Water (RW) Project

Alternative A – Additional Narrative

One of the alternatives to RW would be for Woodland to purchase, divert, treat, and deliver surface water, which has a lower reliability, especially in drought. Surface water, however, can be used, when abundant, to provide in-lieu and direct recharge. Woodland has entered into contract with Conaway Preservation Group to purchase senior surface water rights to be delivered and treated at the joint Woodland-Davis Clean Water Program surface water treatment plant that will go on line in 2016 in an effort to diversify Woodland's supply portfolio and meet WW discharge water quality requirements for Chrome VI. The cost of the water rights alone is $21,732,432 for 53.79% of 10,000 AF (or 5,379 AF) which is equivalent to $4,040/AF (Ref. 5 Woodland Water Purchase contract, 2010, p. 5). In addition, there will be diversion, treatment, and delivery capital cost of $29,610,696 and O&M costs of $806,850 for 5,379 AF (Ref 6. CDPH loan for the Woodland portion of the Design, Construction and Operation of the Woodland-Davis Regional Water Treatment Facility, p. 143-149). The CDPH loan is for $111 million for 18 MGD (20,164 AF) of capacity for which Woodland has acquired other water rights. The CDPH loan amount has been scaled by the ratio of 5,379AF /20,164 AF so that it is in line with the water rights purchase.

With a useful life of 25 years for a delivery of 134,475 AF, the present value of water rights, capital and O&M for this alternative is $61,657,379 and is expected to provide water supply at a rate of $458/AF (61657379/134475) which is greater than the present value of the project cost of $93/AF.

Alternative B – Additional Narrative

Another alternative, which Woodland has considered is to construct additional wells to deliver an equivalent quantity of water. GW quality is such that treatment for a number of natural constituents including selenium and Chrome VI and anthropogenic contaminants including nitrate will be required to meet drinking water MCLs. Cost estimates for this alternative include:

New well: $3.0 Million (Ref. 7 -2013 Woodland Well 28 construction costs)

Nitrate, selenium, chrome VI treatment: $4.3 Million (Ref. 8- WRF 2014, 9. 93)

Total Construction cost for a new well with treatment: $7.3M

Therefore on construction costs alone, 1,280 AF of GW will be $5,703/AF

O&M costs: approximately $300,000/year for treatment only (Ref. 8-WRF 2014, p. 93)

O&M costs: approximately $150,000/year for electricity and chemicals (Woodland Existing electricity and chlorine costs)

Total O&M $450,000/year

With a useful life of 25 years, for a total of 32,000 AF, the present value of capital and O&M costs for the project total $13,052,510 in 2014 dollars. Thus, this alternative is expected to provide water supply at a rate of $408/AF ($13,052,510/32,000AF) which is also greater than the project cost of $93/AF. .

References:

1. Woodland GWMP, West – Yost Associates, April 2011.
2. Yolo County FCWCD, 2006, Groundwater Management Plan
3. Woodland Pump Curve, 2014
4. Draft Recycled Water Opportunities Evaluation, City of Woodland, California. Brown and Caldwell, 2013
5. Woodland Water Purchase contract, 2010, p. 5
6. CDPH Loan application for Woodland portion of Design, Construction and Operation of the Woodland-Davis Regional Water Treatment Facility, p. 4)
7. Woodland, Well 28 Construction cost estimate, 2013.
8. Water Research Foundation, 2014 - Impact of Water Quality on Hexavalent Chromium Removal Efficiency and Cost and WQTS cost estimating worksheet.

These references are provided in the file labelled Att3_DG_ProJust_3of4.pdf

PROJECT 3: Lake County Special District (LCSD)– Mount Hannah Water Loss Minimization Project

1. Project Summary Table Explanations

a. Eligible IRWM Project Explanation

As summarized in PSP Table 4 above, the Lake County Special Districts– Mount Hannah Water Loss Minimization Project is of the following eligible IRWM project types. Explanations as to relevance of each type follows:

IR.1 Water supply reliability, water conservation, and water use efficiency: The Mount Hannah Water Loss Minimization Project will replace 900 LF of pipe that is estimated to leak up to 45% of production therefore it is a water conservation and WUE IRWM project type.

IR.10 Drinking water treatment and distribution: The Mount Hannah Water Loss Minimization Project is a Drinking Water Distribution IRWM project type because it replaces leaky drinking water distribution pipeline and thereby reduces water losses

2. Project Description

Implementing Agency: Lake County Special Districts –Mt. Hannah County Service Area #22 (Mt. Hannah)

25 word description: The Mt. Hannah Project constructs 900' of 6" pipeline from a well to an existing tank to reduce ~45% water loss to 79 low-income customers.

a. Eligible Drought Project Type Explanation

D.1 Provide immediate regional drought preparedness by reducing up to 45% water loss from the 900' pipeline that connects the well to tank. This will preserve valuable water in both the tank as well as in the Clear Lake Pleistocene volcanic regional groundwater source area (not an alluvial basin), which contains over 550 domestic wells, 11 municipal wells and 59 irrigation wells (Ref. 1, 2006 Lake C GWMP, p. 19). The source area has the highest number of wells for all but one other groundwater source area in Lake County and is showing signs of declining water level. Maintaining water in storage is critical to this portion of the Region for drought protection.

D.2 Increase local water supply reliability and the delivery of safe drinking water by permanently reducing water losses thereby preserving the groundwater to remain for potable uses in a disadvantaged community and increasing the supply reliability.

b. How the Project Alleviates Drought Impacts

The primary drought impacts described in Attachment 2 for the Lake County CSA#22 – Mt. Hannah (Mt. Hannah) are the dramatic reductions in rainfall in 2013 (less than a projected 1976-1977 drought precipitation) and continuing into 2014, the resulting reduced recharge to the Clear Lake Pleistocene Volcanic groundwater source area as evidenced in falling groundwater levels. As a consequence, Mt. Hannah is:

At risk of not meeting existing drinking water demands: The water losses (averaging 900,000 gallons/year, 2,465 gallons/day) or up to 45% of well production, represents water that is being wasted in a water system that has a current average gallons per capita per day (gpcd) of 24.7 gpcd (based on April 15-June 16 meter read) consumption. The extremely low gpcd is because of a lack of supply as well as a stage 4 mandatory reduction in consumption to less than 50 gallons per day (per person) which is lower than the 55 gpcd California Department of Public Health (CDPH) has determined as needed for basic health and hygiene. CDPH is planning to fund a new well to alleviate low water production, but this pipeline project is necessary to use the water from the new well as effectively as possible. Therefore every savings, however modest, is important to meeting existing drinking water demands to meet health and safety needs to the 79 customers of this disadvantaged community.

Groundwater basin overdraft –Due to current drought conditions, the well level dropped 65% from January 2013 to January 2014. The well has lost the ability to recharge and can only be pumped for approximately 30 minutes and then must be allowed to recharge for 2 to 3 hours. Anecdotal information from Lake County Water Resources staff indicate that in 2013 as well as in the early 1990s, local springs that previously flowed at 70-80 gpm have dried up, some since June 2012 at the start of the drought. The lack of recharge poses a challenge for all GW source areas and increases risk for GW basin overdraft as evidenced by both falling water levels and drying up of springs.

Other drought related adverse impacts –The drought has also increased wildfire risk in this rural area; lack of water to fill the tank has minimized water for fire storage which increases fire risk for the residents. In May 2014, it took almost 2 days of intermittent pumping to recover storage after storage had been drawn down. Reduced water levels also increases energy consumption and greenhouse gas (GHG) emissions from the additional pumping required to bring water into the tank.

Expedited funding is needed because the Mt. Hannah system cannot provide sufficient water to meet CDPH minimum health and hygiene standards for its disadvantaged community residents, therefore all water savings, however modest, are valuable. Water rates for Mount Hannah are considerably higher than the county average but due to the small number of customers, this small district struggles financially and has not been able to build a capital reserve fund and cannot build this project without assistance. Mt. Hannah needs expedited funding to obtain sufficient water to meet the minimum 55 gpcd health and hygiene standard.

3. Project Map

Figure 3-4, a map of the Mt Hannah Project follows.

4. Project Physical Benefits

Overview of Benefits of Project 3

The Lake County Special Districts Mt. Hannah Water Loss Minimization Project has both quantifiable and non-quantifiable physical benefits, detailed below, including:

A. Water savings of up to 900,000 gallons/year (2,465 gallons/day) by repairing 900 feet of leaky transmission pipeline between well and tank.

The several non-quantifiable benefits that are detailed in Section 5 include:

- Reduced operations and maintenance cost because of the 45% water savings.
- Improved fire storage capacity to improve firefighting ability and reduced fire risk
- Improved quality of life for Mt. Hannah residents as gpcd can be increased to CDPH minimum gpcd

Benefit A: Water Savings of up to 900,000 gallons per year (2,465 gallons/day)

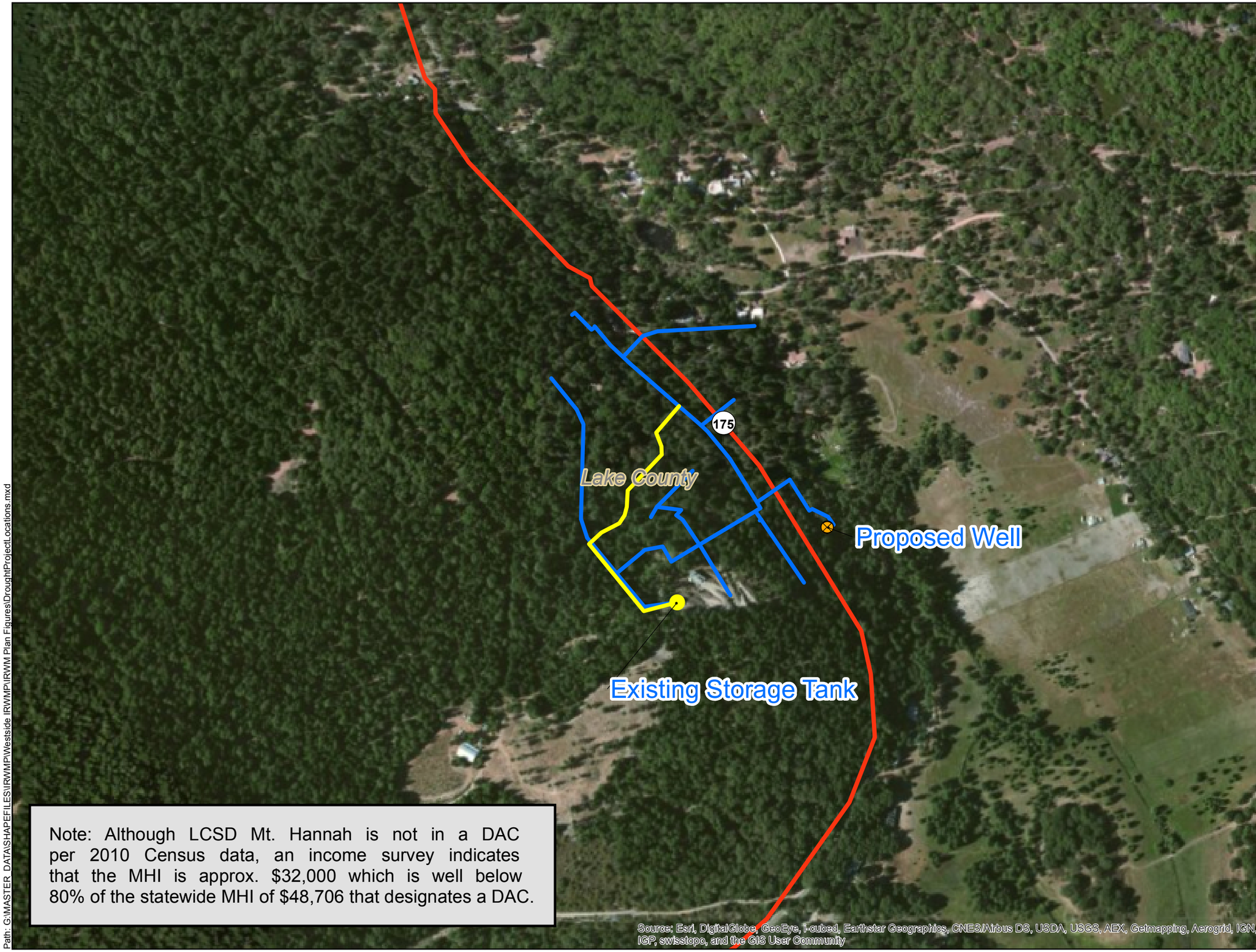
The project will result in up to 900,000 gallons/yr (2,465 gallons/day) of potable water savings starting in early 2016. The estimated useful life for the pipeline is at least 50 years, therefore a 50 year analysis starting in 2016 is provided in PSP Table 5 that follows.

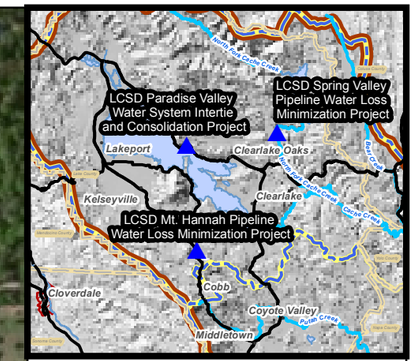
Table 5 – Annual Project Physical Benefits

Project Name: Lake County Special District – Mt. Hannah Water Loss Minimization Project
Type of Benefit Claimed: Potable Water Saved
Units of the Benefit Claimed: Million Gallons per year
Additional Information About this Benefit:

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	
2015	0	0	
2016	0	900,000	900,000
2017-2064	0	900,000	900,000
2066	0	900,000	900,000
Total	0	45,000,000	45,000,000

Comments: This is an average annual potable water saved from repairing 900 feet of leaky transmission pipeline from the well to the tank.





Legend

- Proposed Water Main
- Existing Water Main
- City Boundaries
- Planning Areas
- Streams
- Water Bodies
- DACs (Census Places)
- DACs (Census Tract)
- DACS (Census Blocks)

N

0 0.08 0.16 Miles

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Note: Although LCSD Mt. Hannah is not in a DAC per 2010 Census data, an income survey indicates that the MHI is approx. $32,000 which is well below 80% of the statewide MHI of $48,706 that designates a DAC.

Westside-Sacramento 2014 Drought Funding Application

LCSD Mt. Hannah Pipeline Water Loss Minimization Project

K/J 1170019.00
July, 2014

Figure 3-4

Path: G:\MASTER_DATA\SHAPEFILES\IRWMP\Westside IRWMP\IRWM Plan Figures\DroughtProjectLocations.mxd

5. Technical Analysis of Physical Benefits Claimed

a. Technical Analysis and Description of Physical Benefit A –Estimated Water savings of up to 900,000 gallons/year (2,465 gallons/day)

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

Recent and historical conditions that have occurred are declining water levels and reduced well production as well as significant water losses in the pipeline between the well and the water storage tank.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Mt. Hannah Water Loss Minimization Project, water losses would continue as in 5.A.i. above. In fact the losses could increase as the old pipeline is a direct-buried steel pipe removed from a submarine and has no cathodic protection which experiences weld failures as well as pitting of the steel. While there have been no soil corrosion studies, the presence of trees such as Douglas fir, black oak and pine indicate slightly acidic soils. Failure to repair the pipeline prolongs the hardship for residents of water usage that is below the CDPH minimum standard for meeting basic health and sanitation of 55 gpcd. No other projects are likely to be undertaken if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

The benefits are estimated using the production and meter data to the Mt. Hannah water system, the following annual production and delivery data were provided by the Lake County Special Districts.

Year	Produced (Gallons/Yr)	Consumed (Gallons/Yr)	Water Loss (Gallons/Yr)	Percent Loss
2009	4,086,320	1,311,553	2,774,767	68%
2010	2,683,870	1,061,486	1,622,384	60%
2011	1,234,630	1,121,329	113,301	9%
2012	1,761,527	1,205,856	555,671	32%
2013	2,210,145	1,350,107	860,038	39%
2014	970,222	495,965	474,257	49%
Average	2,157,786	1,091,049	1,066,736	49%

Ref. 2, Lake County Special Districts, 2014

Although the average value is over 1 million gallons/yr of water loss, a more conservative savings of 900,000 gallons/year is used for the analysis. The project to replace the leaky transmission pipeline results in water saving that provides a cost effective means of stretching decreasing water supplies.

The methods to be used to monitor the physical benefits include monthly measurement of all water produced and distributed. All connections are metered and the variance between water produced and water consumed is calculated.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The new facilities needed to achieve the water savings include replacement of 900 LF of 6-inch-diameter pipeline meeting AWWA standards from the new well (to be replaced with CDPH funds) to the storage tank.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. noise, traffic, and dust from pipeline construction. No permanent adverse physical effects that cannot be mitigated are anticipated. This project is Categorically Exempt from CEQA as it replaces an existing pipeline and is an emergency project.

b. Non-quantifiable Benefits

The several non-quantifiable benefits that are identified in Section 4 are detailed below:

- Reduced operations and maintenance (O&M) costs including a reduction in staff time managing groundwater pumping in line with well recharge frequency, water conservation reduction outreach to residents, reduced treatment of higher turbidity water from

declining water levels, as well as reduced pumping energy and GHG emissions associated with pumping less water. The O&M savings can go into building capital reserves to prevent future infrastructure failures for this small economically disadvantaged water system.

- Improved fire storage capacity will result as more of the pumped water can go to storage. This will improve firefighting ability by providing a longer duration of water availability and therefore will reduce fire risk, especially as the wildfire risk in this rural area has increased because of the drought.
- Improved quality of life for Mt. Hannah residents as they will be able to modestly increase the 24.7 gpcd that they are using to at least the 55 gpcd which is the CDPH minimum. These increases need to be balanced against the groundwater in storage, which will be more accessible as the new well to be funded by CDPH will be 50 feet deeper than the current well.

6. Cost Effective Analysis

Table 6 – Cost Effective Analysis

Project Name: Lake County Special District – Mount Hannah (CSA#22) Water Loss Minimization Project

Question 1

Types of benefits provided as shown in Table 5

Benefit A: Water savings of 900,000 gallons per year

Question 2

Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes.

If no, why? Not Applicable

If yes, list the methods (including the proposed project) and estimated costs.

Alternatives Description	Estimated Costs (Capital and O&M)	Describe studies, plans, or documents that identify alternatives and costs of those alternatives.
Proposed project	$223,500 of Capital and $2,500/yr O&M cost (2014)	Lake County budget
A. Intertie with a nearby system	$800,000 of Capital and $10,000/yr O&M cost (2014)	Ref. 3 CDPH Emergency Drought Funding Application(2014)

The Proposed project includes the replacement of 900' of pipeline for a total capital cost of $223,500 and an annual O&M cost of $2,500/yr for a present value of $269,140 over the 50 year life of the pipe. The primary benefit used for selecting benefits was to provide water in at least an equivalent quantity to the savings.

Question 3

If the project is not the least cost alternative, why is it the preferred alternative? In Table 8, provide an explanation of any benefits of the project that are different from the alternative project(s) or methods. Provide sufficient justification for selection of the project.

This project is the least cost alternative

Comments:

Alternatives considered but rejected: The geographic location of Mt. Hannah precludes the option of interties or consolidation as it is located on Cobb Mountain and not near any other systems with which to intertie/consolidate. Surface water is not a viable alternative because it is about 7 miles away, along existing roadways to Clear Lake, and none of the local streams are of sufficient capacity/reliability to store, divert, treat, and deliver local surface water.

Alternative A – Additional Narrative

CDPH estimated in June 2014 (Ref 3. CDPH Grant Application for Well, 2013, p. 3) it would cost $600,000 plus engineering, environmental, and administration for a total of $800,000 to construct an intertie pipeline with Loch Lomond Mutual Water System. With an estimated O& M of $10,000/yr the present value of $982,559 is estimated over the 50 year life of the pipe which is significantly higher than the project.

References:

1. 2006 Lake County GWMP (p. 62 GW Basin – Clear Lake Pleistocene volcanic)
2. Lake County Special Districts – water meter data, 2014
3. CDPH grant Application. June 2014, P. 3

These references are provided in the file labelled Att3_DG_ProJust_4of4.pdf

PROJECT 4: Lake County Special District – Spring Valley (CSA#2) Pipeline Water Loss Minimization Project

1. Project Summary Table Explanations

a. Eligible IRWM Project Explanation

As summarized in PSP Table 4 above, the Lake County – Spring Valley Pipeline Water Loss Minimization Project is of the following eligible IRWM project types. Explanations as to relevance of each type follows:

IR.1 Water supply reliability, water conservation, and water use efficiency (WUE): The Spring Valley Pipeline Water Loss Minimization Project will replace 7,500 LF of pipe that is estimated to leak up to 12,000,000 gallons/year and install 9,100 LF of pipeline for a looped system to improve water system reliability, save water in a supply-constrained system, and reduce water age to avoid disinfection by product (DBP) formation, therefore it is a water conservation and WUE IRWM project type.

IR.7 Water banking, exchange, reclamation and improvement of water quality: The construction of 9,100 LF of new pipeline will eliminate dead ends and result in a looped water distribution system that reduces water age and stagnant water at dead ends, reduces DBP formation and improves the drinking water quality for customers.

IR.10 Drinking water treatment and distribution: The Spring Valley Pipeline Water Loss Minimization Project is a Drinking Water Distribution IRWM project type because it replaces leaky drinking water distribution pipeline and thereby reduces water losses and creates a looped pipeline system to improve system reliability, fire suppression capacity, and reduce DBP formation.

2. Project Description

Implementing Agency: Lake County Special Districts–Spring Valley County Service Area #2 (Spring Valley)

25 word description: The Spring Valley Project constructs 16,600' of potable water pipeline to reduce ~40% water loss and improve water quality/fire suppression to 1,577 DAC customers.

a. Eligible Drought Project Type Explanation

D.1 Provide immediate regional drought preparedness by reducing from 26% up to 40% water loss (estimated at an average loss of 27,000 gallons per day (gpd) in 2011 up to over 61,000 gpd in 2004) from leaky pipelines that deliver water from Indian Valley Reservoir (IVR) that is currently at 9.2% of capacity and is obligated to release 10 cubic feet per second (cfs) to meet fisheries needs.

D.2 Increase local water supply reliability and the delivery of safe drinking water by permanently reducing water losses thereby preserving the water in the reservoir to remain for potable and fisheries uses.

D.4 Reduce water quality conflicts or ecosystem conflicts created by the drought – by creating a looped pipeline system to reduce DBP formation and improve drinking water quality thereby reducing water quality conflict.

b. How the Project Alleviates Drought Impacts

The primary drought impacts described in Attachment 2 for the Spring Valley are the dramatic reductions in rainfall in 2013 (estimated to be less than 1976-1977 drought precipitation) and continuing into 2014 with the resulting reduced storage in Indian Valley Reservoir, the source of Spring Valley's drinking water. As a consequence, Spring Valley is:

At risk of not meeting existing drinking water demands: The significantly reduced storage in IVR poses a risk to Spring Valley of not meeting existing water demands. IVR is at 27,753 acre-feet (AF) of storage (or 9.2% of full capacity) compared to 96,411 AF last year. IVR released zero irrigation supplies and only released the 10 cfs of habitat flows in 2014 because of spring rains. Spring Valley diverts a maximum of 0.5 cfs from the 10 cfs released for domestic needs. The significant water losses (from 25% up to 40% of produced water or an average of 12 million gallons per year) in addition to the water used to flush dead ends to meet maximum contaminant levels (MCLs) for Total Tri halomethanes (TTHM) represents water that is being wasted. Therefore every savings, however modest, is important to retaining water in IVR storage, to continue to meet existing drinking water demands to meet health and safety needs to the 493 homes in this disadvantaged community.

At risk of not meeting existing ecosystem water demands: The IVR operating requirements include 10 cfs releases to meet downstream fisheries needs, from which Spring Valley diverts a small amount. If storage in IVR continues to fall through lack of rainfall and wasted water, releases to Cache Creek which is a California Wild and Scenic River, for maintenance of fisheries and ecosystem habitat may be reduced or eliminated, thereby posing a risk of not meeting existing ecosystem water demands.

F***acing Drinking water MCL violations*** –The Spring Valley water distribution system is not looped and has dead ends, which has resulted in violations of drinking water MCLs for TTHM of 80 μg/L. The MCL violation is for exceeding the Locational Running Annual Average (LRAA) for 7 different quarters in 2008. 2009, 2010, 2012 and 2013 with values ranging from 31 to 90 μg/L. Violations have occurred after line flushing was reduced to save valuable water. Therefore, Spring Valley has violated and continues to be at risk for violation of drinking water MCLs as water demands have decreased, water age has increased, and water for line flushing needs to be saved in spite of the TTHM formation.

Other drought related adverse impacts –The drought has also increased wildfire risk in this rural area; lack of hydrants in portions of the distribution system increases fire risk for the residents. Water loss results in increased operation and maintenance costs for treatment and distribution since more water is treated than needed with associated increases in energy consumption and greenhouse gas (GHG) emissions.

Expedited funding is needed because Indian Valley Reservoir, which serves Spring Valley is critically low and at risk of further cutback. Leaky pipelines are wasting 12 million gallons of water per year, the dead end segments continue to create TTHMs in violation of MCLs, and the wildfire risk continues to increase with the drought. Expediting funding is needed to significantly reduce water waste in order to preserve water in Indian Valley Reservoir for both potable water users and to maintain fishery habitats. The project will also reduce the fire risk in this rural area by adding fire hydrants in areas that have not had hydrants. Spring Valley is a DAC and therefore its residents can benefit from grant assistance.

3. Project Map

Figure 3-5, a map of the Spring Valley Project follows.

4. Project Physical Benefits

Overview of Benefits of Project 4

The Lake County Special Districts Spring Valley Pipeline Water Loss Minimization Project has both quantifiable and non-quantifiable physical benefits, detailed below, including:

A. Water savings of 10 million gallons/year (27,400 gallons/day)

The several non-quantifiable benefits that are detailed in Section 5 include:

- Reduced operations and maintenance cost because of the 26% - 40% water savings
- Improved water quality as TTHM formation potential decreases with looped piping.
- Improved fire flow delivery through additional hydrants to improve firefighting ability and reduced fire risk
- Providing increased fish habitat flows in Cache Creek by saving water, thereby reducing diversions and retaining it in IVR storage for future use

Benefit A: Water savings of 10 million gallons/year (27,400 gallons/day

The project will result in 10 million gallons/yr (27,400 gallons/day) of potable water savings starting in early 2016 and the estimated useful life for the pipeline is at least 50 years therefore a 50 year analysis starting in 2016 is provided in PSP Table 5 that follows.

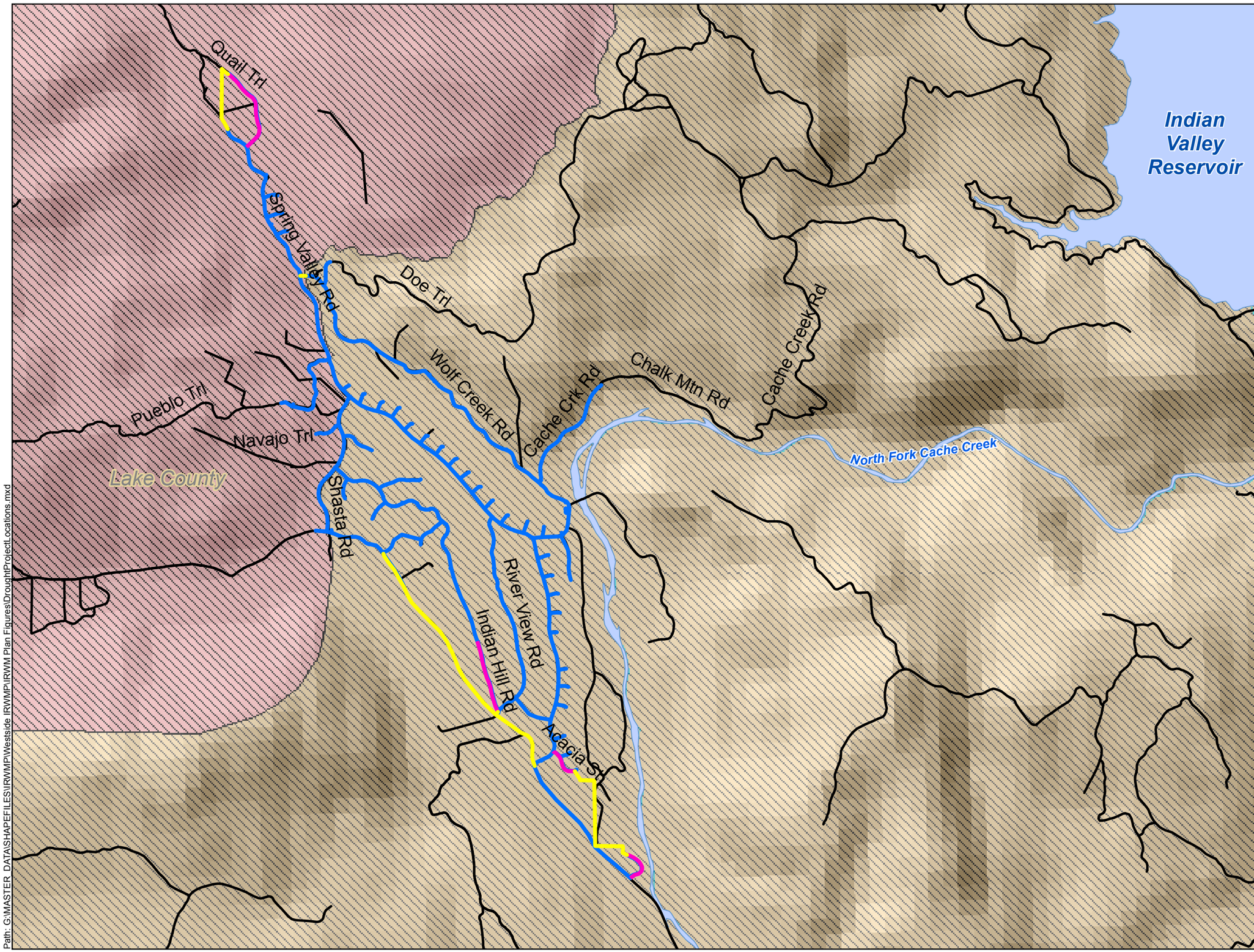
Table 5 – Annual Project Physical Benefits

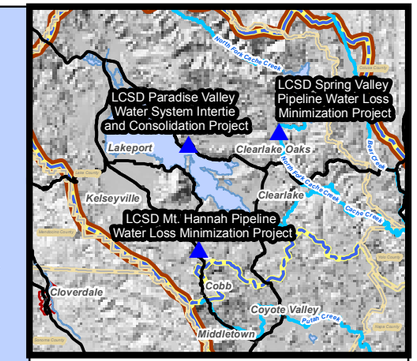
Project Name: Lake County -Spring Valley Pipeline Water Loss Minimization Project
Type of Benefit Claimed: Potable Water Saved
Units of the Benefit Claimed : Million Gallons per year

Additional Information About this Benefit:

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	
2015	0	0	
2016	0	10	10
2017-2064	0	10	10
2066	0	10	10
Total	0	500	500

Comments: This is an average annual potable water saved from replacing 7,500 feet of leaky distribution pipeline and adding 9,100 feet of new looped pipeline that reduces the need to flush lines to reduce disinfection by products that exceed maximum contaminant levels.





Legend

- Proposed Water Main
- Replacement Water Main
- Existing Water Main
- City Boundaries
- Planning Areas
- Streams
- Water Bodies
- DACs (Census Places)
- DACs (Census Tract)
- DACS (Census Blocks)

N

0 0.35 0.7 Miles

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Westside-Sacramento 2014 Drought Funding Application

LCSD Spring Valley Pipeline Water Loss Minimization Project

K/J 1170019.00
July, 2014

Figure 3-5

Path: G:\MASTER_DATA\SHAPEFILES\IRWMP\Westside IRWMP\IRWM Plan Figures\DroughtProjectLocations.mxd

5. Technical Analysis of Physical Benefits Claimed

a. Technical Analysis and Description of Physical Benefit A –Estimated Water savings of 10 million gallons/year (27,400 gallons/day)

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

The recent and historical conditions at Spring Valley include the lack of precipitation and reduced storage in IVR, the Spring Valley water supply. The risk of having insufficient water supply if the drought continues and the high leakage rates from the Spring Valley water system have required Lake County to impose voluntary conservation, tiered water rates, and, as of 7/22/14, mandatory conservation targeting high water users. In addition, pipeline flushing to reduce disinfection by products has been reduced in order to save water, with associated risks of not meeting drinking water standards.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Spring Valley Pipeline Water Loss Minimization Project, water losses would continue as in 5.A.i. above. Lake County Special Districts will replace other portions of the pipeline in the future as capital reserves are built up. However, no capital reserves are available to accomplish this project and no other projects are likely to be undertaken in the same time frame if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

The methods used to estimate the water savings of 10 million gallons/year (27,400 gallons/day) are the production and meter data of the Spring Valley water system, summarized below, which were provided by the Lake County Special Districts.

Year	Produced (Gallons/Yr)	Consumed (Gallons/Yr)	Water Loss (Gallons/Yr)	Percent Loss
2004	62,290,425	39,878,330	22,412,095	35.98%
2005	60,360,555	39,204,180	21,156,375	35.05%
2006	49,616,162	32,687,128	16,929,034	34.12%
2007	46,969,921	29,878,137	17,091,784	36.39%
2008	41,637,176	30,002,432	11,634,744	27.94%
2009	45,820,580	27,900,668	17,919,912	39.11%
2010	45,391,300	27,354,440	18,036,860	39.74%
2011	37,480,333	27,741,939	9,738,394	25.98%
2012	41,063,400	28,302,829	12,760,571	31.08%
2013	41,469,280	29,025,305	12,443,975	30.01%
Average	**47,209,913**	**31,197,539**	**16,012,374**	**34%**

Ref 1: Lake County Special Districts, 2014

Although the average loss is 16 million gallons per year, a conservative value of 10 million gallons per year is used because even with savings from line flushing achieved from adding 9,100 LF of pipeline, 100 % savings will not be achieved. This project replaces 7,500 LF of the highest priority pipelines of the total 66,600 LF of pipeline in the system. Losses in 2011-2013 are less than in prior years which is reflective of reduced demands from mandatory restrictions.

In addition, the project elements to replace the leaky transmission pipeline and add pipeline for looping both result in water saving that provides a cost effective means of retaining storage in IVR so that the water can be used in the future.

The methods to be used to monitor the physical benefits include monthly measurement of all water produced at the surface water treatment plant and distributed to customers. All connections are metered and read on a bi-monthly basis; the variance between water produced and water consumed is calculated using the meter data.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The new facilities needed to achieve the water savings include replacement of 7,500 LF and the addition of new 9,100 LF of 6-inch- diameter pipeline which reduces the need for flushing which saves water. All pipelines within the distribution system will be installed to meet AWWA standards.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. noise, traffic, and dust from pipeline construction. No permanent adverse physical effects that cannot be mitigated are anticipated. Portions of this project are Categorically Exempt from CEQA as it replaces an existing pipeline; other portions will require preparation of a CEQA document.

b. Non-quantifiable Benefits

The several non-quantifiable benefits that are identified in Section 4 are detailed below:

- Reduced operations and maintenance costs are a consequence of a reduced quantity of water being treated, with reduced chemical use (estimated at $4,500/year), pumping energy (estimated at $9,500/year)and GHG emissions associated with treating and pumping less water. The O&M savings can contribute to building capital reserves to continue pipeline replacement for this economically disadvantaged water system.
- Improved water quality with looped piping which eliminates dead ends where TTHM formation occurs especially during reduced demands. Looped piping also reduces the need to conduct line flushing to reduce TTHM which saves water that can be retained in storage at IVR.
- Improved fire flow delivery through additional hydrants to improve firefighting ability by providing more locations with access to hydrants and therefore will reduce fire risk, especially as the wildfire risk in this rural area has increased because of the drought
- Providing increased fish habitat flows in Cache Creek by saving water which retains water in storage in IVR that can be used to continue 10 cfs discharge, particularly if the drought continues.

6. Cost Effective Analysis

Table 6 – Cost Effective Analysis

Project Name: Lake County Special District – Spring Valley Pipeline Water Loss Minimization Project

Question 1

Types of benefits provided as shown in Table 5

Benefit A: Water savings of 10 million gallons per year/ (27,400 gallons/day)

Question 2

Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes.

If no, why? Not Applicable

If yes, list the methods (including the proposed project) and estimated costs.

Alternatives Description	Estimated Costs (Capital and O&M)	Describe studies, plans, or documents that identify alternatives and costs of those alternatives.
Proposed project	$1.756 m Capital and $15,000/yr O&M cost (2014)	Lake County Budget and Kennedy/Jenks Experience
A. Purchase and Deliver groundwater	$1.7 m Capital and $50,000/yr O&M cost (2014)	Lake County Estimate, CSA Tech Memo, 2008 (Ref. 2)

The Proposed project includes the replacement of 7,500' of pipeline and the installation of 9,100' of new pipeline for a total capital cost of $1.756 million and an annual O&M cost of $15,000/yr for a present value of $2.01 million over the 40 year life of the pipe. The primary benefit used for selecting benefits was to provide water in at least an equivalent quantity to the savings as well as TOC reduction for DBP control.

Question 3

If the project is not the least cost alternative, why is it the preferred alternative? In Table 8, provide an explanation of any benefits of the project that are different from the alternative project(s) or methods. Provide sufficient justification for selection of the project.

This project is the least cost alternative

Comments:

Alternatives considered but rejected: One option to produce 10 million gallons of year of water with lower TTHM formation potential for Spring Valley is to drill a well. The geology of Spring Valley does not lend itself to groundwater production because information from prior test drilling indicates both highly impermeable blue clay in the area (the clay is used to seal geothermal wells) as well as the poor water quality.

Another option that could help produce more water, but does not reduce TTHM formation is to replace the surface diversion from Cache creek with a Ranney-type collector in the Cache Creek gravels which could have a capital cost in excess of $5 million. An option that could remove total organic carbon (TOC), a TTHM precursor, but does not produce more water is to utilize additional TOC removal treatment at the surface water treatment plant which will likely have a capital cost in excess of $10 million. TOC removal is likely to include technologies such as MIEX, an ion exchange system, and ACTIFLO which is a high rate clarification system neither of which may be compatible with the existing slow sand filter currently used at Spring Valley. Another alternative means to remove TOC may be granular activated carbon which has not been demonstrated to be successful. These options were not pursued as they likely not feasible, do not individually meet both objectives, and have a significant capital cost.

Alternative A – Additional Narrative

This option is to provide groundwater from nearby valley would require drilling wells and pipeline to deliver the water as described in a 2008 Lake County study. It has an estimated capital cost of $1.7 million (2014) and annual O&M of $50,000 including pump/motor replacements for the well for a present value of $2.55 m over the 40 year life of the pipeline and well. (Ref. 2, Lake County Spring Valley CSA Well Study, p. 40)

References:

1. Lake County Special Districts, water meter data, 2014
2. Lake County CSA Well Study, 2008, p. 40

These references are provided in the file labelled Att3_DG_ProJust_4of4.pdf

PROJECT 5: Lake County Special District – Paradise Valley (CSA#16) Water System Intertie and Consolidation Project

1. Project Summary Table Explanations

a. Eligible IRWM Project Explanation

As summarized in PSP Table 4 above, the Lake County Special District– Paradise Valley Water System Intertie and Consolidation Project is of the following eligible IRWM project types. Explanations as to relevance of each type follows:

IR.1 Water supply reliability, water conservation, and water use efficiency: The Paradise Valley Water System Intertie and Consolidation Project will improve the reliability of the Paradise Valley water supply by creating a 1.8 mile, 8" diameter intertie pipeline and system consolidation between Paradise Valley and Clear Lake Oaks County Water System which has a secure surface water supply, under contract with YCFCWCD, from Clear Lake. The project will also improve supply reliability through construction of a new 300,000 gallon water storage tank.

IR.10 Drinking water treatment and distribution: The Paradise Valley Water System Intertie and Consolidation Project is a Drinking Water Distribution IRWM project type because it constructs a drinking water distribution intertie pipeline. The project also includes construction of a new 300,000 gallon water storage tank which improves water supply reliability and provides needed fire flow storage.

2. Project Description

Implementing Agency: Lake County Special Districts –Paradise Valley County Service Area #16 (Paradise Valley) –

25 word description: The Paradise Valley Project constructs 8,900' of 8" pipeline and tank to interconnect with the Clearlake Oaks County Water District's more reliable surface water source.

a. Eligible Drought Project Type Explanation

D.1 Provide immediate regional drought preparedness by connecting the current 74 Paradise Valley connections to a highly reliable Clear Lake supply as there is inadequate groundwater supply in this part of the Region to weather the drought. The existing three wells collectively provide 15-17 gallons per minute (gpm) while a new fourth test well did not provide adequate flows and had poor water quality.

D.2 Increase local water supply reliability and the delivery of safe drinking water by permanently interconnecting Paradise Valley to the Clear Lake Oaks County Water District which has a highly reliable source of water from Clear Lake. In addition, the intertie pipeline will ensure the delivery of safe drinking water as the water quality of the existing three Paradise Valley wells has Iron (Fe) and Manganese (Mn) in excess of secondary drinking water standards. The water storage tank will provide additional water supply reliability and improve the ability for the water system to provide emergency and fire flows.

D.4 Reduce water quality conflicts or ecosystem conflicts created by the drought – Paradise Valley's existing three wells and the 4th test well that was recently drilled all have elevated levels (do they exceed secondary MCLs) for iron and manganese, so interconnection with a higher quality water supply from Clearlake Oaks reduces a water quality conflict.

b. How the Project Alleviates Drought Impacts

The primary drought impacts described in Attachment 2 for the Lake County CSA#16 – Paradise Valley are the dramatic reductions in rainfall in 2013 (less than a projected 1976-1977 drought precipitation) and continuing into 2014, the resulting reduced recharge levels to the highly geologically complex Franciscan groundwater source area which is in a small drainage area (not identified in Lake County's 2006 Groundwater Management Plan) and lacks sufficient recharge and storage to be a reliable source for Paradise Valley. As a consequence, Paradise Valley is:

At risk of not meeting existing drinking water demands: The three existing wells have an cumulative production of 15-17 gpm (5,400 – 6,120 gallons per day) with well capacity that has dropped an additional 6% since the drought started as a result of falling water levels and pumps that are not pumping on their curves. The water system has a current average gallons per capita per day of (gpcd) of 21 gpcd (for indoor use only, outdoor use is pumped from Clear Lake into a dedicated irrigation system). This is in compliance with the Stage 3 mandatory conservation consumption limit of less than 50 gallons per day per person. A fourth well also had very low production and poor water quality and was not brought on line. Therefore even with an extremely low groundwater usage, the low productivity of this groundwater source area is likely to be inadequate to meeting existing drinking water demands to meet health and safety needs to the 74 current homes in this community.

Other drought related adverse impacts – The drought has also increased wildfire risk in this rural area; lack of water supply minimizes water for firefighting which increases fire risk for the residents. Therefore, the water storage tank component of this project will help provide adequate and reliable storage for fire suppression. Reduced water levels also increases energy consumption and greenhouse gas (GHG) emissions.

Expedited funding is needed because the supply is currently insufficient and will likely continue to decline in spite of extensive and mandatory water conservation measures. Without the interconnection, Paradise Valley is likely to run out of water in the relatively near future as there is limited recharge of the groundwater source area with the associated increased risk in wildfire. Expediting funding is needed to supplement a severely reduced water supply for the 74 current homes in Paradise Valley.

3. Project Map

Figure 3-6, a map of the Paradise Valley Project follows.

4. Project Physical Benefits

Overview of Benefits of Project 5

The Lake County Paradise Valley Water System Intertie and Consolidation Project has both quantifiable and non-quantifiable physical benefits, detailed below, including:

A. Water delivery of up to 25 acre-feet/year (22,400 gallons/day) by constructing a 8,900 LF (1.8 mile) 8-inch diameter intertie pipeline between Paradise Valley and Clear Lake Oaks County Water System.

B. Allows construction 59 additional homes in the subdivision by lifting building moratorium

The several non-quantifiable benefits that are detailed in Section 5 include:

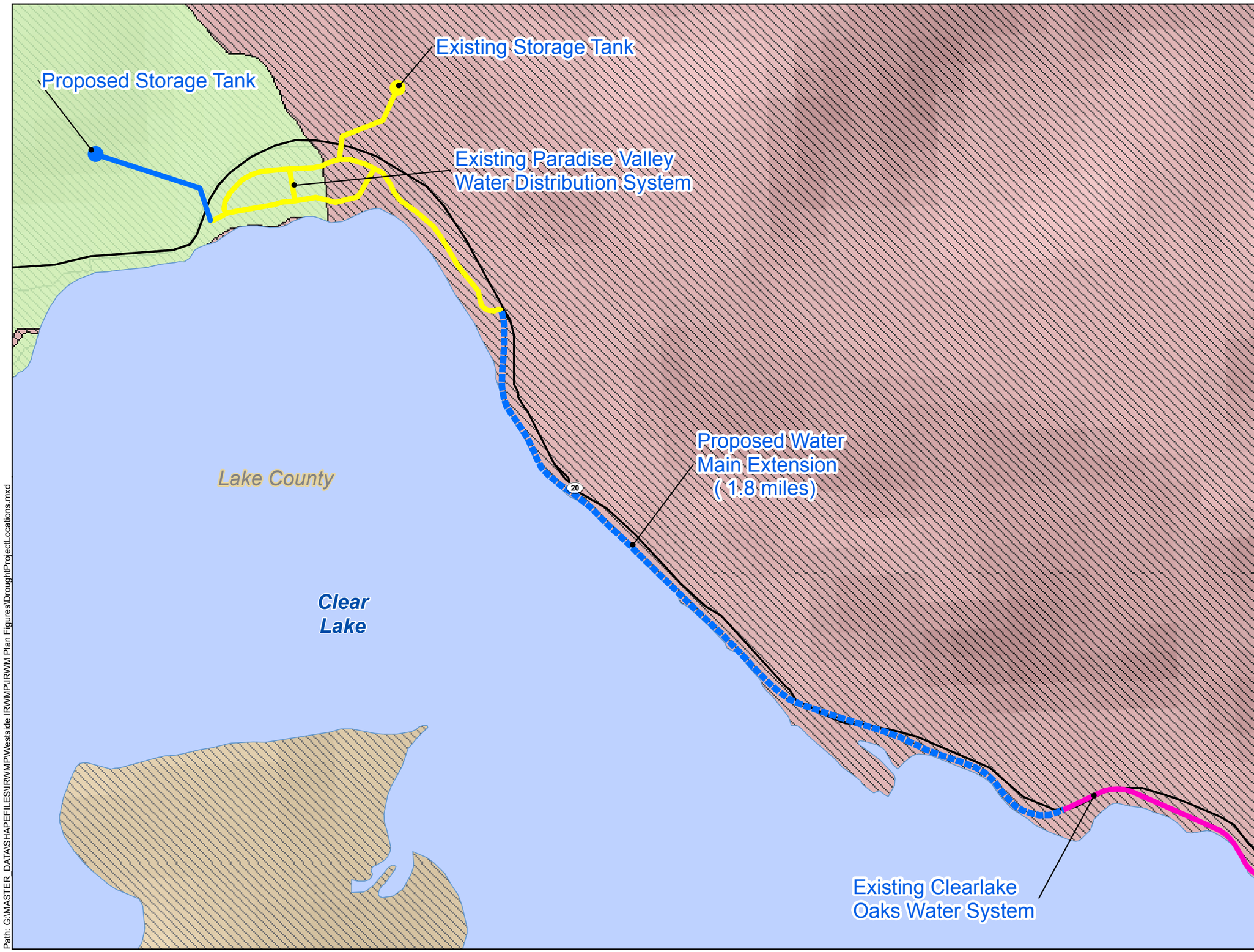
- Eliminate/reduced backwash of Fe/Mn from green sand filters to sanitary sewer
- Improved water quality to customers with change to surface water
- Improved fire conveyance capacity to improve firefighting ability and reduced fire risk

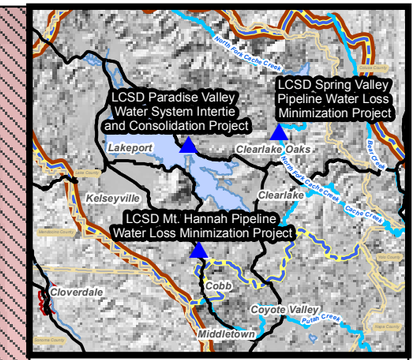
Benefit A: Water Delivery of up to 25 acre-feet per year (22,400 gallons/day)

The project will result in up to 25 acre-feet /year (22,400/day) of potable water starting in early 2016, with increases in delivery as other homes connect. The estimated useful life for the pipeline is at least 50 years therefore a 50 year analysis starting in 2016 is provided in PSP Table 5A that follows.

Benefit B: Allows construction 59 additional homes in the subdivision by lifting building moratorium

The project will result in the construction of 59 [annual benefit is 3 homes per year starting in 2016, for a total of 59 homes by 2035] homes starting in 2016. The estimated useful life for the pipeline is at least 50 years therefore a 50 year analysis starting in 2016 is provided in PSP Table 5B that follows.





Legend

- City Boundaries
- Planning Areas
- Streams
- Water Bodies
- DACs (Census Places)
- DACs (Census Tract)
- DACS (Census Blocks)

N

0 0.2 0.4 Miles

Kennedy/Jenks Consultants

Westside-Sacramento 2014 Drought Funding Application

LCSD Paradise Valley Water System Intertie and Consolidation Project

K/J 1170019.00
July, 2014

Figure 3-6

Path: G:\MASTER_DATA\SHAPEFILES\IRWMP\Westside IRWMP\IRWM Plan Figures\DroughtProjectLocations.mxd

Table 5A – Annual Project Physical Benefits

Project Name: Lake County Special District -Paradise Valley System Intertie and Consolidation Project

Type of Benefit Claimed: Potable Surface Water Delivery

Units of the Benefit Claimed Acre-feet per year (AFY)

Additional Information About this Benefit: These are conservative estimates of delivery assuming that consumption increases from a 2013 consumption of 18 gpcd up to 76.5 gpcd as residents water usage increases as supply availability and reliability increases. This assumes an increase of 3 homes per year until buildout in 2036

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	0	0	0
2015	0	0	0
2016	0	10.9	10.9
2017	0	14.5	14.5
2018	0	15.1	15.1
2019	0	15.6	15.6
2020	0	16.2	16.2
2021	0	16.8	16.8
2022	0	17.3	17.3
2023	0	17.9	17.9
2024	0	18.5	18.5
2025	0	19.0	19.0
2026	0	19.6	19.6
2027	0	20.2	20.2
2028	0	20.7	20.7
2029	0	21.3	21.3
2030	0	21.9	21.9
2031	0	22.4	22.4
2032	0	23.0	23.0
2033	0	23.6	23.6
2034	0	24.1	24.1
2035	0	24.7	24.7
2036	0	25	25
2037	0	25	25
2038	0	25	25
2039	0	25	25
2040	0	25	25
2041	0	25	25
2042	0	25	25
2043	0	25	25
2044	0	25	25
2045	0	25	25
2046	0	25	25
2047	0	25	25
2048	0	25	25
2049	0	25	25

Table 5A – Annual Project Physical Benefits

Project Name: Lake County Special District -Paradise Valley System Intertie and Consolidation Project

Type of Benefit Claimed: Potable Surface Water Delivery

Units of the Benefit Claimed Acre-feet per year (AFY)

Additional Information About this Benefit: These are conservative estimates of delivery assuming that consumption increases from a 2013 consumption of 18 gpcd up to 76.5 gpcd as residents water usage increases as supply availability and reliability increases. This assumes an increase of 3 homes per year until buildout in 2036

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2050	0	25	25
2051	0	25	25
2052	0	25	25
2053	0	25	25
2054	0	25	25
2055	0	25	25
2056	0	25	25
2057	0	25	25
2058	0	25	25
2059	0	25	25
2060	0	25	25
2061	0	25	25
2062	0	25	25
2063	0	25	25
2064	0	25	25
2065	0	25	25

Comments:

Table 5B – Annual Project Physical Benefits

Project Name: Lake County Special District – Paradise Valley System Intertie and Consolidation Project

Type of Benefit Claimed: Construction of Homes to Subdivision Buildout

Units of the Benefit Claimed: Additional Cumulative new homes connected

Additional Information About this Benefit: Starting from 74 existing homes, this assumes an increase of 3 homes per year starting in 2017 until buildout of 133 homes in 2035

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2014	74	0	0
2015	74	0	0
2016	74	77	3
2017	74	80	6
2018	74	83	9
2019	74	86	12
2020	74	89	15
2021	74	92	18
2022	74	95	21
2023	74	98	24
2024	74	101	27
2025	74	104	30
2026	74	107	33
2027	74	110	36
2028	74	113	39
2029	74	116	42
2030	74	119	45
2031	74	122	48
2032	74	125	51
2033	74	128	54
2034	74	131	57
2035	74	133	59
2036	74	133	59
2037	74	133	59
2038	74	133	59
2039	74	133	59
2040	74	133	59
2041	74	133	59
2042	74	133	59
2043	74	133	59
2044	74	133	59
2045	74	133	59
2046	74	133	59
2047	74	133	59
2048	74	133	59
2049	74	133	59

Table 5B – Annual Project Physical Benefits

Project Name: Lake County Special District – Paradise Valley System Intertie and Consolidation Project

Type of Benefit Claimed: Construction of Homes to Subdivision Buildout

Units of the Benefit Claimed: Additional Cumulative new homes connected

Additional Information About this Benefit: Starting from 74 existing homes, this assumes an increase of 3 homes per year starting in 2017 until buildout of 133 homes in 2035

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) - (b)
2050	74	133	59
2051	74	133	59
2052	74	133	59
2053	74	133	59
2054	74	133	59
2055	74	133	59
2056	74	133	59
2057	74	133	59
2058	74	133	59
2059	74	133	59
2060	74	133	59
2061	74	133	59
2062	74	133	59
2063	74	133	59
2064	74	133	59
2065	74	133	59

Comments:

5. Technical Analysis of Physical Benefits Claimed

a. Technical Analysis and Description of Physical Benefit A – Water Delivery of up to 25 acre-feet per year (22,300 gallons/day)

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

Paradise Valley is a 133 parcel subdivision on the shores of Clear Lake that has had challenges with potable water supply culminating in 2004 with a building moratorium as projected supplies are not sufficient to meet buildout demands. In order to reduce potable groundwater demands, all 74 current customer connections use a separate lake water irrigation system. In addition to the moratorium, the lack of recent precipitation, reduced groundwater recharge, and declining groundwater production and quality have required Lake County to impose mandatory 30% water use reduction measures which has resulted in indoor per capita use of 21 gpcd..

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Paradise Valley Project, groundwater levels would continue to decline and production capacity would diminish further limiting the water supply for the 74 homes. Loss of well yields in this subdivision have occurred with a 120 gpm capacity in 1982 which has declined to 15 gpm in 2014 (Ref 1., Paradise Valley Well History, no date). No other projects are likely to be undertaken if not for this project.

iii. Provide a description of methods used to estimate physical benefits.

The physical benefit of 25 AFY of production are estimated using annual production and metered delivery data from the Paradise Valley water system(provided by the Lake County Special Districts) to estimate per capita demands to be used to calculate future consumption.

Year	Produced (Gallons/Yr)	Consumed (Gallons/Yr)	Water Loss (Gallons/Yr)	GPCD
2007	4,151,530	4,103,334	48,196	69
2008	4,208,248	3,720,437	487,811	63
2009	3,407,580	3,152,290	255,290	53
2010	3,391,537	3,031,106	360,431	51
2011	3,480,828	3,265,993	214,835	55
2012	2,900,392	2,405,732	494,660	40
2013	1,297,190	1,051,013	246,177	18
Average	**3,262,472**	**2,961,415**	**301,057**	**49.8**

Ref 2, Lake County Special District, 2014

The GPCD estimate is based on 74 active connections with 2.2 persons household for a population of 163 persons. There are 133 lots in the subdivision (Ref. 3 Paradise Valley Source Capacity study, 2011) , 59 of which have not been built upon because of a building moratorium from lack of reliable water.

Using the above table, the water delivery estimate is based on a conservative gpcd of 75.6 (which is an estimate without significant conservation effects similar to 2007) at buildout of 133 lots at 2.2 persons per household for a total of 25 acre-feet per year or 22,400 gallons per day. The estimate starts using 74 households then increases the demand at 3 households per year for 20 years until the subdivision is built out.

The methods to be used to monitor the physical benefits include monthly measurement of all water delivered and distributed. All connections are metered and the variance between water produced and water consumed is calculated.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The new facilities needed to deliver the water from Clear Lake Oaks County Water District include construction of 1.8 miles (8,900 LF) of 8-inch- diameter intertie PVC C-900 pipeline and appurtenances such as pressure reducing valves meeting AWWA standards between the two water systems. The new 300,000 gallon water storage tank will also be constructed to AWWA standards. The tank will be located on a hillside elevated parcel and therefore does not require a booster pump station.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. noise, traffic, and dust from pipeline construction. No permanent adverse physical effects that cannot be mitigated are anticipated.

Completion of CEQA will occur for this project as part of the project planning and final design.

b. Technical Analysis and Description of Physical Benefit B – Allows construction a total of 59 additional homes in the subdivision by lifting building moratorium

i. List any recent and historical conditions that provide a background for the benefit being claimed (i.e., recent water shortages, loss of habitat, water quality problems).

Lake County issued a building moratorium in 2004 in the Paradise Valley subdivision because of the severe limitations on drinking water supply after the developer constructed a lake water irrigation system in 1986/1987 to reduce drinking water demands and water conservation urgency ordinances were enacted in August 2004 (Ref 1, Paradise Valley Well History. Lake County, no date. P. 1). Since that time, the number of households in the subdivision has remained stable at 74 connections out of a total build out of 133 connections. There are 59 lots remaining to be constructed upon. Lake County staff has indicated that there is a developer agreement pending to allow building pending construction of the project which confirms that there is pent up demand to develop the remaining lots. Based on Lake County staff projections, it is reasonable to expect that 3 homes/year will be built for 20 years until the subdivision is completed.

ii. Provide a description and estimates of without-project conditions (i.e., the level of the physical benefit in the future, without the project, but with other projects that would most likely be undertaken if not for the project).

Without the Paradise Valley Project, the development in the subdivision will remain at 74 homes as it has for the last 10 years. The price of the existing homes will remain depressed, there will be no construction jobs which are valued since the unemployment rate is 9% in Lake County as of May 2014, which is largely disadvantaged, there will be no property tax revenue from the sale of the homes or the increased value of the existing homes. No other projects are likely to be undertaken if not for the project.

iii. Provide a description of methods used to estimate physical benefits.

The methods to be used to estimate the physical benefits include a count of new homes from the Paradise Valley Subdivision that are constructed. A rate of 3 homes per year was provided by Lake County staff based on their discussion with the local real estate community indicating that there is pent-up demand for homes in this subdivision.

iv. Provide a description of all new facilities, policies, and actions required to obtain the physical benefits.

The new facilities needed to deliver the water from Clear Lake Oaks County Water District include construction of 1.8 miles (8,900 LF) of 8-inch- diameter intertie C-900 pipeline and appurtenances such as pressure reducing valves meeting AWWA standards between the two water systems.

v. Provide a description of any potential adverse physical effects as a result of the project

The potential adverse effects as a result of the project are temporary construction effects, e.g. noise, traffic, and dust from pipeline construction. No permanent adverse physical effects that cannot be mitigated are anticipated. Completion of CEQA will occur for this project as part of the project planning and final design.

c. Non-quantifiable Benefits

The several non-quantifiable benefits that are detailed below that include:

- Eliminate/reduced backwash of Fe/Mn from green sand filters to sanitary sewer- The existing groundwater treatment systems use green sand filters to remove Fe/Mn to meet secondary drinking water standards. The filters require backwash so that the Fe/Mn precipitates can be removed and the filters can continue to remove the Fe/Mn. Currently the backwash water is discharged to the sanitary sewer which contributes the Fe/Mn to the wastewater stream. While Fe/Mn is likely removed as a solid in the wastewater sludge, construction of the project would result in decreased wastewater solids for dewatering and disposable
- Improved water quality to customers with change to surface water – the Clear Lake Oaks County Water District uses treated surface water from Clear Lake that does not contain Fe/Mn or other minerals associated with groundwater. The water quality that the Paradise Valley customers will receive will be significantly better, especially from an aesthetic perspective, than the current groundwater quality.
- Improved fire conveyance capacity to improve firefighting ability and reduced fire risk – the intertie with Clear Lake Oaks County Water District will improve the flow to the existing and planned Paradise Valley storage so that fire storage can be maintained even in the event of a fire. This improves firefighting ability and therefore reduces fire risk.

6. Cost Effective Analysis

Table 6 – Cost Effective Analysis

Project Name: Lake County Special District – Paradise Valley (CSA#16) Water System Intertie and Consolidation Project

Question 1

Types of benefits provided as shown in Table 5

Benefit A: Delivery of up to 25 acre-feet per year (22,300 gallons/day)

Question 2

Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes.

If no, why? Not Applicable

If yes, list the methods (including the proposed project) and estimated costs.

Alternatives Description	Estimated Costs (Capital and O&M)	Describe studies, plans, or documents that identify alternatives and costs of those alternatives.
Proposed Project	$1,753,000 Capital and $25,000 O&M (2014)	Lake County budget and O&M estimates
A. Purchase and construction of surface water treatment plant	$2.518 million Capital plus $100,000/yr O&M(2014)	Ref. 4: BKF Engineers, 2014, p. 10 and O&M estimates

The Proposed project includes the construction of 1.8 miles of pipeline and a 300,000 gallon storage tank for a total capital cost of $1.753 million and an annual O&M cost of $25,000/yr for a present value of $2.12 million over the 50 year life of the pipe. The primary benefit used for selecting benefits was to provide an equivalent quantity of water.

Question 3

If the project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any benefits of the project that are different from the alternative project(s) or methods.

This project is the least cost alternative when the project and the alternative are compared on a $/AF basis as discussed in the comments below.

Comments:

Alternative A – Additional Narrative

Lake County Special Districts estimated in July 2014 it would cost $2.518 million to construct a 50,000 gallon per day surface treatment plant including intake, headworks, and backwash storage and an additional $100,000/year to operate it. Even on a upfront capital and O&M basis, the proposed project is the least cost.

When the useful life of the two projects are compared and normalized, the surface water treatment plant has a useful life of 20 years and using a 6% discount rate has cost of $12,781 AF/Yr for 25 AF delivered while the project, which has a useful life of 50 years has a cost of $5,448 AF/yr for 25 AF delivered. The proposed project is still the least cost project.

References:

1. Lake County Special District, CSA 16 Well history, no date
2. Lake County Special Districts – 2014 production and water meter data,
3. Lake County Special District, Source Capacity Study for CSA 16 – Paradise Valley Water system, 10/16/11
4. BKF Engineers, Feasibility Study, Service Expansion from Clearlake Oaks CWD Westerly to Service CSA 16 (Paradise Cove and Paradise Valley Ranch) p. 20, June 2014 (p. 10)

These references are provided in the file labelled Att3_DG_ProJust_4of4.pdf