

**LAKE DON PEDRO COMMUNITY SERVICES DISTRICT  
2015 IRWM Implementation Grant Proposal**

**PROJECT JUSTIFICATION**

This attachment provides the project justification for the various projects contained in this Proposal and is organized as follows:

**Project Summary Table** – A table showing how each project addresses IRWM Project Elements of the 2015 IRWM Grant Solicitation. This table is consistent with PSP Table 4.

**Regional Map** – An illustration of the IRWM regional boundary and the location of each project contained in the Proposal.

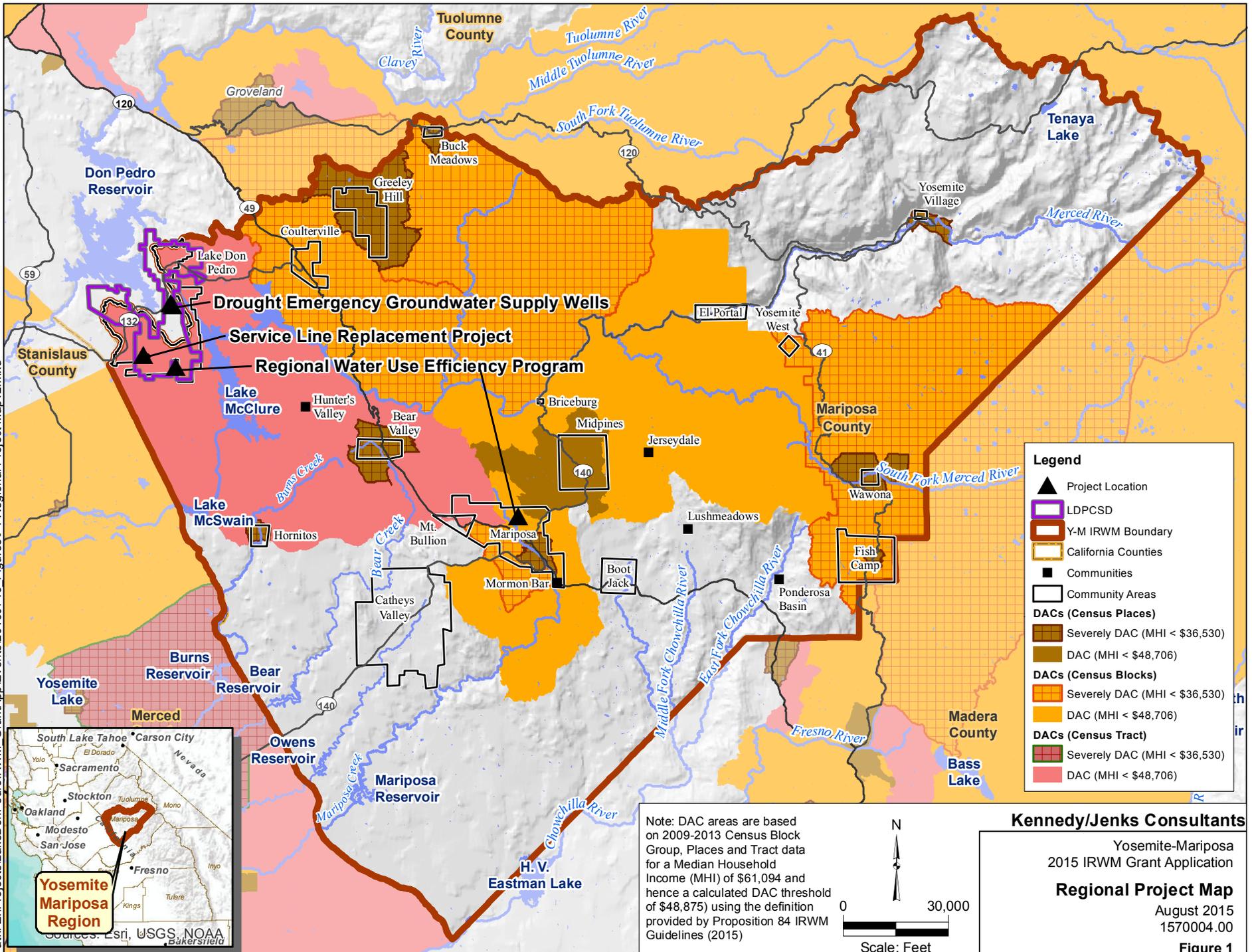
**Project Specific Information** – Information for each project is provided in the following order:

- Project description
- Project-specific map
- Description of project physical benefits and technical analysis of physical benefits claimed
- Discussion on direct water-related benefit to a DAC
- Project Performance Monitoring Plan.
- Cost-effectiveness analysis of the project

**PROJECT SUMMARY TABLE**

Table 2.1: 2015 IRWM Grant Solicitation Project Summary (PSP Table 4)				
IRWM Project Element		Drought Emergency Groundwater Wells	Regional Water Use Efficiency Program	Service Line Replacement
		#1	#2	#3
IR.1	Water supply reliability, water conservation, and water use efficiency	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		
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users			
IR.7	Water banking, exchange, reclamation, and improvement of water quality			
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
IR.11	Ecosystem and fisheries restoration and protection	X	X	X

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Source: DAC Areas, US Census American Community Survey (ACS) 5-Year Data: 2009 - 2013

# **LAKE DON PEDRO COMMUNITY SERVICES DISTRICT 2015 IRWM Implementation Grant Proposal**

## **DROUGHT EMERGENCY GROUNDWATER SUPPLY WELLS**

Construction of two new wells to increase water supply reliability for customers of Lake Don Pedro Community Service District (LDPCSD) by 141 acre-feet per year.

## **IMPLEMENTING AGENCY: LAKE DON PEDRO COMMUNITY SERVICES DISTRICT (LDPCSD)**

### **PROJECT DESCRIPTION**

LDPCSD serves approximately 1,400 active connections and a population of over 3,200 in Mariposa and Tuolumne Counties, between Lake McClure and Lake Don Pedro. Despite being directly between two very large surface storage reservoirs, supplies are dwindling and/or inaccessible and there is the risk that LDPCSD will not have adequate water supply by December 2015. In order to address this need, LDPCSD plans to construct four new groundwater wells to provide a reliable back up water source during this and future drought emergencies. Emergency funding for Wells 1 and 2, currently under construction, has already been procured from multiple agencies under the guidance of the California Office of Emergency Services. The wells are expected to be completed by August 2015. This proposal will provide for completion of Wells 3 and 4 to be connected directly to LDPCSD's distribution system, downstream of the existing surface water treatment plant (WTP). A single package WTP will be used to treat one or both wells for manganese. Figure 1 shows the selected well locations.

The Wells 3 and 4 Project, undertaken by LDPCSD, will include drilling of two 8" diameter production wells (75 and 100 gpm) and install casing and screening in order to provide a reliable, secondary supply to diversify LDPCSD's portfolio. Assuming the wells will operate about half of a year when needed during peak summer months and the fall, they will provide about 141 acre-feet (AF) of critically needed water supply. There is no alluvial groundwater basin present in this vicinity, therefore all groundwater supplies are obtained from fractured bedrock formations. It can be difficult to identify high yield formations, and LDPCSD is currently drilling test holes and confirming the proposed well locations.

The wells will be developed and pump tested by a licensed well driller. Based on completed exploratory work, it is expected that one of the two wells will exceed secondary drinking water standards for manganese and will require a package 100 gpm WTP using a pyrolucite media filtration system. Other features will include sodium hypochlorite chemical feed, a backwash storage and recovery system to maximize water delivered to the system, piping, valving, mechanical and electrical components and controls, site improvements, fencing, and surface restoration, and connecting the wells to the existing water distribution system. A switch for installation of a standby emergency diesel generator will be included in the event of a power outage or catastrophic event.

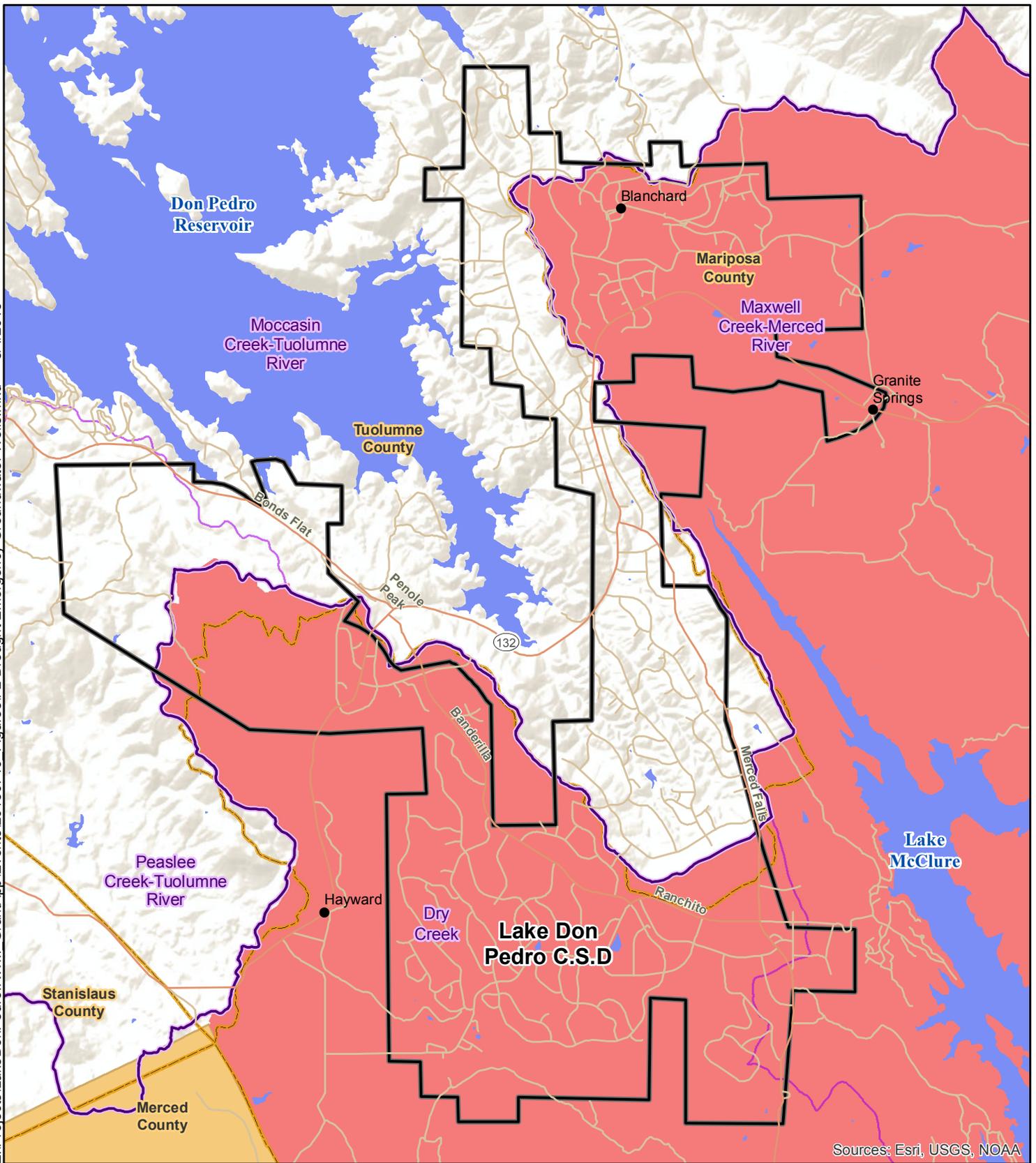
### **How the Project Addresses a Current Need of the Region**

The multi-year, statewide drought has reduced the availability of water supplies across Mariposa and Tuolumne Counties, where the LDPCSD is located, and in the downstream San Joaquin Valley. Many small, community water systems within the Yosemite-Mariposa Region had adequate access to water supply until this year, when competition for limited water supplies coupled with record low snowfall put the largest reservoir, Lake McClure, on the brink of reaching deadpool and making water unavailable for municipal, agricultural, or environmental uses. The LDPCSD fixed water intake pumps on Lake McClure extend down to an elevation of 700 feet above sea level (ASL) and have been unusable since October 2013, at which time an emergency barge-mounted adjustable pump system was launched and has been in service continuously since that time. The floating emergency pumps are routinely extended further into the lake, typically on a weekly basis as the water level drops. The pumps can be extended to the Merced River bottom in the area, and can pump water to LDPCSD down to an elevation of 560 feet ASL, which could occur by the beginning of 2016, based on current estimates, leaving LDPCSD with no surface water supply available and relying only upon new groundwater sources accessed through the wells constructed with this project.

The emergency groundwater wells project helps to provide much needed additional supply reliability for residents that receive water supply from LDPCSD. The addition of the wells also reduces pressure for the limited remaining Lake McClure resources, potentially freeing up supply for alternative uses and helping the Region to meet water supply reliability objectives. Once the project is completed, the four new wells and the existing Ranchito Well will together produce 350 to 450 gpm, meeting 70% of the LDPCSD's maximum day demand. This water will provide a reliable water supply while LDPCSD continues to pursue additional water supply solutions, should this drought continue into another year.

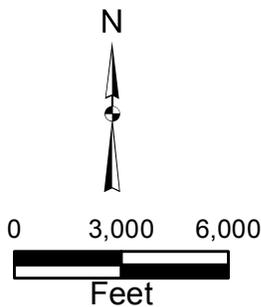
### **PROJECT MAP**

The project map that follows shows all of the projects major elements described in Attachment 3 – Work Plan.



Sources: Esri, USGS, NOAA

-  Lake Don Pedro C.S.D
-  DAC Census Tract
-  Watersheds
-  DAC Census Place
-  Sub Watersheds
-  DAC Census Block Group
-  California Counties



**Kennedy/Jenks Consultants**

Yosemite-Mariposa  
2015 IRWM Grant Application

**Drought Emergency  
Groundwater Wells**

August 2015  
1570004.00

Figure 2

**LAKE DON PEDRO COMMUNITY SERVICES DISTRICT  
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**PROJECT PHYSICAL BENEFITS**

The following primary and secondary physical benefits are expected from this project:

- Primary benefit: Produces about 141 AFY of critical water supply for LDPCSD customers. Through completion of the wells, adequate water supply will be available to LDPCSD to meet the human consumption, sanitation and fire protection needs of the community.
- Secondary benefit: Provides 0.4 CFS of conserved storage for instream flows for fishery benefit in the Lower Merced River.

The following sections discuss these benefits in more detail, with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the project benefits discussion, a cost effectiveness analysis of the project compared to its alternatives is provided.

**TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED**

**Primary Benefit: Water supply produced of about 141 AFY during drought years**

As shown in Table 2.2, the groundwater well supply project will provide approximately 141 AFY of new water supply as required based on drought or emergency water supply need, estimated to be about every 3 years.

Table 2.2: Annual Project Physical Benefits (PSP Table 5)			
Project Name: Drought Emergency Groundwater Supply Wells			
Type of Benefit Claimed: Water supply produced (primary benefit)			
Units of the Benefit Claimed: acre-feet per year (AFY)			
Anticipated Useful Life of Project (Years): 40			
(a)	(b)	(c)	(d)
Year	Physical Benefits		
	Without Project	With Project	Change Resulting from Project (c) – (b)
2015 to 2017	0	141	141
2018 to 2020	0	141	141
2021 to 2023	0	141	141
2024 to 2026	0	141	141
2027 to 2029	0	141	141
2030 to 2032	0	141	141
2033 to 2035	0	141	141
2036 to 2038	0	141	141
2039 to 2041	0	141	141
2042 to 2044	0	141	141
2046 to 2048	0	141	141
2049 to 2051	0	141	141
2052 to 2054	0	141	141
2055	0	47	47

**Comments:** Project life is anticipated to be 40 years and is expected to produce the same additional water supply every year after it is placed into service assuming normal operations and maintenance of the facilities. Well is assumed to operate in single and multi-dry years for 50% of the time each year it is required.

**Explanation of Need for the Project Including Recent and Historical Conditions**

The LDPCSD’s water supply portfolio is comprised of surface water supplied from Lake McClure, managed by Merced Irrigation District by contract and groundwater from a single well, the Ranchito well, managed by LDPCSD. The maximum water production of Ranchito well of 70 gallons per minute (GPM) can only provide 16% of the maximum day demands. The remaining, 84% of demands is met by surface water obtained from Lake McClure. Due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015 of approximately 64,000 AF (6.2% of total capacity) with the water surface elevation of 586 feet above sea level. This water level is over 100 feet below the LDPCSD’s fixed intake pump system, and LDPCSD

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has been utilizing emergency floating pumps since 2013 to boost water to the intake pump station which then pumps water to the surface water treatment plant. Lake McClure storage increased slightly to 11% of capacity as of July 12, 2015, but current projections show that if the drought continues water will be consumed at a rate where surface supply from Lake McClure will be unavailable in December 2015. This date is based on the projection that the current surface water supply from Lake McClure at the Barrett Cove Intake is being consumed at a rate of approximately one vertical foot every three days, such that LDPCSD will be out of water in December 2015 if the current drought continues. LDPCSD currently has mandatory water conservation measures in place and its customers have temporarily reduced water consumption by 50% over the past year. By December 2015 it is expected that the water level at the Lake McClure Barrett Cove Intake will be at ground surface so that the existing floating pumps can no longer be used. Part of the solution to provide a reliable water source during the drought emergency is to construct four new wells, two of which are in this project proposal.

LDPCSD has been working closely with numerous agencies including the California Office of Emergency Services (Cal/OES), Department of Water Resources, State Water Resources Control Board, and others to identify and procure alternative water supply sources. Thus far, the agencies are supporting construction of the first two wells with emergency grant funding and are supportive of this project to construct two additional wells.

These groundwater wells are only part of a long-term water supply solution and provide much needed supply during drought.

### **Estimates of Without Project Conditions with Respect to this Benefit**

No meaningful alternative water supply has been identified to replace the surface water supply capacity that could be lost this year from Lake McClure. Without the groundwater well project, the Lake Don Pedro Community Service District would be forced to truck the water from Lake McClure to the LDPCSD water treatment plant at a cost of \$40,240 per day, according to LDPCSD and consultant estimates, which would provide only 50% of supply to its customers, only meeting basic health and sanitary needs (Binkley, 2014, p. 1). The Lake Don Pedro Community Service District serves a disadvantaged community that is ill-suited to higher water rates associated with trucking of water, and the District's entire financial reserves would be depleted in the first month of the trucking operation, creating the inability to provide for routine water system operation and water supply or human consumption, sanitation and fire protection.

### **Descriptions of Methods used to Estimate Physical Benefits**

The physical benefit of water supply provided is estimated by determining the projected well yields and the operational frequency of the wells. Once the pumping capacity and operating frequency was determined it was possible to estimate the total AFY of water supply provided.

The number of wells required and their potential water output were determined based on the water supply need of LDPCSD and the historical well drilling and productions data available in the region. The need was determined by reviewing historical LDPCSD total water system production records, and projecting future demand after incorporating an emergency 30 percent water demand reduction based longer term on mandated conservation.

The project lifetime has assumed to be 40 years. This lifetime is considered to be reasonable given the typical useful life experienced for similar fractured bedrock deep wells in Mariposa County. LDPCSD operators will maintain and operate the well facilities and treatment plant in order to ensure the project benefits are maintained. The wells will not be required every year, as hydrology will determine in part whether there is adequate storage in Lake McClure to provide a reliable surface water supply. It is assumed that with growing pressures to increase downstream reservoir releases, and a highly limited water supply from the Merced River Watershed, that it is reasonable to expect LDPCSD to pump groundwater in Dry and Critical hydrologic years. Review of the DWR 60-20-20 index from 1975 to 2014 suggests a return interval of 1 in every 2 years for a single dry year and 1 in every 4 years for a multiple dry year. Therefore for the purposes of completing Table 2.2, it is estimated that the wells will be required every 3 years. It is also estimated that the wells will be required primarily during the summer and spring and fall shoulder periods, and therefore will operate about 6 months of the year, for a cumulative 50% operational period.

The need for the wells as an alternate water supply to Lake McClure was determined by reviewing historical operational patterns of Lake McClure, calculating the effect of continued releases from the reservoir on the storage capacity and water levels, and review and validation of operational water level and storage curves provided by the Merced Irrigation District. The evaluation revealed that the LDPCSD pumps would not be operational after December 2015 if precipitation did not fill the reservoir in advance. With no alternative surface

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water supplies available for diversion into the LDPCSD water system, as confirmed by the LDPCSD and its emergency management team, the alternative of groundwater development was evaluated against the option of trucking water to the LDPCSD water treatment plant. Trucking water was determined economically and logistically infeasible and available groundwater well records confirmed that areas of adequate subsurface fractured rock contained sufficient quantities of water making well development in the proper location a cost effective water supply solution.

### **Identification of all New Facilities, Policies, and Actions Required to Obtain the Physical Benefit**

LDPCSD will construct two new wells totaling 175 GPM in pumping capacity. The features will include an approximately 700 foot deep 8-inch diameter below ground well with surface improvements to include above grade piping, electrical and control panels, site fencing, paving, and other surface improvements required to provide the required groundwater production. One of the wells will require a packaged pyrolucite pressure filter treatment system in order to remove high concentrations of manganese exceeding the secondary maximum contaminant level. Pipelines will be constructed to connect the wells to the water distribution system.

### **Description of any Potential Adverse Physical Effects**

The pumping of groundwater from the fractured bedrock formation underlying LDPCSD could result in declining groundwater tables over time, if operated continuously. However, the wells are likely to be required only once every three years and are being constructed in an area that is not a defined groundwater basin in accordance with Bulletin 118. Any impacts are expected to be limited to just the fracture or area in the vicinity of the wells. In addition, all wells are being pump-tested and residual water levels monitored in existing and newly drilled wells to evaluate the short term and potential for long term effects on groundwater in the region. Wells will not be developed in locations determined to have a negative effect on the long term groundwater availability of the region.

No additional permanent adverse above ground physical effects are anticipated as a result of construction of the well pump station facility. However, some limited construction phase effects may occur. The effects of construction will be mitigated by constructing improvements during the dry season on LDPCSD-owned property previously developed and limiting ground disturbance to the greatest extent feasible. The sites cumulatively will be less than one acre, thereby minimizing any Stormwater Pollution Prevention Plan Requirements. All appropriate erosion and environmental protection measures will be taken during construction to minimize physical impacts.

### **Description of Whether the Proposed Project Effectively Addresses Long-Term Drought Preparedness**

The project provides a new local water supply and helps provide supply resilience to a community that currently has only one primary source of supply. When combined with the other two well projects that are currently in progress, LDPCSD will have the capacity to meet peak water demands of its customers after considering stringent water conservation measures that have already been implemented.

This project ***promotes conjunctive use*** and ***provides a new water supply*** for LDPCSD by providing access to a critical new groundwater source of supply that was not previously available to the District. This new source will be used in concert with its surface water supply to significantly improve supply resiliency for the community. Without this project, LDPCSD is at risk of losing its entire surface water supply by December 2015 and not having sufficient alternative source capacity. With construction of the wells, the use of groundwater will offset the need for surface water from Lake McClure, and allow the District and the Merced Irrigation District to operate the Lake and wells conjunctively to the maximum benefit of the region.

Therefore, the Drought Emergency Groundwater Supply Wells address the long-term drought preparedness of contributing to water supply and reliability during water shortages by:

- Promote water conservation, conjunctive use, reuse and recycling
- Solutions that yield a new water supply

### **Summary of Primary Benefit**

The Drought Emergency Groundwater Well Project will produce about 141 AFY of critical water supply over a 40 year period for LDPCSD customers in dry and multi-dry years when Lake McClure supplies are diminished or no

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longer available to LDPCSD. The project will provide a critical alternative water supply for this drought stricken community.

**Secondary Benefit: Maintain 0.4 CFS of Instream Flows for Ecosystem Benefit**

As shown in Table 2.3, the groundwater well supply project will provide approximately 0.4 cubic feet per second (CFS) of new water supply every third year for fishery benefit, or as required based on drought or emergency water supply need.

Table 2.3: Annual Project Physical Benefits (PSP Table 5)			
<b>Project Name: Drought Emergency Groundwater Supply Wells</b>			
<b>Type of Benefit Claimed: Maintain instream flows for environmental fishery benefit (secondary benefit)</b>			
<b>Units of the Benefit Claimed: cubic feet per second (CFS)</b>			
<b>Anticipated Useful Life of Project (Years): 40</b>			
(a)	(b)	(c)	(d)
Year	Physical Benefits		
	Without Project	With Project	Change Resulting from Project (c) – (b)
2015 to 2017	0	0.4	0.4
2018 to 2020	0	0.4	0.4
2021 to 2023	0	0.4	0.4
2024 to 2026	0	0.4	0.4
2027 to 2029	0	0.4	0.4
2030 to 2032	0	0.4	0.4
2033 to 2035	0	0.4	0.4
2036 to 2038	0	0.4	0.4
2039 to 2041	0	0.4	0.4
2042 to 2044	0	0.4	0.4
2046 to 2048	0	0.4	0.4
2049 to 2051	0	0.4	0.4
2052 to 2054	0	0.4	0.4
2055	0	0.1	0.1

**Comments:** Project life is anticipated to be 40 years and is expected to produce the same additional water supply every year after it is placed into service assuming normal operations and maintenance of the facilities. Wells are assumed to operate 50% of each year it is required.

**Explanation of Need for the Project Including Recent and Historical Conditions**

As described earlier, due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015. Lake McClure storage increased slightly to 11% of capacity as of July 12, 2012, but current projections show that if the drought continues water will be consumed at a rate where surface supply from Lake McClure will be unavailable by December 2015.

The lower Merced River provides critical habitat for anadromous fisheries including fall and spring run chinook salmon and steelhead. These sensitive species rely on flows released from reservoirs to provide water of adequate flow and temperature to provide suitable habitat to survive and spawn. The potential to use the conserved surface water for downstream fishery flows provide a key secondary benefit, in addition to relieving LDPCSD of its current critical drought water supply crises. Lake McClure is a 1.02 million acre foot storage reservoir in western Mariposa County, California. The reservoir is formed by the New Exchequer Dam impounding the Merced River, a tributary of the San Joaquin River. The Merced River is a 145-mile long tributary of the San Joaquin River flowing from the Sierra Nevada into the Central Valley. Using CDEC data, the average annual unimpaired flow of the Merced River is 960 thousand AFY. Drilling two new wells will help Merced Irrigation District and regulatory agencies by reducing LDPCSD surface water diversions, especially during drought years when surface supplies are limited, thereby increasing conserved storage in Lake McClure. This measure will provide water to potentially enhance the instream flows in the lower Merced River and support a critical fisheries benefit, during dry years, to meet regulatory objectives as promulgated by the State Water Resources Control Board, Federal Energy Regulatory Commission, CA Department of Fish and Wildlife, US Fish and Wildlife

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Service, and many others. Minimum flow releases vary throughout the year, and while there are numerous agreements and regulatory instream requirements, Merced River flows could be as low as 15 cfs between June 1 and October 15 during a dry year in accordance with the existing FERC license for Project Number 2179 (SWRCB, 2013). The addition of 0.4 cfs to the lower Merced River could help enhance instream flows by about 2.5% in dry years.

The drought, reduced unimpaired flow, and declining storage has also resulted in significant impacts to the agricultural sector in the San Joaquin Valley. Earlier this year, Merced Irrigation District (MID) had informed its growers that due to a lack of available storage, no surface water from Lake McClure would be available. However, faced with the current unprecedented drought conditions, the MID Board took the only action available to it, directing staff to immediately divert approximately 10,000 AF of stored water. In a more typical year, MID would divert up to 500,000 AF for irrigation.

### **Estimates of Without Project Conditions with Respect to this Benefit**

Without this project there would simply be less storage available to augment downstream fishery releases in dry and multiple-dry years. Inasmuch as years with limited snow pack (March 2015 had 10% of the historical average snowpack in the Merced River Basin (DWR CDEC, 2015), conservation of storage or alternative supply sources will help relieve critical supply constraints.

### **Descriptions of Methods Used to Estimate Physical Benefits**

Because it is difficult to estimate the direct benefit of the conserved storage relative to the timing and volumes of downstream flow releases, the physical benefit will be measured by determining the avoided diversion from Lake McClure. The physical benefit of water supply provided is estimated by determining the projected well yields and the operational frequency of the wells. Once the pumping capacity and operating frequency was determined it was possible to estimate the total AFY of water supply provided.

The needed well capacities were determined based on the water supply need of LDPCSD. The need was determined by reviewing historical LDPCSD total water system production records, and projecting future demand after incorporating an emergency 30 percent water demand reduction based on mandated conservation.

The project lifetime has assumed to be 40 years. This lifetime is considered to be reasonable given the typical useful life experienced for similar fractured bedrock deep wells in Mariposa County. LDPCSD operators will maintain and operate the well facilities and treatment plant in order to ensure the project benefits are maintained. The wells will not be required every year, as hydrology will determine in part whether there is adequate storage in Lake McClure to provide a reliable surface water supply. It is assumed that with growing pressures to increase downstream reservoir releases, and a highly limited water supply from the Merced River Watershed, that it is reasonable to expect LDPCSD to pump groundwater in Dry and Critical hydrologic years. Review of the 60-20-20 index from 1975 to 2014 suggests a return interval of 1 in every 2 years for a single dry year and 1 in every 4 years for a multiple dry year. Therefore for the purposes of completing Table 2.3, it is estimated that the wells will be required every 3 years. It is also estimated that the wells will be required primarily during the summer and spring and fall shoulder periods, and therefore will operate about 6 months of the year, for a cumulative 50% operational period.

Therefore, the physical benefit is estimated based on the 141 AFY being pumped over 6 months or 0.4 cfs with an availability every three years.

### **Identification of all New Facilities, Policies, and Actions Required to Obtain the Physical Benefit**

LDPCSD will construct two new wells totaling 175 GPM in pumping capacity. The features will include an approximately 700 foot deep 8-inch diameter below ground well with surface improvements to include above grade piping, electrical and control panels, site fencing, paving, and other surface improvements required to provide the required pumping capacity. One of the wells will require a packaged pyrolucite pressure filter treatment system in order to remove high concentrations of manganese exceeding the secondary maximum contaminant level. Pipelines will be constructed to connect the wells to the water distribution system.

### **Description of any Potential Adverse Physical Effects**

The pumping of groundwater from the fractured bedrock formation underlying LDPCSD could result in declining groundwater tables over time, if operated continuously. However, the wells are likely to be required every three

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years, are being constructed in an area that is not a defined groundwater basin in accordance with Bulletin 118 and any impacts are expected to be limited to just the fracture or area in the vicinity of the wells.

In addition, all wells are being pump-tested and residual water levels monitored in existing and newly drilled wells to evaluate the short term and potential for long term effects on groundwater in the region. Wells will not be developed in locations determined to have a negative effect on the long term groundwater availability of the region.

No additional permanent adverse above ground physical effects are anticipated as a result of construction of the well pump station facility. However, some limited construction phase effects may occur. The effects of construction will be mitigated by constructing improvements during the dry season on LDPCSD-owned property that are already developed and limiting ground disturbance to the greatest extent feasible. The sites cumulatively will be less than one acre, thereby minimizing any Stormwater Pollution Prevention Plan Requirements. All appropriate erosion and environmental protection measures will be taken during construction to minimize physical impacts.

### **Description of Whether the Proposed Project Effectively Addresses Long-Term Drought Preparedness**

As described in the Primary Benefit discussion, the project provides a new local water supply and helps provide supply resilience to a community that currently has only one primary source of supply. When combined with the other two well projects that are currently in progress, LDPCSD will have the capacity to meet peak water demands of its customers after considering stringent water conservation measures that have already been implemented.

This project promotes conjunctive use and provides a new water supply for LCPCSD by providing access to a critical new groundwater source of supply that was not previously available to the District. This new source will be used in concert with its surface water supply to significantly improve supply resiliency for the community. Without this project, LDPCSD is at risk of losing its entire surface water supply by December 2015 and not having sufficient alternative source capacity. With construction of the wells, the use of groundwater will offset the need for surface water from Lake McClure, and allow the District and the Merced Irrigation District to operate the Lake and wells conjunctively to the maximum benefit of the region.

Therefore, the Drought Emergency Groundwater Supply Wells address the long-term drought preparedness of contributing to water supply and reliability during water shortages by:

- Promote water conservation, conjunctive use, reuse and recycling
- Solutions that yield a new water supply

### **Summary of Secondary Benefit**

The LDPCSD Drought Emergency Groundwater Wells project will provide fisheries benefit by reducing surface water diversions during dry and multiple dry (drought) years, providing valuable ecosystem benefits. It is estimated that the project will provide up to 0.4 CFS (141 AFY delivered over 6 months) of conserved supply that will be available for storage in Lake McClure and later release into the lower Merced River for benefit of critical anadromous fisheries. Recent studies published on the relicensing of New Don Pedro Hydroelectric facilities value the water stored in this region at \$4,600 per acre foot for an annual benefit value of \$647,000.

### **DIRECT WATER-RELATED BENEFIT TO A DAC**

As described in Attachment 7, the proposed project and its benefit area is the entirety of LDPCSD. LDPCSD overlaps two IRWM Regions (Yosemite-Mariposa and Tuolumne-Stanislaus), and is also located in two counties (Mariposa and Tuolumne). Approximately 60% of the District's active service connections are located in Mariposa County. According to the latest 2009-2013 American Community Survey, the Median Household Income for the portion of LDPCSD in Mariposa County is \$46,150. It is also estimated based on the proportion of active service connections in each county that approximately 1,900 of the 3,200 residents are located within the DAC portion of Mariposa County. Therefore, in accordance with Appendix G of the 2015 IRWM Grant Program Guidelines, this project benefits an area that is more than 25% DAC.

The two wells proposed by this project will help LDPCSD address a critical supply shortfall that could occur as soon as December 2015 if the District is no longer able to divert water from Lake McClure. As a result, LDPCSD has had to implement stringent conservation mandates and identify alternative supply sources, as recommended

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in this grant funding proposal. With the addition of the two new wells, LDPCSD will be able to meet 70% of its projected maximum day demand. This project is therefore meeting a critical water supply need of a DAC, which is consistent with the example measure “infrastructure renovations to a public water supply system necessary to assure continued reliability of the minimum quality and quantity of water” in accordance with Critical Water Supply or Water Quality Need Program Preference Project Examples included in the 2015 IRWM Grant Program Guidelines.

The LDPCSD’s water supply portfolio is comprised of surface water supplied from Lake McClure, managed by Merced Irrigation District by contract, and groundwater from a single well, the Ranchito well, managed by LDPCSD. The maximum water production of Ranchito well of 70 GPM can only provide 16% of the maximum day demands. The remaining, 84% of demands is met by surface water obtained from Lake McClure. Due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015 of approximately 64,000 AF (6.2% of total capacity) with the water surface elevation of 586 feet above sea level. By December 2015 it is expected that the water level at the Lake McClure Barrett Cove Intake will be so low that the existing floating pumps can no longer be used. Part of the solution to provide a reliable water source during the drought emergency is to construct four new wells.

**PROJECT PERFORMANCE MONITORING PLAN**

Table 2.4 presents the project performance monitoring plan. LDPCSD has selected monitoring tools and metrics, such as recording well flow meter data that are reasonable to implement for a small community water system for use in confirming that the project physical benefits can be measured and tracked appropriately. The measurements of the project benefits will be provided to the Yosemite-Mariposa Regional Water Advisory Council as data management requests are issued consistent with the 2014 Integrated Regional Water Management Plan.

<b>Table 2.4: Project Performance Monitoring Plan (PSP Table 6)</b>		
<b>Project: Water Use Efficiency Project</b>		
<b>Proposed Physical Benefits</b>	<b>Targets</b>	<b>Measurement Tools and Methods</b>
Water supply provided	175 gpm/141 AFY every three years for the 40 year useful life of the project	Record and totalize flow from the new groundwater wells flow meters. The data will be recorded in LDPCSD’s electronic SCADA historian system and used to confirm that adequate water supply is being provided to residents of the community in being able to maintain sufficient minimum water system pressures at all times throughout the year.
Instream flows for fishery benefit	0.4 cfs/175 gpm every three years for the 40 year useful life of the project	Record and totalize flow from the new groundwater wells flow meters. This measurement approach will be used in-lieu of measuring direct lower Merced River instream flow increases, as it will not otherwise be possible to directly synchronize the timing of releases with additional conserved storage.

**COST EFFECTIVENESS ANALYSIS**

Table 2.5 presents a summary of the cost-effectiveness analysis of this project. No other project alternatives can produce comparable water supply in conjunction with the fisheries instream flow benefits. Although demand-side water conservation programs can produce water savings, they cannot provide the direct water supply benefits that this project provides. Similarly, there have been no alternatives identified that will be able to quickly address the ongoing water supply threat with a reliable water supply source that will help offset the potential critical loss of surface water supply from Lake McClure.

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**Table 2.5: Cost Effective Analysis (PSP Table 7)**

<b>Project Name: Drought Emergency Groundwater Wells</b>	
Question 1	<p>Types of benefits provided as shown in Tables 2.2 and 2.3:</p> <ul style="list-style-type: none"> <li>• Primary benefit of 141 AFY of water supply produced.</li> <li>• Secondary benefit of 0.4 CFS of increased Instream fishery flows.</li> </ul>
Question 2	<p>Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?</p> <ul style="list-style-type: none"> <li>• Yes alternative methods have been considered. There are no alternative projects that have been identified that would provide the same type and amounts of physical benefits at a comparable cost.</li> </ul> <p>If no, why?</p> <ul style="list-style-type: none"> <li>• Not applicable.</li> </ul> <p>If yes, list the methods (including the proposed project) and estimated costs.</p> <ul style="list-style-type: none"> <li>• With the upcoming depletion of the LDPCSD water supply from Lake McClure in approximately December 2015, the LDPCSD considered all possible alternatives to increase its water supply portfolio including acquisition of additional surface water supplies and installation of related infrastructure, installation of groundwater wells and implementing water conservation actions for both end users and aggressive LDPCSD distribution system leak repair. The cost of installing pumping facilities in the deep water of Lake McClure coupled with construction of a pipeline connecting the deep water pumps to the LDPCSD system was estimated to cost in excess of \$6.5 million with a \$100,000 annual increase in operating costs, and take well in excess of two years to design, permit and construct which would leave the community without water for nearly the entire two year period. LDPCSD chose to proceed with groundwater well construction costing \$2 million, coupled with implementation of an aggressive end user water conservation program (approximately \$518,000) and replacement of 1400 leaky LDPCSD water service lines (\$2.4 million). This combination of projects provides for a long term, drought resistant community water supply with a \$2 million savings in construction and implementation costs, as well as a \$250,000 annual savings in operation and maintenance costs, allowing for continued investments in and maintenance of the water conservation program post implementation</li> </ul>
Question 3	<p>If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.</p> <ul style="list-style-type: none"> <li>• By providing an immediate alternative supply of water for the community, the proposed project is the most cost effective alternative to address the current situation. Another alternative evaluated was the trucking of water. Information provided by LDPCSD and their consultant estimate that the cost to provide just 5% of normal winter demand for LDPCSD (27 AF) is \$28,555 per month for one truck plus diesel. Assuming three months of trucking (June-August) for 40 years, the total cost to truck in water to meet 5% of winter demand is \$3,426,600 plus diesel. This is more than 2 times the cost of the proposed wells.</li> </ul>

**REFERENCES**

Binkley Associates, Inc., “RE: Drought Contingency Planning – Water Supply Emergency.” Memo to the Lake Don Pedro Board of Directors. November 5, 2014.

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Socioeconomic Study Prepared for the Relicensing of New Don Pedro Hydroelectric Facilities

State Water Resources Control Board. Bay-Delta Water Quality Control Plan Update, Draft Substitute Environmental Document, 2012

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## REGIONAL WATER USE EFFICIENCY PROGRAM

The Regional Water Use Efficiency Program will promote best water conservation practices to improve indoor /outdoor water use efficiency within both LDPCSD and Mariposa County.

## IMPLEMENTING AGENCY: LAKE DON PEDRO COMMUNITY SERVICES DISTRICT (LDPCSD)

### PROJECT DESCRIPTION

The Lake Don Pedro Community Service District (LDPCSD) is proposing the Water Use Efficiency Program (WUE Program), which promotes a suite of high-efficiency technologies and best water conservation practices to improve indoor and outdoor urban water use efficiency throughout Mariposa County. The Program will initially focus on the LDPCSD's service area within Mariposa County, which is a disadvantaged community (DAC) for the first year, and later expand to the remainder of Mariposa County, much of which is also DAC.

Program elements include: 1) Regional Water Conservation coordination; 2) a regional program of Water Conservation Education and Outreach including workshops and use of infographics, flyers, Public Service Announcements (PSA's), door hangers and tent cards for restaurants and hotels, bill stuffers, and web site widgets; 3) a housecall program of providing free water use evaluations and audits, leak repair, water saving devices and leak detection tablets to DAC and non-DAC households and businesses throughout the region; 4) a rebate program for residential and commercial/industrial users for High- Efficiency Toilets, and laundry to landscape (graywater) irrigation systems and irrigation efficiency improvements; 5) development of Commercial sector water conservation Programs. Combined, these program elements target significant indoor and outdoor end uses of water in urban sectors. This will be the first formal water use efficiency program in Mariposa County and will address the most urgent drought need at LDPCSD. This Project will address the LDPCSD water shortage emergency in the first year and will be expanded in the following year to serve as a county-wide regional water use efficiency (WUE) program that would benefit other community water systems as well as self-supplied water users. This Program will work with multiple agencies, such as the California Energy Commission, CPUC, local organizations and stakeholder groups, to communicate additional conservation programs outside of this Program to Mariposa County residents.

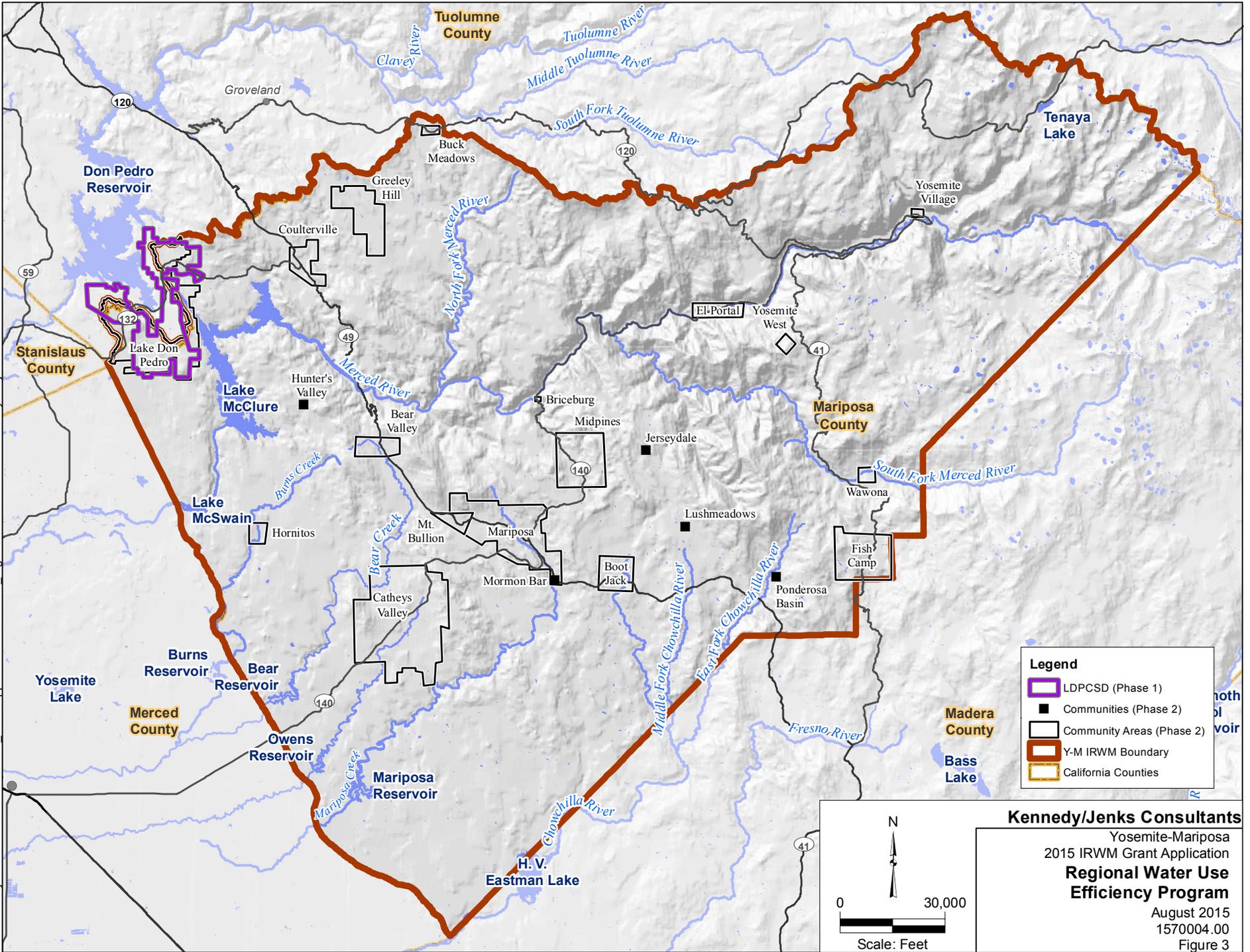
With California in the midst of an on-going drought of historic proportions, the WUE Program's elements will help the region achieve its water conservation goals. Through the life of this Program, LDPCSD is expected to see a water savings of 18 AFY, or 5% of LDPCSD total water use. Once the Program is fully implemented and the WUE Program expanded to the rest of Mariposa County, the Region could see a savings of 36 AFY or about 3% of the Region's 2010 total water supply according to the Yosemite-Mariposa Integrated Regional Water Management Plan. In addition to the semi-permanent water savings, through outreach, education, and practice, this Program will foster long-term "passive" water savings beyond the life of the Program elements and encourage behavioral modification for long-term conservation.

### **How the Program Addresses a Current Need of the Region**

The multi-year, statewide drought has reduced the availability of, and increased competition for, water supplies across Mariposa County and in the downstream San Joaquin Valley. Many small community water systems within the Yosemite-Mariposa Region had adequate access to water supply until this year, when competition for limited water supplies coupled with record low snowfall put the largest reservoir, Lake McClure, on the brink of reaching deadpool and making water unavailable for municipal, agricultural, or environmental users. As of August 2, 2015 Lake McClure is at 11% of capacity (17% of average). The Water Use Efficiency Program helps to provide much needed conservation for residents that receive water supply from LDPCSD and to other water users throughout Mariposa County.

### PROJECT MAP

The project map that follows shows all of the projects major elements described in Attachment 3 – Work Plan.



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**PROJECT PHYSICAL BENEFITS**

The following primary and secondary physical benefits are expected from this project:

- Primary benefit: Saves 36 AFY high-quality water.
- Secondary benefit: Provides 0.05 CFS of conserved storage for instream flows for fishery benefit in the Merced, Chowchilla, and Fresno Rivers, as well as the Lower Mariposa County Streams Group.

The following sections discuss these benefits in more detail, with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the project benefits discussion, a cost effectiveness analysis of the project compared to its alternatives is provided.

**TECHNICAL ANALYSIS OF PHYSICAL BENEFITS**

**Primary Benefit: Annual Savings of High-Quality Water**

Table 2.6: Annual Project Physical Benefits (PSP Table 5)									
Project Name: Regional Water Use Efficiency Project									
Type of Benefit Claimed: Water supply saved (primary benefit)									
Units of the Benefit Claimed: acre-feet per year (AFY)									
Anticipated Useful Life of Project (years): 20									
(a)	(b)	(c)							(d)
Year	Physical Benefits								
	Without Project	With Project							Change Resulting from Project
		Faucet Aerators	WE Showerhead	Sprinkler Nozzle	Toilet Tank Bank	HET	Laundry to Landscape (Graywater)	Total	(c) – (b)
2016	0	3	7	3	<1	2	2	18	18
2017	0	7	14	6	<1	4	5	36	36
2018-2036	0	7	14	6	<1	4	5	36	36
<b>Comments:</b> Implementation includes issuance of 1,536 home water kits, 400 rebates for HETs, and 200 rebates for laundry to landscape (graywater) systems in the first year of the Project. The remaining kits and rebates will be issued in the second year of the Project.									

The program also includes irrigation upgrades and landscaping incentives that could include turf replacement, irrigation controls and sensors and other measures which are not estimated for savings because of the range of possibilities. Similarly, water savings can also be expected as a result of outreach efforts and water use audits, but those are not quantified here. The savings associated with landscape and outreach would only increase the With Project total savings.

**Explanation of need for the project including recent and historical conditions**

The LDPCSD’s water supply portfolio is comprised of surface water supplied from Lake McClure, managed by Merced Irrigation District by contract and groundwater from a single well, the Ranchito well, managed by LDPCSD. The maximum water production of Ranchito well of 70 GPM can only provide 16% of the maximum day demands. The remaining, 84% of demands is met by surface water obtained from Lake McClure. In January 2015, due to four years of continued drought, the water stored in Lake McClure dropped to a historic low of 64,000 AF (6.2% of total capacity) with the water surface elevation of 586 feet above sea level. This water level is over 100 feet below LDPCSD’s fixed intake pump system, and LDPCSD is currently utilizing floating pumps to boost water to the intake pump station which then pumps water to the surface water treatment plant. Though Lake McClure storage has increased slightly to 11% of capacity as of July 12, 2015, projections show the surface water supply from Lake McClure at the Barrett Cove Intake is being consumed at a rate in which it will be out of water in December 2015 if the current drought continues. LDPCSD currently has a water conservation plan in place and has reduced water consumption by 50% over the past year. By December 2015 it is expected that the water level at the Lake McClure Barrett Cove Intake will be at ground surface so that the existing floating pumps can no longer be used. Part of the solution to provide a reliable water source during the drought emergency is to

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implement stringent water conservation measures and other programs to immediately decrease the water consumption.

LDPCSD has been working closely with numerous agencies including California Office of Emergency Services (Cal/OES), Department of Water Resources, State Water Resources Control Board, and others to identify and procure alternative water supply sources. Concurrently, LDPCSD has adopted a resolution 2015-15 in March 2015 committing District customers to achieve 50% water savings over 2014 water use. Mariposa Public Utilities District (Mariposa PUD) implemented Stage 2 Water Use Restrictions on May 5, 2015 restricting watering times and use. Mariposa County Board of Supervisors adopted Resolution 2014-210 declaring a drought local emergency on May 13, 2014.

**Estimates of without project conditions with respect to this benefit**

Lake Don Pedro Community Service District serves a disadvantaged community that is ill-suited to higher water rates associated with trucking of water and underserved with regard to programs such as replacement of older inefficient appliances, and vital programs that help achieve long-term water savings and adequate water demand response capabilities during drought. The community served by LDPCSD has already reduced water use in 2014 by between 35% and 60% as compared to 2013, however, without the Water Use Efficiency Program, continued or more restrictive conservation would be cost-prohibitive and local water supplies may “dry up” by December 2015.

**Descriptions of methods used to estimate physical benefits**

Education, replacement of water dependent landscaping, improvement in outdoor water application means and methods and installation of high efficiency fixtures are proven methods for decreasing the use of potable water in residences, businesses and industry, in both the short and long term. For example, old inefficient toilets currently use between 2.22 and 3.72 gallons per flush (gpf) more than high efficiency toilets (HET). The old urinals use between 1.0 and 4.5 gpf more than high efficiency urinals (HEU). EPA provides lists of “certified WaterSense toilets” and other fixtures that are backed by independent, third-party testing and certification, and meet EPA’s specifications for water efficiency and performance.

Lake Don Pedro Community Service District staff conducted a web-based search of various programs that included replacement of inefficient fixtures and installation of water efficient devices to develop a summary water savings table for the various components of the Regional Water Conservation Program. Average annual savings per unit were obtained from various web sites including manufacturers of EPA certified fixtures. Where differing annual savings were found, the lower or more conservative estimate was used to populate the table.

Estimates of water savings generated on an annual basis from each of the Program components are shown below.

<b>Table 2.7: Water Savings Calculations</b>					
<b>Fixture or Program</b>	<b>Total Regional Rebates or Installations</b>	<b>Rebate Unit</b>	<b>Annual Unit Water Savings (Gal/YR)</b>	<b>Annual Total Water Savings (Gal/YR)</b>	<b>Water Savings (AF/YR)</b>
Aerator	1536	2 aerators (1 kitchen, 1 bath)	700	2,150,400	7
WE Showerhead	1536	showerhead	2900	4,454,440	14
WE Sprinkler Nozzle	1536	nozzle	1300	1,996,800	6
Toilet Tank Bank	1536	toilet tank bank	<1	<1	<1
HET	400	HET	2900	1,160,000	4
Laundry to Landscape (Graywater System)	200	system	7409	1,481,760	5
<b>TOTAL*</b>				<b>11,588,640</b>	<b>36</b>

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**Table 2.7: Water Savings Calculations**

Fixture or Program	Total Regional Rebates or Installations	Rebate Unit	Annual Unit Water Savings (Gal/YR)	Annual Total Water Savings (Gal/YR)	Water Savings (AF/YR)
<p><b>Source:</b>  EPA WaterSense product information for faucet aerators and showerheads  <a href="http://www.epa.gov/WaterSense/products/bathroom_sink_faucets.html">http://www.epa.gov/WaterSense/products/bathroom_sink_faucets.html</a>  <a href="http://www.epa.gov/WaterSense/products/showerheads.html">http://www.epa.gov/WaterSense/products/showerheads.html</a>  MWD Water Conservation Program for WE sprinkler nozzles (<a href="http://www.bewaterwise.com/pdf/Rotating_Nozzles_Brochure_2014.pdf">http://www.bewaterwise.com/pdf/Rotating_Nozzles_Brochure_2014.pdf</a>)  AM Conservation Group, Inc. for Toilet Tank Bank  (<a href="http://www.amconservationgroup.com/products/WaterConservationProducts/ToiletWaterSavingDevices-LeakDetectors&amp;ToiletTankBags/toilet-tummy/?variation_id=4562">http://www.amconservationgroup.com/products/WaterConservationProducts/ToiletWaterSavingDevices-LeakDetectors&amp;ToiletTankBags/toilet-tummy/?variation_id=4562</a>)  Assuming 5 flushes per person per day, 2.36 persons per household, and 1.8 toilets per household (CEC, Census, and EPA)  Graywater availability based on average water used by a high efficiency washer of 3,763 gal/year (CEE Tier 3).</p>					

In addition to the savings described above, workshops and other outreach efforts, technical assistance, and water audits are expected to result in other permanent water savings. Moreover, landscape conversions coupled with smart controller rebates are will result in even greater savings; however due to the variance in landscape acreage and current water practices, these savings were not estimated.

**Identification of all new facilities, policies, and actions required to obtain the physical benefit**

This Program does not involve construction, but it will require the development of a rebate and program administration tracking system, including a website, computer, and equipment for the installation and audit technicians.

**Description of any potential adverse physical effects**

This Program is a rebate and education program and does not require any construction or land acquisition and is not expected to result in any adverse physical effects.

**Description of whether the proposed project effectively addresses long-term drought preparedness**

The Water Use Efficiency Project will implement a series of programs that will result in long-term drought preparedness by promoting water conservation and achieving long-term reduction of water use. This Project will change water use patterns and provide for reliable water demand management, versus relying on threats of penalties and enforcement to achieve water savings. On average, indoor water use can account for 50-60% of residential water use. The installation of indoor water saving devices such as faucet aerators, WE showerheads, WE sprinkler nozzles, toilet tank banks, HETs and laundry to landscape graywater systems will maximize indoor water use efficiency. The Water Use Efficiency Program targets both indoor and outdoor water use and will reduce water demand thereby reducing reliance on imported water and increasing reliability. The water savings associated with this Program are expected to continue for up to 20 years. Beyond the life of this Program, implementation of the Regional Water Use Efficiency Project will influence and transform markets and standards towards higher efficiency and foster long-term “passive” water savings by encouraging behavioral modification for long-term conservation.

This Program provides immediate water conservation savings and helps lower demands, for a community that currently has only one primary source of supply which is extremely threatened during drought years. Increased water conservation will support the preparedness of LDPCSD to lower demands during times of drought when it is critically needed. When combined with the other projects in this proposal, LDPCSD will have the capacity to meet peak water demands of its customers after considering stringent water conservation measures such as the service line replacement program that are in the process of being implemented.

Therefore, the Regional Water Use Efficiency Program address the long-term drought preparedness of contributing to water supply and reliability during water shortages by:

- Promote water conservation, conjunctive use, reuse and recycling
- Improve landscape and agricultural irrigation efficiencies

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- Achieve long-term reduction of water use

**Summary of Primary Benefit**

The Regional Water Use Efficiency Program will conserve over 36 AFY throughout Mariposa County, including 18 AFY in LDPCSD. The Program will provide immediate results, and ease pressures on the limited water supply available.

**Secondary Benefit: Additional Instream Flows for Ecosystem Benefit to the Merced, Chowchilla, and Fresno Rivers, as well as the Lower Mariposa County Streams Group**

Water savings as a result of this Project can be directly translated to additional instream flows to the Merced, Chowchilla, and Fresno Rivers, as well as the Lower Mariposa County Streams Group for the benefit of downstream users and fish habitat. Once the Project is completed, there will be an additional 0.05 cfs available for fishery flows.

**Table 2.8: Annual Project Physical Benefits (PSP Table 5)**

Table 2.8: Annual Project Physical Benefits (PSP Table 5)			
<b>Project Name: Regional Water Use Efficiency Project</b>			
<b>Type of Benefit Claimed: Fishery Flows</b>			
<b>Units of the Benefit Claimed: cfs</b>			
<b>Anticipated Useful Life of Project (years): 20</b>			
(a)	(b)	(c)	(d)
Year	Physical Benefits		
	Without Project	With Project	Change Resulting from Project (c) – (b)
2016	0	0.02	0.02
2017	0	0.05	0.05
2018-2036	0	0.05	0.05

**Explanation of need for the project including recent and historical conditions**

As described earlier, due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015. Lake McClure storage increased slightly to 11% of capacity as of July 12, 2015, but current projections show that if the drought continues water will be consumed at a rate where surface supply from Lake McClure will be unavailable in December 2015.

The lower Merced River provides critical habitat for anadromous fisheries including fall and spring run chinook salmon and steelhead. These sensitive species rely on flows released from reservoirs to provide water of adequate flow and temperature to provide suitable habitat to survive and spawn. The potential to use the conserved surface water for downstream fishery flows provide a key secondary benefit, in addition to relieving LDPCSD of its current critical drought water supply crises. Lake McClure is a 1.02 million AF storage reservoir in western Mariposa County, California. The reservoir is formed by the New Exchequer Dam impounding the Merced River, a tributary of the San Joaquin River. The Merced River is a 145-mile long tributary of the San Joaquin River flowing from the Sierra Nevada into the Central Valley. The average annual flow recorded unimpaired flow of the Merced River is 960 thousand AFY. Water conservation will help Merced Irrigation District and regulatory agencies by reducing LDPCSD surface water diversions, thereby increasing conserved storage in Lake McClure. This measure will provide water to potentially enhance the instream flows in the lower Merced River and support a critical fisheries benefit to meet regulatory objectives as promulgated by the State Water Resources Control Board, Federal Energy Regulatory Commission, CA Department of Fish and Wildlife, US Fish and Wildlife Service, and many others. Minimum flow releases vary throughout the year, and while there are numerous agreements and regulatory instream requirements, Merced River flows could be as low as 15 cfs between June 1 and October 15 during a dry year in accordance with the existing FERC license for Project Number 2179 (SWRCB, 2013). The addition of 0.05 cfs to the lower Merced River could help enhance instream flows by about 0.3% in dry years.

The drought and reduced unimpaired flow and storage have also resulted in significant impacts to the agricultural sector in the San Joaquin Valley. Earlier this year, Merced Irrigation District had informed its growers that due to a lack of available storage no surface water from Lake McClure would be available. However, faced with the current unprecedented drought conditions, the Merced Irrigation District Board took the only action available to it,

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directing staff to immediately divert approximately 10,000 AF of stored water. In a more typical year, MID would divert up to 500,000 AF for irrigation.

### **Estimates of without project conditions with respect to this benefit**

Without this project there would simply be less storage available to augment downstream fishery releases in dry and multiple-dry years. Inasmuch as years with limited snow pack (March 2015 had 10% of the historical average snowpack in the Merced River Basin (DWR CDEC, 2015)), conservation of storage or alternative supply sources will help relieve critical supply constraints.

In addition, the LDPCSD will have difficulty maintaining the currently required high level of mandatory water conservation measures for another year or more to allow the Lake McClure water supply to recover. LDPCSD customers have reduced water consumption by over 50% during the months of June and July 2015 due to the mandatory restrictions. Without the project in place, it is highly likely that the community water demand will quickly return to normal water use patterns once the mandatory restrictions are reduced or lifted, resulting in increased stress on the small amount of available surface and groundwater.

### **Descriptions of methods used to estimate physical benefits**

Because it is difficult to estimate the direct benefit of the conserved storage relative to the timing and volumes of downstream flow releases, the physical benefit will be measured by determining the avoided diversion from Lake McClure. Most of Mariposa County falls into the Upper Merced River Watershed. Therefore, it was assumed that 100% of the water conserved by those participating in the Program throughout Mariposa County would be available as additional fishery flows in the Merced River throughout the year. Using the conversion of 724 AFY per cfs, 36 AFY of water conserved is about equal to 0.05 cfs into Merced, Chowchilla, and Fresno Rivers, as well as the Lower Mariposa County Streams Group.

The amount of water savings calculated is based on evaluation of LDPCSD customer water use types and amounts by season of the year. Extensive research was conducted to optimize the water use efficiency program and project needs of the LDPCSD and Mariposa County customer base to determine the optimal means expected to result in maximized water use efficiency and water demand reduction.

### **Identification of all new facilities, policies, and actions required to obtain the physical benefit**

Additional fishery flows can be achieved passively, without any additional effort beyond the rebate and outreach programs, water saving audits, and technical assistance. The reduction of water use will result in less water required to be pumped from Lake McClure and more water available to release downstream.

### **Description of any potential adverse physical effects**

This Program is a rebate and education program and does not require any construction or land acquisition and is not expected to result in any adverse physical effects.

### **Description of whether the proposed project effectively addresses long-term drought preparedness**

The Regional Water Use Efficiency Program will implement a series of programs that will result in long-term drought preparedness. Indoor water use can account for 50-60% of residential water use. The installation of indoor water saving devices such as faucet aerators, WE showerheads, WE sprinkler nozzles, toilet tank banks, HETs and laundry to landscape graywater systems will maximize indoor water use efficiency. This Program targets both indoor and outdoor water use and will reduce water demand thereby increasing reliability. The water savings associated with this Program are expected to continue for 20 years. Beyond the life of this Program, implementation of the Regional Water Use Efficiency Project will influence and transform markets and standards towards higher efficiency and foster long-term "passive" water savings by encouraging behavioral modification for long-term conservation.

This Program provides immediate water conservation savings and helps lower demands, for a community that currently has only one primary source of supply and an extremely threatened source during drought years. Increased water conservation will prepare LDPCSD to lower demands during times of drought when it is critically needed. When combined with the other projects in this proposal, LDPCSD will have the capacity to meet peak water demands of its customers after considering stringent water conservation measures such as the service line replacement program that are in the process of being implemented.

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Therefore, the Regional Water Use Efficiency Program address the long-term drought preparedness of contributing to water supply and reliability during water shortages by:

- Promote water conservation, conjunctive use, reuse and recycling
- Improve landscape and agricultural irrigation efficiencies
- Achieve long-term reduction of water use

### **Summary of Secondary Benefit**

The Regional Water Use Efficiency Program will make 0.05 cfs of additional instream flows to the Merced River. These benefits will be seen immediately with the implementation of water conservation measures.

### **DIRECT WATER-RELATED BENEFIT TO A DAC**

As described in Attachment 7, the proposed project and its benefit area is the entirety of LDPCSD. LDPCSD overlaps two IRWM Regions (Yosemite-Mariposa and Tuolumne-Stanislaus), and is also located in two counties (Mariposa and Tuolumne). Approximately 60% of the District's active service connections are located in Mariposa County. According to the latest 2009-2013 American Community Survey, the Median Household Income for the portion of LDPCSD in Mariposa County is \$46,150. It is also estimated based on the proportion of active service connections in each county that approximately 1,900 of the 3,200 residents are located within the DAC portion of Mariposa County. For all of Mariposa County, it is estimated that 17,000 of the entire county population of 18,251 is located within a DAC, including the communities of Mariposa, Midpines, Cathey's Valley, Coulterville and Greeley Hill which will benefit from the program. In both cases, more than 25% of the geographic area and 25% of the population of the project beneficiaries are located in a DAC. Therefore, in accordance with Appendix G of the 2015 IRWM Grant Program Guidelines, this project benefits an area that is more than 25% DAC.

The LDPCSD's water supply portfolio is comprised of surface water supplied from Lake McClure, managed by Merced Irrigation District by contract and groundwater from a single well, the Ranchito well, managed by LDPCSD. The maximum water production of Ranchito well of 70 GPM can only provide 16% of the maximum day demands. The remaining, 84% of demands is met by surface water obtained from Lake McClure. Due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015. By December 2015 it is expected that the water level at the Lake McClure Barrett Cove Intake will be so low that the existing floating pumps can no longer be used. Part of the solution to provide a reliable water source during the drought emergency is to institute water conservation measures and make system improvements required to reduce significant water losses.

The water conservation efforts that will be achieved by this proposed project will help LDPCSD address a critical supply shortfall that could occur as soon as December 2015 if the District is no longer able to divert water from Lake McClure. LDPCSD has had to implement stringent conservation mandates and identify alternative supply sources, as recommended in this grant funding proposal. Although this project will not be completed by December 2015, it will provide a means to for LDPCSD to be better prepared for long-term drought. This project is therefore meeting a critical water supply need of a DAC, which is consistent with the example measure "infrastructure renovations to a public water supply system necessary to assure continued reliability of the minimum quality and quantity of water" in accordance with Critical Water Supply or Water Quality Need Program Preference Project Examples included in the 2015 IRWM Grant Program Guidelines.

### **PROJECT PERFORMANCE MONITORING PLAN**

Table 2.9 presents the project performance monitoring plan. The measurements of the project benefits will be provided to the Yosemite-Mariposa Regional Water Advisory Council as data management requests are issued consistent with the 2014 Integrated Regional Water Management Plan.

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<b>Table 2.9: Project Performance Monitoring Plan (PSP Table 6)</b>		
<b>Project: Water Use Efficiency Project</b>		
<b>Proposed Physical Benefits</b>	<b>Targets</b>	<b>Measurement Tools and Methods</b>
Water savings from water kits containing: faucet aerators, WE showerheads and sprinkler nozzles, and toilet tank banks.	Issue 768 kits in year 1 to LDPCSD, issue 768 kits in year 2 in all of Mariposa County.	Staff will track number of kits issued, and associated water savings
Water savings through installation of Laundry to Landscape graywater systems.	Install 100 systems in year 1 in LDPCSD, install 100 systems in year 2 in all of Mariposa County.	Staff will track number of systems installed and associated water savings
Water savings through issuance of rebates for HETs.	Issue 200 rebates for HETs in year 1 to LDPCSD, issue 200 rebates in year 2 in all of Mariposa County.	Staff will track number of rebates issued and associated water savings.

The LDPCSD portion of the Project will act as a pilot and guide the focus and target areas for the second year of the Project. Staff will track and record number kits, installations, and rebates issued in LDPCSD as well as attendance to workshops and classes, website use, and the number of requests for water saving audits.

**COST EFFECTIVENESS ANALYSIS**

Table 2.10 presents a summary of the cost-effectiveness analysis of this project. No other project alternatives can be implemented with immediate water supply savings, additional instream flows, or changes in behavior towards water use.

<b>Table 2.10: Cost Effective Analysis (PSP Table 7)</b>	
<b>Project Name: Regional Water Use Efficiency</b>	
Question 1	Types of benefits provided as shown in Tables 2.7 and 2.8 Primary Benefit: Water Supply Secondary Benefit: Fishery Flows Additional Benefits not quantified include: <ul style="list-style-type: none"> <li>• Reduced financial burden on the DAC.</li> <li>• Maximum awareness of drought impacts throughout the region resulting in increased conservation.</li> <li>• Reduction of energy required for pumping and heating water.</li> <li>• New source project avoidance.</li> </ul>
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes; Lake Don Pedro Community Service District has implemented voluntary and mandatory conservation measures, but need to immediately implement a more comprehensive and/or integrated water conservation program to assure that the community water supply is maintained in the occasion that Lake McClure drops below LDPCSD pumps.. <ul style="list-style-type: none"> <li>• If no, why?</li> <li>• If yes, list the methods (including the proposed project) and estimated costs.</li> </ul> <p>a. The Lake Don Pedro Community Service District (LDPCSD) water rates are currently being evaluated for significant increase to fund necessary capital improvements and reserves for emergencies such as drought. Considering the fact that current LDPCSD water rates are very high, exceeding 2% of the median household income of its service area, the additional rate increases necessary to fund The Lake Don Pedro Community Service District 2010 Urban Water Management Plan (UWMP) describes demand management measures (DMM's) the Water Use Efficiency Project within LDPCSD boundaries is considered excessive and a hardship on this Disadvantaged community.</p>

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**Table 2.10: Cost Effective Analysis (PSP Table 7)**

<b>Project Name: Regional Water Use Efficiency</b>	
	<p>b. With the upcoming depletion of the LDPCSD water supply from Lake McClure in approximately December 2015, the LDPCSD considered all possible alternatives to increase its water supply portfolio including acquisition of additional surface water supplies and installation of related infrastructure, installation of groundwater wells and implementing water conservation actions for both end users and aggressive LDPCSD distribution system leak repair. The cost of installing pumping facilities in the deep water of Lake McClure coupled with construction of a pipeline connecting the deep water pumps to the LDPCSD system was estimated to cost in excess of \$6.5 million with a \$100,000 annual increase in operating costs, and take well in excess of two years to design, permit and construct which would leave the community without water for nearly the entire two year period. LDPCSD chose to proceed with groundwater well construction costing \$2 million, coupled with implementation of an aggressive end user water conservation program (approximately \$440,000) and replacement of 1400 leaky LDPCSD water service lines (\$2.4 million). This combination of projects provides for a long term, drought resistant community water supply with a \$2 million savings in construction and implementation costs, as well as a \$250,000 annual savings in operation and maintenance costs, allowing for continued investments in and maintenance of the water conservation program post implementation.</p>
Question 3	<p>If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.</p> <p>To maintain the community water supply in anticipation of when Lake McClure water level drops below the LDPCSD pumps, this suite of Programs is the least-cost alternative. It is the preferred alternative because the DMMs are difficult for the Lake Don Pedro Community Service Districts to fund with such a small rate-payer base of 1, 400 rate payers. LDPCSD has implemented voluntary and mandatory conservation measures, but they are unable to fund a more comprehensive conservation program. This comprehensive and integrated conservation program, which touches all of the water users in the Yosemite-Mariposa Region, is the preferred and most cost effective alternative. It can serve both the DAC of LDPCSD and the rest of Mariposa County.</p>

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# LAKE DON PEDRO COMMUNITY SERVICES DISTRICT 2015 IRWM Implementation Grant Proposal

## SERVICE LINE REPLACEMENT PROJECT

Replacement of 1,400 residential water service lines in order to save 69 AFY of potable water supplies currently being lost through leaks.

## IMPLEMENTING AGENCY: LAKE DON PEDRO COMMUNITY SERVICES DISTRICT (LDPCSD)

### PROJECT DESCRIPTION

LDPCSD serves approximately 1,400 connections and a population of over 3,200 in Mariposa and Tuolumne Counties, between Lake McClure and Lake Don Pedro. Despite being directly between two very large surface storage reservoirs, supplies are dwindling and/or inaccessible and there is a risk LDPCSD will not have adequate water supply by December 2015. While LDPCSD is proceeding with obtaining additional groundwater supply to augment limited surface water availability, it is also taking extraordinary measures to conserve water. LDPCSD operations staff is engaged almost 100% in repairing these service line leaks. Water production and meter records indicate that LDPCSD loses about 32% of its entire water supply to leaks and other unaccounted for uses. LDPCSD operations staff has confirmed that while the water distribution system mains appear to be sound, the primary sources of the leakage in the water distribution system is through the water service lines that connect from the main to the customer's meter. The service lines were installed approximately 40 years ago using thin walled 5/8" and 1" diameter HDPE pipe, which is inadequate for municipal water service, installed poorly, and does not comply with current drinking water standards. This project would call for replacement of all existing 5/8" and 1" diameter services lines with HDPE piping that meets current codes and standards for material and diameter, and would provide a long and serviceable useful life with minimal leakage. The length of the service lines vary considerably, but the estimated average length is 45 feet per service line. Based on data collected from recent leak repairs conducted and analysis of current water loss rates, it is estimated that the project will save 69 AFY of water currently being lost due to leaks.

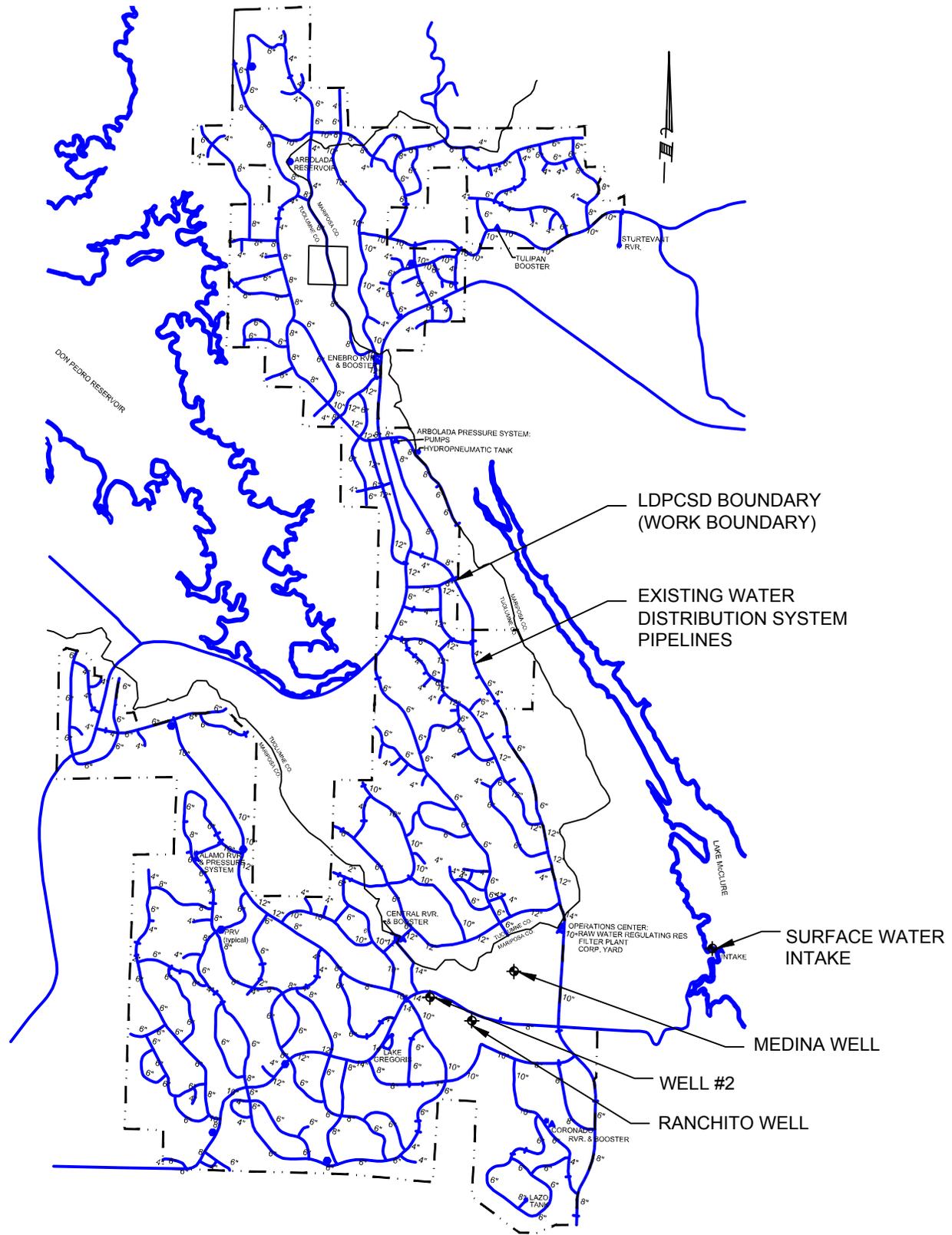
In order to address this need, emergency replacements have been conducted for 40 critical service lines since 2015 by a contractor in order to help LDPCSD further its 50% water conservation target over 2014 water use. Fourteen hundred service lines will be replaced by this project, which will be prioritized using leak detection technology and inspection. It is anticipated that the work will include open cut or trenchless replacement of the service line, and replacement of the aging curb stop valves, which are approaching the end of their useful life and are due for replacement. Any surface impacts, such as removed AC pavement, sidewalks, or damaged landscaping will be fully restored to existing conditions. After replacement, the service lines will be pressure tested, disinfected and placed back into service. The project will reduce potable water wasted through leaking pipes, thereby reducing the amount of Lake Don Pedro Community Service District water supplies used from the very limited Lake McClure source and freeing up those key and highly limited supplies for other uses. The project also provides a safer drinking water supply for residents by reducing the potential for contamination via leaking pipes. The water saved by the repair of leaks will remain in the Lake McClure, thus making more water available for environmental/ecosystem uses and reducing potential conflicts.

### **How the Project Addresses a Current Need of the Region**

The multi-year, statewide drought has reduced the availability of, and increased competition for water supplies across Mariposa County, and in the downstream San Joaquin Valley. Many small, community water systems within the Yosemite-Mariposa Region had adequate access to water supply until this year, when competition for limited water supplies coupled with record low snowfall put the largest reservoir, Lake McClure on the brink of reaching deadpool which will make water unavailable for municipal, agricultural, or environmental uses. The Service Line Replacement project helps to provide much needed conservation for residents that receive water supply from LDPCSD. The replacement of the service lines will save as much as 17% of the current distribution system demand, thereby reducing pressure for limited Lake McClure resources, freeing up supply for alternative uses and helping the Region to meet water supply reliability objectives. The number and severity of service line leaks has increased by nearly double each year for the past 3 years since the beginning of the drought. The increase in the failure rate has been determined to be caused by the contraction of drying soil in the pipe zone, allowing movement of the pipe with leaks caused by rock puncture and abrasion damage to the pipe.

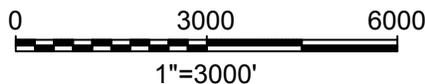
### PROJECT MAP

The project map that follows shows all of the projects major elements described in Attachment 3 – Work Plan.



**LEGEND**

◆ SURFACE AND GROUNDWATER FLOW MONITORING LOCATIONS



Kennedy/Jenks Consultants

YOSEMITE - MARIPOSA  
2015 IRWM GRANT APPLICATION  
SERVICE LINE  
REPLACEMENT PROJECT

AUGUST 2015  
K/J 1570004.00

**FIGURE 4**

# LAKE DON PEDRO COMMUNITY SERVICES DISTRICT 2015 IRWM Implementation Grant Proposal

## PROJECT PHYSICAL BENEFITS

The following primary and secondary physical benefits are expected from this project:

- Primary benefit: Save about 69 AFY of critical water supply for LDPCSD customers.
- Secondary benefit: Provides 0.1 cubic feet per second (CFS) of conserved storage for instream flows for fishery benefit in the Lower Merced River.

The following sections discuss these benefits in more detail, with an overview of each benefit expected over the project life and a technical analysis of the physical benefit claimed. Following the project benefits discussion, a cost effectiveness analysis of the project compared to its alternatives is provided.

## TECHNICAL ANALYSIS OF PHYSICAL BENEFITS CLAIMED

Service line replacement is a standard demand management measure that is implemented worldwide to help conserve water. Quantifiable benefits of the proposed project include saving 69 AFY of potable water supplies once the Project is completed, increasing local water supply reliability, reducing water quality conflicts or ecosystem conflicts created by the drought, delivery of safe drinking water, energy savings, and green house reduction.

### **Primary Benefit: Water supply saved of about 69 AFY each year.**

The LDPCSD Service Line Replacement project is expected to save 69 AFY of potable water supplies currently being lost through leaking pipes. The following table presents the expected quantifiable water supply benefits on an annual basis, assuming a constant rate of replacement.

Table 2.11: Annual Project Physical Benefits (PSP Table 5)			
<b>Project Name: Service Line Replacement Project</b>			
<b>Type of Benefit Claimed: Water Supply</b>			
<b>Units of the Benefit Claimed: Acre-feet per year (AFY) saved</b>			
<b>Anticipated Useful Life of Project (Years): 50</b>			
(a)	(b)	(c)	(d)
Year	Physical Benefits		
	Without Project	With Project	Change Resulting from Project
	(c) – (b)		
2016	0	50	50
2017	0	69	69
2018-2065	0	69	69
<b>Comments:</b>			
1. Estimated savings is based historic repair records and field measurements (see discussion in text).			
2. The benefits presented in this table assume a replacement rate of 21 service lines per week with full replacement completed by 2017; however, the rate of replacement may increase if conditions warrant, such as loss in service pressure or greater efficiency of replacement crews.			

### **Explanation of need for the project including recent and historical conditions**

The LDPCSD’s water supply portfolio is comprised of surface water supplied from Lake McClure, managed by Merced Irrigation District by contract and groundwater from a single well, the Ranchito well, managed by LDPCSD. The maximum water production of Ranchito well of 70 GPM can only provide 16% of the maximum day demands. The remaining, 84% of demands is met by surface water obtained from Lake McClure. Due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in February 2015. This water level is over 100 feet below the LDPCSD’s fixed intake pump system, and LDPCSD is currently utilizing floating pumps to boost water to the intake pump station which then pumps water to the surface water treatment plant. Though Lake McClure storage has increased slightly to 11% of capacity as of July 12, 2015, under current projections surface water supply from Lake McClure will be unavailable as early as December 2015. LDPCSD currently has a water conservation plan in place and has reduced water consumption by 50% over the past year. By December 2015 it is expected that the water level at the Lake McClure Barrett Cove Intake will be so low that the existing floating pumps can no longer be used. Part of the solutions to provide a reliable water source during

## **LAKE DON PEDRO COMMUNITY SERVICES DISTRICT 2015 IRWM Implementation Grant Proposal**

the drought emergency for both the short and long term is to implement stringent water conservation measures, develop four 4 groundwater wells, and replace 1,400 leaky water service lines to decrease the water system's significant water loss.

LDPCSD has very high water loss in the distribution system, averaging about 32% per year, based on LDPCSD service records. In some months, such as May 2015, water loss exceeded 50% of overall supply. Leak repair records and inspection of the water distribution mains and service lines have confirmed that vast majority of the losses originate in the water service lines, which were constructed with substandard pipe material installed in a trench filled with rock and no bedding material. Historically, much of LDPCSD annual service line replacement budget has been directed towards emergency repairs due to frequent ruptures of the service lines. However, each time repairs were completed using pipe clamps, additional damage and leaks located on the same pipe were identified. In some cases, District staff was called back week after week to fix the same service line leaking in a different location. Replacing service lines in a more proactive, controlled method to eliminate system leakage will help ensure that precious potable water supplies are not being wasted and that residents within LDPCSD service area are not subject to lengthy, unplanned outages that are sometimes required for emergency repairs. Burst service lines result in water system pressure reductions, disrupted fill around existing water mains, creation of sinkholes, property damage, serious water loss, as well as an increase in the risk for coliform or other forms of water supply contamination.

The pipes were originally installed incorrectly with improper backfill. The pipe is not bedded or compacted correctly and therefore moves around with pressure changes and flow. The rocks, gravel and asphalt buried next to the pipe are abrading holes along the entire pipe length.

Traditional water line leak repair practices and materials cannot be used to stop leaks in the service lines, as when leaks are unearthed, there are normally multiple leaks identified at the same time in the service line, due to the same causes. The time and cost to repair the typical service line leaks exceeds the cost to replace the entire line. Therefore, when leaks are identified, the entire service line is replaced using current materials and standard construction practices. The number and severity of service line leaks has increased by nearly double each year for the past 3 years since the beginning of the drought. The increase in the failure rate has been determined to be caused by the contraction of drying soil in the pipe zone, allowing movement of the pipe with leaks caused by rock puncture and abrasion damage to the pipe. What once was an occasional work order to repair a service line leak has recently consumed the full time efforts of the LDPCSD operations staff of three. In addition, it has become necessary in response to the call for 50% mandatory water conservation in LDPCSD customers, for LDPCSD to hire an outside contractor to assist in quickly replacing leaky service lines throughout the system.

In order to address the immediate need to drastically reduce system leakage due to the impending end to the District's Lake McClure water supply, using the independent contractor 40 critically leaking service lines have been replaced in the past three months. The line failures and contracted line replacements are continuing on a one-at-a-time basis as current funding allows, however in order to maintain water supply when the Lake McClure pumps run dry and LDPCSD water supply is coming only from the new wells, the pace at which the service line are replaced must be expedited exponentially

LDPCSD has been working closely with numerous agencies including California Office of Emergency Services (Cal OES), Department of Water Resources, State Water Resources Control Board, and others to identify and procure alternative water supply sources. Concurrently, LDPCSD has adopted a resolution 2015-15 in March 2015 committing District customers to achieve 50% water savings over 2014 water use. Replacement of the water service lines will help support the water conservation effort, ensure potable water demand is met, and it will provide a long term, permanent water savings.

### **Estimates of without project conditions with respect to this benefit**

While there are numerous other water conservation measures that could be implemented that would achieve water savings, there is no meaningful alternative that would conserve water on a permanent basis and help ensure protection of LDPCSD's water system integrity. Without the service line replacement project, the LDPCSD's service lines would continue to deteriorate, leaks would increase, and LDPCSD could run out of water.

As noted earlier, without the project, additional impacts include: water system pressure reductions, disrupted fill around existing water mains, creation of sinkholes, property damage, serious water loss, as well as an increase in the risk for coliform or other forms of water supply contamination.

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The absence of this project could contribute ultimately to a complete loss of water in areas of the system and the need (in conjunction with a surface water supply outage) for LDPCSD to truck the water from Lake McClure to the LDPCSD water treatment plant at a cost of \$40,240 per day, according to LDPCSD and consultant estimates, which would provide only 50% supply to its customers, only meeting basic health and sanitary needs. The Lake Don Pedro Community Service District serves a disadvantaged community that is ill-suited to higher water rates associated with trucking of water and other emergency needs.

Without the Service Line Replacement project, LDPCSD would continue to lose more than 32% of the water entering its distribution system, 69 AFY of potable water supplies through the widespread leakage and periodic rupture of the service lines. This loss would force the LDPCSD to pursue multimillion dollar, multiyear construction projects to extend surface water pumping systems on Lake McClure to deeper water over five miles away from the current pump location.

### **Descriptions of methods used to estimate physical benefits**

The physical benefit of water supply provided is estimated by comparing the metered production of the surface water treatment plant and wells as compared to the metered consumption of the end use service connections over the same time period. The difference in production and end use meter records provides an estimate of unaccounted for water, including water losses, and makes it possible to estimate the total AFY of water supply saved. Monthly meter data from January 2011 to December 2014 for the water treatment plant, groundwater wells, and service connections was analyzed to determine difference between average annual water produced (treated) and water consumed (unaccounted-for water), which averaged about 134 AFY or 32% per year. Typical system losses according to AWWA water system efficiency standards is about 10%, or 42 AFY. Assuming that 25% of unaccounted-for water is due to system services (i.e. treatment plant flushing, etc.), then the assumed savings from replacing 100% of the service lines is  $75\% \times (134 \text{ AFY} - 42 \text{ AFY}) = 69 \text{ AFY}$ .

Annual water savings assume that an average of 21 service lines per week will be replaced from 2016 through 2017; however replacement of all 1,400 service lines may be completed sooner depending on conditions of the system, such as continued drought, loss of McClure water supply, increasing leakage rate, low groundwater well production or higher than expected customer water use; and also taking into consideration project bids or other conditions such as efficiency/availability of service line replacement crews.

Actual water savings once the replacements have been made will be estimated by comparing the surface water treatment plant and groundwater supply production volumes to the metered volume used by customers. The difference between the production and end use meters will indicate any water loss reductions. LDPCSD is in the process of calibrating and repairing its distribution meters, and is instituting a water audit program that will identify areas of the system with highest water loss, water theft areas to target first in service replacement. The project lifetime is assumed to be 50 years or more using standard materials and industry standard construction practices..

### **Identification of all new facilities, policies, and actions required to obtain the physical benefit**

LDPCSD will replace 1,400 water service lines through the fourth quarter of 2017 or sooner. The features will include removal of the existing service line and replacement with a new HDPE service line that conforms to industry standards and installed using proper methods. The curb stop valve will also be replaced where appropriate. Once the service line has been installed, tested, and put into operation, the physical benefit will be obtained for that individual line. The service lines will be installed within existing county road Right of Way or easements that provide access for construction with no additional property acquisition approvals needed to proceed with the work.

### **Description of any potential adverse physical effects**

No additional permanent adverse above ground physical effects are anticipated as a result of construction of the service lines. However, some limited construction phase effects may occur. The effects of construction will be mitigated by constructing improvements during the dry season, and coordination with the affected water service customers whose supply will be impacted while the service line replacement is being conducted. All appropriate erosion and environmental protection measures will be taken during construction to minimize physical impacts. While there may be some construction impacts from excavating up to 4 feet deep, these are temporary impacts and construction stormwater management practices will be implemented to minimize water quality impacts. Each site will be restored to existing conditions upon completion of construction.

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**Description of whether the proposed project effectively addresses long-term drought preparedness**

The project provides a permanent water conservation savings and helps lower demands long term, for a community that currently has only one primary source of supply, a supply that is continuously threatened during drought years. Reduced system water losses will lower LDPCSD water demands in all water years, but especially during times of drought when it is critically needed. Currently with so much system leakage visible to the general public through failed service lines, implementing mandatory water conservation requirements on customers can be difficult when they feel we are irresponsible in allowing water loss. This project will remove all visible signs of water leakage in the LDPCSD system, thereby increasing the probability of successful mandatory water conservation measures, when needed to reduce demand during system emergencies and drought. When combined with the other projects in this proposal, and stringent water conservation measures, LDPCSD will have the capacity to meet peak water demands of its customers during continued years of drought.

This function of the LDPCSD water system from a firefighting perspective with its 350 fire hydrants is critical to the health and safety of the community, especially in a continued drought. The replacement of the service lines will ensure that the water system tanks stay full and prepared to provide water supply for fire protection purposes. Therefore, the service line replacement project address the long-term drought preparedness of contributing to water supply and reliability during water shortages by:

- Promote water conservation, conjunctive use, reuse and recycling
- Achieve long-term reduction of water use

**Summary of Primary Benefit**

The Water Service Line Replacement Project will save about 69 AFY of critical water supply and ensure that the water supply for the Don Pedro community is adequate and reliable this year and with continued drought; for the health and safety of the community. The project will provide critical proven water conservation savings particularly during drought for this economically disadvantaged community. , reducing demand on the region’s stressed surface and groundwater supplies.

**Secondary Benefit: Maintain 0.1 CFS of instream flows for ecosystem benefit**

As shown in Table 2.12, the completion of the water service line replacement project will provide approximately 0.1 cubic feet per second (CFS) of conserved water supply every year that will be left in Lake McClure for fishery benefit, or other water users.

Table 2.12: Annual Project Physical Benefits (PSP Table 5)			
Project Name: Service Line Replacement Project			
Type of Benefit Claimed: Maintain instream flows for environmental fishery benefit (secondary benefit)			
Units of the Benefit Claimed: cubic feet per second (CFS)			
Anticipated Useful Life of Project (Years): 50			
(a)	(b)	(c)	(d)
Year	Physical Benefits		
	Without Project	With Project	Change Resulting from Project (c) – (b)
2015	0	0.05	0.05
2016	0	0.1	0.1
2017-2065	0	0.1	0.1
Comments:			
1. Estimated savings is based historic water loss estimates, repair records and field measurements (see discussion in text).			
2. The benefits presented in this table assume a replacement rate of 21 service lines per week with full replacement in 2017; however, the rate of replacement may increase if conditions warrant, such as loss in service pressure or greater efficiency of replacement crews.			

**Explanation of need for the project including recent and historical conditions**

As described earlier, due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015. Lake McClure storage increased slightly to 11% of capacity as of July 12, 2015, but current projections show that if the drought continues water will be consumed at a rate where surface supply from

## **LAKE DON PEDRO COMMUNITY SERVICES DISTRICT 2015 IRWM Implementation Grant Proposal**

Lake McClure will be unavailable in December 2015. The water service line replacement project will help to conserve key surface water supply and is absolutely necessary to ensure that the emergency wells and water conservation activities combine to stretch water supplies to the maximum extent feasible once the Lake McClure water level drops below the LDPCSD pumps..

The lower Merced River provides critical habitat for anadromous fisheries including fall and spring run chinook salmon and steelhead. These sensitive species rely on flows released from reservoirs to provide water of adequate flow and temperature to provide suitable habitat to survive and spawn. The potential to use the conserved surface water for downstream fishery flows provide a key secondary benefit, in addition to relieving LDPCSD of its current critical drought water supply crises. Lake McClure is a 1.02 million AF storage reservoir in western Mariposa County, California. The reservoir is formed by the New Exchequer Dam impounding the Merced River, a tributary of the San Joaquin River. The Merced River is a 145-mile long tributary of the San Joaquin River flowing from the Sierra Nevada into the Central Valley. The average annual flow recorded unimpaired flow of the Merced River is 960 thousand AFY. Reducing water system losses will help Merced Irrigation District and regulatory agencies by reducing LDPCSD surface water diversions, thereby increasing conserved storage in Lake McClure. This measure will provide water to potentially enhance the instream flows in the lower Merced River and support a critical fisheries benefit to meet regulatory objectives as promulgated by the State Water Resources Control Board, Federal Energy Regulatory Commission, CA Department of Fish and Wildlife, US Fish and Wildlife Service, and many others. Minimum flow releases vary throughout the year, and while there are numerous agreements and regulatory instream requirements, Merced River flows could be as low as 15 cfs between June 1 and October 15 during a dry year in accordance with the existing FERC license for Project Number 2179 (SWRCB, 2013). The addition of 0.1 cfs to the lower Merced River could help enhance instream flows by about 0.6% in dry years.

The drought, reduced unimpaired flow and storage has also resulted in significant impacts to the agricultural sector in the San Joaquin Valley. Earlier this year, Merced Irrigation District had informed its growers that due to a lack of available storage no surface water from Lake McClure would be available. However, faced with the current unprecedented drought conditions, the Merced Irrigation District Board took the only action available to it, directing staff to immediately divert approximately 10,000 AF of stored water. In a more typical year, MID would divert up to 500,000 AF for irrigation

### **Estimates of without project conditions with respect to this benefit**

Without this project there would simply be less storage available to augment downstream fishery releases in dry and multiple-dry years. Inasmuch as years with limited snow pack (March 2015 had 10% of the historical average snowpack in the Merced River Basin (DWR CDEC, 2015)), conservation of storage or alternative supply sources will help relieve critical supply constraints.

### **Descriptions of methods used to estimate physical benefits**

Because it is difficult to estimate the direct benefit of the conserved storage relative to the timing and volumes of downstream flow releases, the physical benefit will be measured by determining the avoided diversion from Lake McClure. Using the conversion of 1cfs = 724 AFY, the total water available for fishery flows due to service line replacement is 69 AFY (water supply saved) / 724 (AFY/cfs) = **0.1 cfs**. The project lifetime has assumed to be 50 years. This lifetime is considered to be reasonable given the typical useful life experienced for similar water service line materials that are properly maintained. LDPCSD operators will maintain and operate the water service lines in between the water distribution main connection to the meter in order to ensure the project benefits are maintained. It is anticipated that the physical benefit will be provided annually once the work is completed for the useful life of the project.

### **Identification of all new facilities, policies, and actions required to obtain the physical benefit**

LDPCSD plans to replace 1,400 water service lines over a 15-month period. The features will include removal of the existing service line, if necessary and replacement with a new HDPE service line that conforms to industry standards. The curb stop valve will also be replaced where appropriate. Once the service line has been installed, tested, and put into operation, the physical benefit will be obtained for that individual line. The service lines will be installed within existing Right of Way or easements that provide access for construction, no additional approvals will be required to proceed with the work.

## **LAKE DON PEDRO COMMUNITY SERVICES DISTRICT 2015 IRWM Implementation Grant Proposal**

### **Description of any potential adverse physical effects**

No additional permanent adverse above ground physical effects are anticipated as a result of construction of the service lines. However, some limited construction phase effects may occur. The effects of construction will be mitigated by constructing improvements during the dry season, and coordination with the affected water service customers whose supply will be impacted while the service line replacement is being conducted. All appropriate erosion and environmental protection measures will be taken during construction to minimize physical impacts. While there may be some construction impacts from excavating up to 4 feet deep, these are temporary impacts and construction stormwater management practices will be implemented to minimize water quality impacts. Each site will be restored to existing conditions upon completion of construction.

### **Description of whether the proposed project effectively addresses long-term drought preparedness**

The project provides a permanent water conservation savings and helps lower demands, for a community that currently has only one primary source of supply in Lake McClure, a supply that is constantly threatened during drought years and will be depleted this year to a level below the LDPCSD emergency pumps. Reduced water leakage will lower water demands during day in and day out, especially beneficial during times of drought when it is critically needed. When combined with the other projects in this proposal, and stringent water conservation measures, LDPCSD will have the capacity to meet peak water demands of its customers in all water year types and without development of extremely expensive and invasive new surface water intake pumps.

This project also augments inadequate water supply pressure in a public water supply system by replacing rapidly failing service lines that threaten the ability of the District to maintain minimum pressures for fire protection, if the catastrophic failures continue.

Therefore, the service line replacement project address the long-term drought preparedness of contributing to water supply and reliability during water shortages by:

- Promote water conservation, conjunctive use, reuse and recycling
- Achieve long-term reduction of water use

### **Summary of Secondary Benefit**

The LDPCSD Service Line Replacement project will provide fisheries benefit by reducing surface water diversions, providing valuable ecosystem benefits. It is estimated that the project will provide up to 0.1 CFS (69 AFY) of conserved supply that will be available for storage in Lake McClure and later release into the lower Merced River for benefit of critical anadromous fisheries.

### **DIRECT WATER-RELATED BENEFIT TO A DAC**

As described in Attachment 7, the proposed project and its benefit area is the entirety of LDPCSD. LDPCSD overlaps two IRWM Regions (Yosemite-Mariposa and Tuolumne-Stanislaus), and is also located in two counties (Mariposa and Tuolumne). Approximately 60% of the District's active service connections are located in Mariposa County. According to the latest 2009-2013 American Community Survey, the Median Household Income for the portion of LDPCSD in Mariposa County is \$46,150 which qualifies as a DAC. It is also estimated based on the proportion of active service connections in each county that approximately 1,900 of the 3,200 residents are located within the DAC portion of Mariposa County. Therefore, in accordance with Appendix G of the 2015 IRWM Grant Program Guidelines, this project benefits an area that is more than 25% DAC.

The LDPCSD's water supply portfolio is comprised of surface water supplied from Lake McClure, managed by Merced Irrigation District by contract and groundwater from a single well, the Ranchito well, managed by LDPCSD. The maximum water production of Ranchito well of 70 GPM can only provide 16% of the maximum day demands. The remaining, 84% of demands is met by surface water obtained from Lake McClure. Due to four years of continued drought, the water stored in Lake McClure dropped to a historic low in January 2015. By December 2015 it is expected that the water level at the Lake McClure Barrett Cove Intake will be so low that the existing floating pumps can no longer be used. Part of the solution to provide a reliable water source during the drought emergency is to institute water conservation measures and make system improvements required to reduce significant water losses. Average annual water losses are 32% of all water supplied to the system. Monthly losses can exceed 50%.

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The new water supply and water conservation benefits that will be achieved by this proposed project will help LDPCSD address a critical supply shortfall that could occur as soon as December 2015 if the water level in Lake McClure drops below the LDPCSD floating pumps as projected. Although this project will not be completed by December 2015, LDPCSD expects the true water supply emergency to materialize in late spring 2016 after pumping water supply from only the emergency wells for six months, with no water remaining at the pumps in Lake McClure and the onset of increased summer water demand. By June 2016, the suite of projects will result in adequate supply from new groundwater supply to safely and consistently meet 70% of the summer water demand, reduced LDPCSD water system leakage to the point where new groundwater supply can meet customer demands plus the continued reduced leakage rates; and end user water conservation awareness and tools/actions available will ensure that 30% water conservation can be continuously achieved under all circumstances. This project is therefore meeting a critical water supply need of a DAC, which is consistent with the example measure “infrastructure renovations to a public water supply system necessary to assure continued reliability of the minimum quality and quantity of water” in accordance with Critical Water Supply or Water Quality Need Program Preference Project Examples included in the 2015 IRWM Grant Program Guidelines. In addition, the LDPCSD water rates are already high at over 2% of the median household income of the DAC community. The service line replacement project is necessary and critical to maintain water supply in the system, and if the project is to be funded with loans, further water rate increases of 20% to 30% will be necessary to pay the loan principle and interest. The financial impact of added debt will have a negative impact on the DAC.

**PROJECT PERFORMANCE MONITORING PLAN**

Table 2.13 presents the project performance monitoring plan. LDPCSD has selected monitoring tools and metrics, such as recording well flow meter data that are reasonable to implement for a small community water system for use in confirming that the project physical benefits can be measured and tracked appropriately. The measurements of the project benefits will be provided to the Yosemite-Mariposa Regional Water Advisory Council as data management requests are issued consistent with the 2014 Integrated Regional Water Management Plan.

<b>Table 2.13: Project Performance Monitoring Plan (PSP Table 6)</b>		
<b>Project: Water Use Efficiency Project</b>		
<b>Proposed Physical Benefits</b>	<b>Targets</b>	<b>Measurement Tools and Methods</b>
Water supply saved	1,400 service lines replaced, 69 AFY conserved	Record completed service line replacements. Record and totalize flow from the groundwater wells flow meters, surface water treatment plant, and customer meters. The data will be recorded in LDPCSD’s electronic SCADA historian system and used to confirm that adequate water loss reduction is being achieved in the system.
Instream flows for fishery benefit	69 AFY/0.1 cfs for the 50 year useful life of the project	Record and totalize flow from the groundwater wells flow meters, surface water treatment plant, and customer meters. The data will be recorded in LDPCSD’s electronic SCADA historian system and used to confirm that adequate water loss reduction is being achieved in the system. This measurement approach will be used in-lieu of measuring direct lower Merced River instream flow increases, as it will not otherwise be possible to directly synchronize the timing of releases with additional conserved storage.

**COST EFFECTIVENESS ANALYSIS**

Table 2.14 presents a summary of the cost-effectiveness analysis of this project. No other project alternatives can produce comparable water savings in conjunction with the fisheries instream flow benefits. Although other demand-side water conservation programs can produce water savings, they are typically based on customer participation and cannot provide the fixed water conservation benefits that this project provides. Additionally, there is no alternative means to reduce water loss in a distribution system other than repairing the facilities in the system that are responsible for the water loss that’s occurring. The primary sources of water loss for LDPCSD are the water service lines.

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**Table 2.14: Cost Effective Analysis (PSP Table 7)**

Project Name: Drought Emergency Groundwater Wells	
Question 1	Types of benefits provided as shown in Tables 2.11 and 2.12: <ul style="list-style-type: none"> <li>• Primary benefit of 69 AFY of water supply conserved.</li> <li>• Secondary benefit of 0.1 CFS of increased Instream fishery flows.</li> </ul>
Question 2	<p>Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?</p> <ul style="list-style-type: none"> <li>• Yes. There are no alternative projects that have been identified that would provide the same type and amounts of physical benefits. There are no alternatives that would achieve the water supply savings in the distribution system, and improve the integrity of the water system to improve fire protection and protect water supply for human consumption and sanitation.</li> </ul> <p>If no, why?</p> <ul style="list-style-type: none"> <li>• Not applicable.</li> </ul> <p>If yes, list the methods (including the proposed project) and estimated costs.</p> <ul style="list-style-type: none"> <li>• No alternatives have been identified that can achieve the same benefits. Service line repairs have proven ineffective, as the same line usually has many of the same types of leaks and must be removed, replaced with HDPE, and bedded/installed properly. The original service lines were installed incorrectly with improper backfill. The pipe is not bedded or compacted correctly and therefore moves around with pressure changes and flow. The rocks, gravel and asphalt buried next to the pipe are abrading holes along the entire pipe length. Average cost for each repair is about \$600, assuming equipment rental and 2 hours labor time; this cost is about half of the replacement cost of an entire line at the end of its service life, and in the long-term will prove more costly than a one-time replacement.</li> <li>• To create an additional 69 AFY of new groundwater supply, two new groundwater wells would need to be constructed at a cost of approximately \$1.2 million, plus an increase in annual operating costs of approximately \$75,000. These two wells would for all intents and purposes have been constructed to simply feed distribution system leaks which would take over 100 years to end at the current service replacement construction pace.</li> <li>• If the Water Service Line Replacement Project is not constructed, when the Lake McClure water level drops below the LDPCSD pumps and the current level of leaks occurs in high water demand periods, LDPCSD will be forced to truck in water at over \$500,000 per month to produce the same amount of water.</li> </ul>
Question 3	<p>If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.</p> <ul style="list-style-type: none"> <li>• This project is the most cost effective alternative and the only solution identified that could provide the same benefits described above.</li> </ul>
<p><b>Comments:</b> In the very short-term (likely 1–2 years), trucking of water could cost less than the funding request in this proposal. However, that difference is likely to be very small. Clearly, given the multiple decades of useful life of the proposed project, there is no real comparison of the benefits of the preferred alternative. See Cost Effective Analysis Discussion for Project 1.</p>	

**REFERENCES**

Binkley Associates, Inc., “RE: Drought Contingency Planning – Water Supply Emergency.” Memo to the Lake Don Pedro Board of Directors. November 5, 2014.

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