

Attachment 2. Project Justification

Table 4 – 2015 IRWM Grant Solicitation Project Summary Table		
IRWM Project Element		Project Name/ID
		Gold Village Drought Resiliency
IR.1	Water supply reliability, water conservation, and water use efficiency	√
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	√
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	√
IR.11	Ecosystem and fisheries restoration and protection	

PROJECT 1: Gold Village Drought Resiliency

IMPLEMENTING AGENCY: County of Yuba (as fiscal agent and project manager for the Gold Village CSD/DAC)

PROJECT DESCRIPTION

Brief Project Description: This project will enhance drought resiliency through installing a new water tank, initiating rebate programs to increase water conservation, and seek additional water sources.

Expanded Project Description - Need: This project addresses the critical water supply need of the 84-household River Highland/Gold Village DAC. The Community Service District (CSD) relies on one primary and two backup wells within the same fractured bedrock aquifer. These wells feed a 255,000-gallon storage tank that supplies water to the entire community. During peak periods, the community's water system is not able to meet demand and would not be sufficient in the case of an emergency. For example, in September 2010, water in the single storage tank ran dangerously low.ⁱ In July 2013, the water tank was emptied by demand exceeding storage capacity.ⁱⁱ During times of peak summer usage (51,115 gpdⁱⁱⁱ) the existing storage tank is drained more quickly than it can refill.

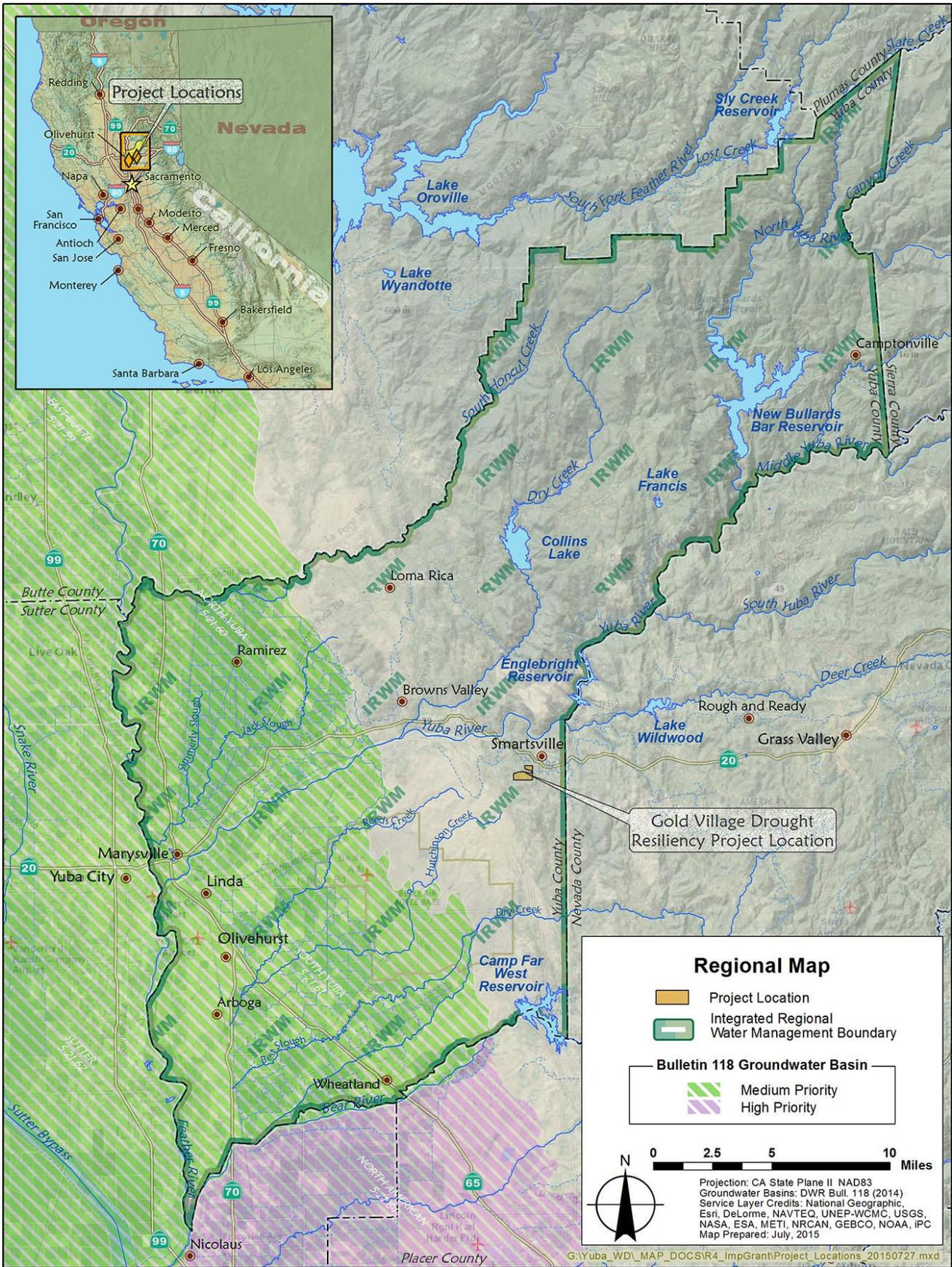
The community currently faces acute disruptions to its water service for additional reasons: In a two-and-a-half-month period (April-June 2014), depth to groundwater dropped from 182 feet to 280 feet below ground surface^{iv} in one of the primary source wells (81% of supply) due to overdrafting. This prompted an emergency declaration on July 8, 2014, still in effect, that prohibits all outdoor use of potable water. Average water use before the declaration was 503.7 gpd/household (June 2014); water use has not exceeded 230 gpd/household, except for August 2014 (290 gpd/household), since the outdoor watering ban was enacted.^v Depth to groundwater is holding steady at 120 feet below surface in the primary well (pump is at 400 feet) as of June 2015, at the onset of summer.

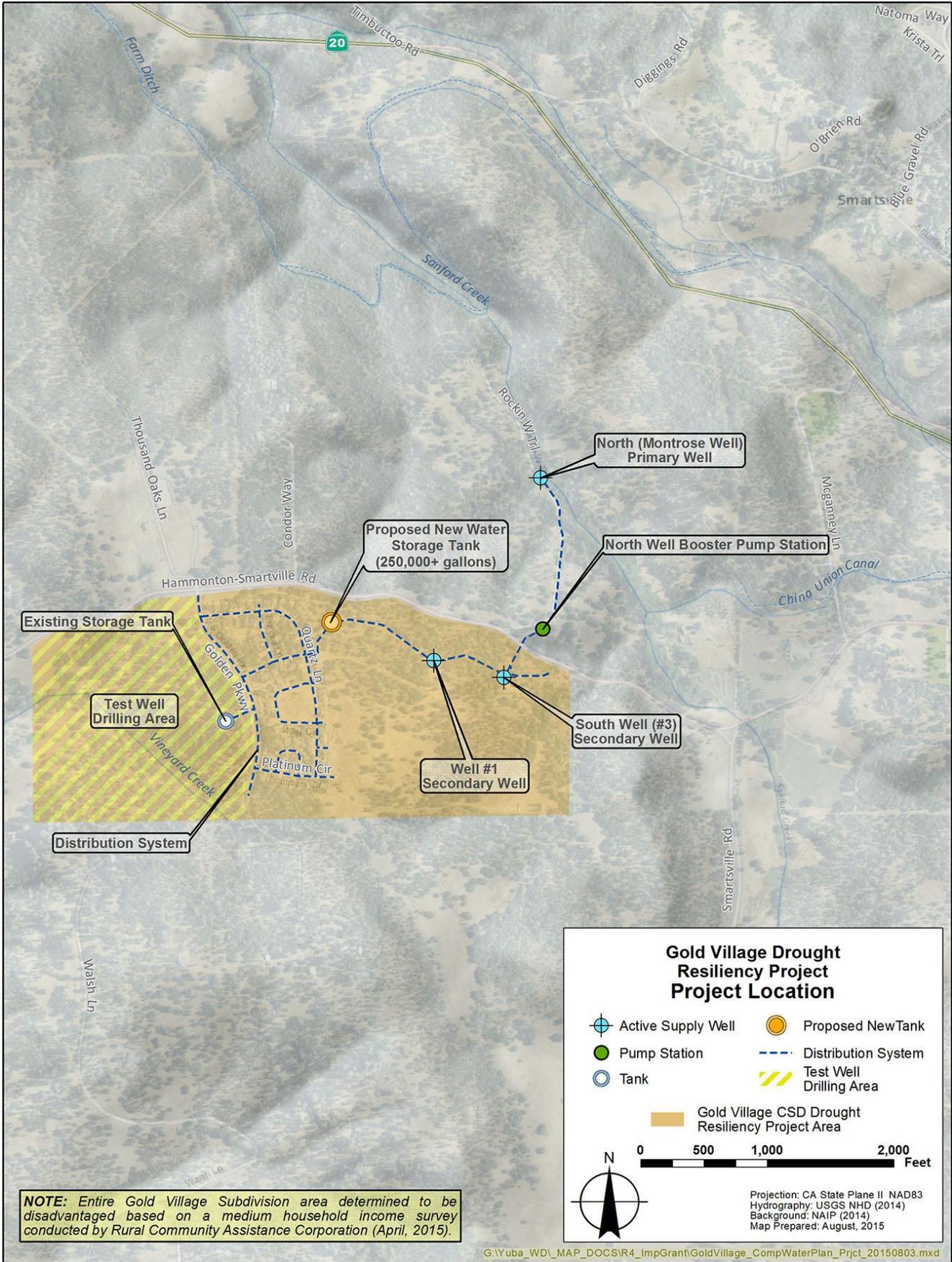
Further, the CSD's water supply and wastewater operations costs have not been covered by current service rates. The CSD has partially addressed this by completing the Proposition 218 process to convert to a tiered, metered rate for water. Since electricity costs from pumping associated with the water system is the CSD's second-largest annual budget expense at \$19,000,^{vi} the district also could become more economically sustainable by reducing both these costs and wastewater treatment costs through the proposed conservation rebate programs.

Proposed Project: The project would consist of designing and constructing a 250,000+ gallon water tank to assure reliable delivery of post-rebate-program peak summer demand of 36,138 gpd, with the collateral benefit of available water for emergency situations, such as power outages, fire, or pump failures. Secondly, the CSD would initiate a rebate program for purchasing low-water-use appliances and fixtures and a rebate program for replacing traditional landscaping with water-efficient plants, xeriscape, or synthetic turf. Community support for the rebate programs is considered strong; a rebate survey was sent to 52 households and only one of 17 responses received was negative.^{vii} Finally, it would seek a new groundwater source from an aquifer to the west, and pursue a potential new surface water supply from either Nevada Irrigation District or another purveyor, along with a preliminary design for conveyance and treatment facilities.

Benefits: The primary benefit would be to provide critically needed post-rebate-program daily storage of 4,938 gpd (1.4 acre-feet per year) [see Technical Analysis of Benefits] to reliably deliver water to the Gold Village DAC; improve system sustainability by conserving 11.7 acre-feet of water (29.3%) annually under indoor and outdoor rebate programs; improve public water conservation awareness through two rebate programs; and, address critical supply and drought resiliency by seeking a potential new water source. Energy savings would also derive from the rebate programs due to a reduction in pumping and decreased treatment of wastewater. Savings are estimated to be 26,616 kWh per year (17%), with an associated reduction of 8.64 metric tons of CO₂ (greenhouse gases) per year, and a decrease in operating costs to the CSD of \$5,338/year (see Technical Analysis).

IRWM/Policy Context: The IRWMP's climate change vulnerability assessment identified reduced water supply reliability, declining snowpack (and thus diminished groundwater recharge), increased occurrence of drought, and increased groundwater extraction in reaction to climate change as regional vulnerabilities. The project addresses those vulnerabilities and offsets the costs of conservation for those who might not otherwise benefit, achieves water conservation and greater energy efficiency, and contributes to the district's economic sustainability. This project will help the CSD sustainably provide its customers with safe, clean, affordable, and accessible drinking water to meet basic human needs, thus addressing the Human Right to Water Policy. Without the project, the CSD will unlikely be able to achieve these outcomes.





Project Physical Benefits

Primary Benefits – Water Supply Produced and Saved

Water supply benefits will occur from two aspects of the project: the new 250,000-gallon storage tank and the rebate programs, as demonstrated on **Table 5**. The storage tank will produce needed (after rebate program reduction of 29.3%) additional available supply of 4,938 gpd (1.4 acre-feet/year) to meet peak summer demand, with the collateral benefit of available storage for emergencies, such as a pump failure or residential fire.

The rebate programs will conserve 11.7 acre-feet (29.3%) per year, both by replacing toilets and clothes washers, and by turf replacement using low-to-no-water-use materials.

Table 5 – Annual Project Physical Benefits			
Project Name: <u>Gold Village Drought Resiliency</u>			
Type of Benefit Claimed: <u>Water Supply Produced and Saved (primary benefit)</u>			
Units of the Benefit Claimed: <u>Acre-feet per year (AFY) 1.4 AFY Storage Project; 11.7 AFY Rebate Project</u>			
Anticipated Useful Life of Project (years): <u>40 years (storage tank); 10 years (rebate programs)</u>			
(a)	(b)	(c)	(d)
Physical Benefits			
Year	Without Water Storage Project	With Water Storage Project	Change Resulting from Water Storage Project (c) - (b)
2017	Deficit of 1.4 AFY of available water to meet peak demand	0.7 AFY of additional water to meet peak demand	0.7 AFY of additional water to meet peak demand
2018 through 2058	Deficit of 1.4 AFY of available water to meet peak demand	1.4 AFY of additional water to meet peak demand	1.4 AFY of additional available water supply
Year	Without Rebate Programs	With Rebate Programs	Change Resulting from Rebate Programs (c) - (b)
2018 through 2028	39.9 AFY	28.2 AFY	11.7 AFY in water conservation
Comments:			
<u>Storage tank benefits accrue from additional water storage capacity produced:</u>			
<ol style="list-style-type: none"> Useful life for the water storage tank was derived from: http://www.dca.ga.gov/housing/HousingDevelopment/programs/downloads/2011QAPDOcs/Manual/2011%20OAH%20Manual/Application%20Process%20to%20Construction%20Completion/B.%20Architectural/Forms/PNA%20Forms/9ExpectedUsefulLife.pdf Assumed that the new tank will come online in July 2017 and therefore offer one-half year of benefits. Full project life will begin in 2018. Usage figures derived from annual and monthly usage from the CSD’s monitored North Well and tank records from September 10, 2013, through June 11, 2014. File name: <i>Gold Village tank levels_chart_north well stats</i> sheet 1 tank levels. Physical benefit from additional storage calculated as follows: Peak pre-rebate-program summer demand: 51,115 gpd (direct calculation from CSD North Well records from June, July, August 2014). Peak summer demand after rebate program (29.3%) reduction = 36,138 gpd. Current well production capacity 31,200 gpd. Deficit in well production to meet summer peak needs = 4,938 gpd. Total additional storage required: 4,938 gpd (4,938 gpd x 92 days = 454,296 gallons [1.4 acre-feet]). Additional peak demand storage also has a corollary benefit of offering potential supply during system emergencies. 			

Two rebate programs' benefits accrue from water conservation:

- 1) Useful life was derived from: **For clothes washers:** <http://blogs.hrblock.com/2013/10/21/the-life-expectancy-of-7-major-appliances/> **For toilets:** <http://www.commerce.wa.gov/Documents/Expected-Useful-Life.pdf>
- 2) Assumes full participation in rebate programs by 2018.
- 3) Outdoor rebate water conservation equation:
 - Total water used = 39.9 AFY
 - Assumed 50% program participation (42 parcels eliminating 2,200 square feet of turf each) = 92,400 sq. ft. turf removed
 - 35 gallons per sq. ft./year (projected water savings) x 92,400 sq. ft. = 9.9 acre-feet/year (24.8% water savings).

For the basis of this estimate, the district assumed that about 50% of water is used for outdoor irrigation purposes (*California Water Plan Update 2013*). (Re: statewide residential indoor use 2.7 million acre-feet, outdoor use 3.0 million acre-feet.) Chapter 3, page 8. The outdoor water use estimate is verified by the 50% reduction in water use recorded under emergency drought declarations, during which outdoor water use is prohibited (average water use before the declaration was 503.7 gpd/household (June 2014).

An estimated 369,600 square feet of irrigated turf landscaping exists in the district. This was calculated by measuring polygon areas off of Google Earth Pro. Based on the assumptions made for a 50% participation rate, and because the amount of money in the rebate program is limited and cannot support removing all existing turf, the water savings calculation assumes that approximately 92,400 sq. ft. of irrigated turf would be removed under this program.

According to information from DWR's Turf Replacement Initiative (*California Urban Water Conservation Council | Turf Removal & Replacement: Lessons Learned*. Brianna Seapy. March 2015, CUWCC), the volume of water saved in turf replacement programs across California ranges from 17 to 70 or more gallons per square foot, per year (43.5 gallon average) (page 13), and Southern California agencies consistently report savings of 45 gallons per square foot (page 13). The CSD therefore determined to use a conservative projected water savings of 35 gallons per square foot per year. The average rebate amount was assumed to be \$2,200.

Indoor rebate water conservation equation:

- Indoor water use 50% of total = 6,500,000 gallons (10.0 acre-feet)
- 45% of all indoor use is from toilets and washers, so 45% of 6,500,000 = 2,925,000 gallons (8.97 acre-feet) attributable to toilets and washers
- 50% reduction from using high efficiency toilets and washers = 2,925,000 gallons x 50% = 1,462,500 (4.48 acre-feet) potential water savings
- 40% (participation rate) x 1,462,500 (potential savings) = 585,000 gallons (1.8 acre-feet or 4.5%) water savings from indoor rebate program

To determine projected water savings from the indoor appliance/fixture rebate program, the CSD first determined indoor water use patterns in California. Based on statewide usage patterns (*California Water Plan Update 2013*. [Re: statewide residential indoor use 2.7 million acre-feet, outdoor use 3.0 million acre feet.] Chapter 3, page 8), water use is about equally divided between indoor and outdoor water use. Indoor water use would be 50% of current use, or 6.5 million gallons annually (or 10.0 acre-feet).

According to the Alliance for Water Efficiency, 27% of all indoor water use is from toilets and 22% is from washing machines (<http://www.home-water-works.org/indoor-use>). The CSD used a conservative estimate of 45% of indoor use coming from combined toilet and washer use. The CSD determined that water use from toilets and washers could be halved by using high-efficiency fixtures and appliances (<http://www.home-water-works.org/indoor-use/toilets> and <http://www.home-water-works.org/indoor-use/clothes-washer>). The CSD conservatively assumed a participation rate of 40% based on a slightly lower motivation than the turf replacement program. It was assumed that local residents are highly motivated to retain their property values by maintaining their landscaping, while they may be slightly less motivated to purchase fixtures and appliances. A year of outdoor irrigation restrictions has likely heightened this motivation.

In total, the two rebate programs would offer 11.7 acre-feet ($11.7/39.9 = 29.3\%$) in water conservation annually, once they were fully implemented in 2018.

Gold Village New Water Supply

Out of the eight original wells that once served the community of Gold Village, five wells have been abandoned due to low production or contamination. Of the three remaining wells, the primary well has a maximum capacity of 65 gallons per minute, while the two backup wells combined can only provide 15 gallons per minute. To enhance drought resiliency, the CSD will seek new groundwater and surface water supplies. The CSD drilled for and developed one successful well in fractured bedrock on the east side of the ridge where the community is located. It will now seek a new well on the west side of the ridge where geology is presumed to be similar, but where no nearby wells have been developed.

The CSD will also approach Nevada Irrigation District (NID) and other regional purveyors to determine if a new surface water source can be secured. If NID or any other district conceptually expressed a willingness to provide water, discussion would likely proceed to the anticipated demand and cost of that supply. Securing a new surface water source could then lead to design and construction of conveyance and treatment facilities.

This aspect of the project is beneficial because it ensures the CSD is doing everything within its power and responsibilities to assure that Gold Village will have a sustainable water supply, especially in times of drought and emergency.

Other Benefits

Gold Village Energy Savings and Related Benefits Energy savings benefits will also accrue to Gold Village DAC from reduced pumping at the well and lower amounts of wastewater treatment due to the indoor and outdoor rebate programs. Total energy used to pump water and treat wastewater between June 2013 and June 2014 was 157,613 kWh, derived from PG&E bills during that period.^{viii} The water system for the community of River Highlands/Gold Village used 78,724 kWh annually (metered use) to pump water during that period. Since the amount of electrical power consumed is directly proportional to the amount of water pumped and distributed throughout the water system, a 29.3% reduction in water pumped due to the rebate programs should translate into a savings in electrical energy use of 23,066 kWh (29.3% [reduction in water pumped] x 78,724 kWh [total annual used] = 23,066 kWh).

The sewer system for the community of River Highlands/Gold Village used 78,889 kWh during the same year period to treat wastewater. The indoor fixture/appliance rebate program will result in an annual reduction of 585,000 gallons being treated by the wastewater treatment plant, or a 4.5% reduction in the overall volume treated. This would result in a 3,550 kWh reduction (4.5% [reduction in treatment] x 78,889 kWh [total annual use] = 3,550 kWh).

In total, energy savings of 26,616 kWh (17%) per year are estimated to result from a reduction in pumping and treating wastewater associated with the rebate programs.

Greenhouse gas emissions (GHGs) would be reduced as follows: Roughly 50% of PG&E's power produces GHGs.^{ix} Therefore, a 50% reduction of GHGs would be associated with the projected 25,066 kWh reduction in energy use. According to the EPA's conversion factor^x this would result in an annual reduction of 8.64 metric tons of CO₂.

And finally, an **overall energy cost savings** of \$5,338 or 17% would be expected to result from the reduction in energy use associated with the rebate programs. This was calculated as follows: 17% [overall energy use reduction] x \$31,334 [annual electrical costs] = \$5,338.

Technical Analysis of Physical Benefits Claimed

1. Need for the project: The CSD serving the 84-household River Highland/Gold Village DAC has suffered serious water supply problems for several years, from demand exceeding both water storage tank capacity, as well as the ability of the well and pump to meet peak summer demand. In July 2013, the water tank was emptied by demand exceeding storage capacity. The system's 255,000-gallon tank cannot currently meet peak summer daily demand either, nor would it furnish adequate domestic supply (currently 3-4 days' storage) in case of an emergency, such as a pump failure or residential fire.

Further, the daily well production capacity, assuming 8 hours a day of pumping, is 31,200 gpd. During days of high demand, therefore, the well capacity cannot meet any demand over 31,200 gpd much less pre-rebate-program peak demand of 51,115 gpd. In the event of a system failure, such as pumping problems that have already occurred, the lack of storage becomes all the more acute.

The community currently faces disruptions to its water service for additional reasons: The community CSD relies on one primary and two backup wells within the same fractured bedrock aquifer. (The original water supply consisted of eight wells, of which five were abandoned because of low production or contamination.) In a 2.5 month period (April-June

2014), depth to groundwater dropped 182 feet in one of the primary source wells (81% of supply) due to overdrafting. This prompted an emergency declaration on July 8, 2014, still in effect, that prohibits all outdoor use of potable water.^{xi} Depth to groundwater is holding steady at 120 feet below surface in the primary well (pump is at 400 feet) as of June 2015, but summer has just begun.

Sustainability is an issue for the CSD because operating costs have not been covered by service rates. The CSD has partially addressed this by completing the Proposition 218 process to convert to a tiered, metered water rate, but energy conservation related to reduced water pumping and wastewater treatment would help the CSD become more financially viable.

2. Estimates of without-project conditions: The proposed suite of projects offers this DAC a comprehensive package for resilience to drought conditions and sustainable water supply. While there are no other projects planned to address the immediate problem of water tank capacity, one alternative would be to delete the storage tank element of this project and simply drill (and subsequently develop and bring online) more wells, or seek available surface water supply. However, the outcomes of this alternative are uncertain and do not offer immediate, comparable, or reliable physical benefits of an assured water storage and delivery system. An additional 250,000-gallon tank is the minimum sufficient size to accommodate a reliable water supply system for domestic needs.

For water supply saved, the least cost alternative is to impose permanent water restrictions. While comparable benefits might be achieved, this alternative does not address the Human Right to Water Policy and, while lowering costs, would require the residents of this DAC to live on less than half the State average water usage. Further, it would reduce property values, ultimately saving on infrastructure costs, but resulting in greater socioeconomic costs. It also would not address potential critical system emergencies, nor a primary project objective of meeting basic human water needs.

While permanent outdoor irrigation restrictions would achieve conservation, there are no alternatives to the water and energy conservation offered by the rebate programs that would deliver equivalent benefits.

3. Description of methods used to estimate physical benefits:

Gold Village Primary Benefit - Water Supply The overall average annual water demand for the River Highlands/ Gold Village CSD between June 2013 and June 2014 was 13,000,000 gallons, or 39.9 acre-feet, based on CSD water records. Peak daily summer demand of 51,115 gpd cannot reliably be met by the current system. The proposed project would provide the additional daily storage requirement of at least 4,938 gpd (see **Table A**). The physical benefit is the ability to provide reliable minimum storage adequate to meet peak daily demand and potential system emergencies. An additional 250,000-gallon water tank, while putting no additional draw on the aquifer other than initial filling, would offer the additional increment of supply to meet community demand, while enhancing both drought resilience and public safety.

Table A. Post-Rebate-Program Storage Required to Meet Summer Demand

<i>Determination of deficit in daily well capacity to meet peak demand</i>		
Peak summer demand after 29.3% reduction from rebate program:	36,138 gallons	<i>Direct Calculation from usage CSD usage figures/well records (51,115 peak summer demand × 29.3% reduction = 36,138)</i>
Daily well production capacity assuming 8 hours of pumping per day:	31,200 gallons	<i>Based upon maximum well capacity of 65.0 gallons per minute (gpm)</i>
Deficiency in well production capacity during peak summer demand:	4,938 gpd	<i>Direct Calculation</i>
<i>Determination of storage capacity needed to meet peak demand</i>		
Storage required to meet 92-day peak summer demand (assume June, July, August):	454,296 gallons	<i>Direct Calculation from usage CSD usage figures/well records (4,938 gpd × 92 days = 454,296)</i>
Existing storage:	250,000 gallons	<i>CSD System records</i>
Additional storage required to meet summer demand:	204,296 gallons	<i>Direct Calculation</i>

Physical benefit from additional storage calculated as follows:

Peak post-rebate-program summer demand: 36,138 gpd

Current well production capacity: 31,200 gpd

Deficiency in well production to meet peak summer needs = 4,938 gpd (4,938 gpd x 92 days = 454,296 gallons [1.4 acre-feet]).

Benefit: Capability to offer available water supply (via the cumulative storage capacity of) 1.4 acre-feet/year. Additional peak demand storage also has a corollary benefit of offering supply during system emergencies.

Additionally, two conservation rebate programs would offer a water savings of approximately 11.7 acre-feet/year or 29.3% of overall water consumption per year. To determine possible participation rates and timing of implementation of the lawn replacement program, the CSD administered an email survey in June 2015 to 52 of 84 households for whom it had email addresses. The CSD received 17 responses within two weeks, or a 33% response rate, all but one of which were positive. Residents also overwhelmingly supported a two-year over a one-year implementation period.^{xiii} Based on this response, research into other rebate programs, and the strong motivation of residents to return to outdoor irrigation, albeit restricted, the participation rate was assumed to be 50%. This is further supported by the fact that customers in Gold Village requested that a turf lawn rebate be initiated during the recent Proposition 218 effort to increase water rates. Proposed rebates would be offered to residents for replacement of traditional turf lawns with water efficient plants, xeriscape, or synthetic turf to reduce water consumption and increase water use efficiency. This rebate program would offer eligible homeowners up to \$1 per square foot, with a maximum rebate amount of \$2,200 for eligible properties. It is proposed that all projects must be approved in advance, and that new impervious surfaces would not qualify.

For the basis of this estimate, the district assumed that 50% of water is used for outdoor irrigation purposes.^{xiii} The outdoor water use estimate is verified by the 50% reduction in water use recorded under emergency drought declarations, during which outdoor water use is prohibited (average water use before the declaration was 503.7 gpd/household [June 2014]; water use has not exceeded 230 gpd/household since then, except for August 2014).^{xiv}

An estimated 369,600 square feet of irrigated turf landscaping exists in the district. This was calculated by measuring polygon areas on Google Earth Pro. Based on the assumptions made for a 50% participation rate, and because the amount of money in the rebate program is limited and cannot support removing all existing turf, the water savings calculation below displays that an anticipated 92,400 square feet of irrigated turf would be removed under this program.

According to information from DWR's Turf Replacement Initiative,^{xv} the volume of water saved in turf replacement programs across California ranges from 17 to 70 or more gallons per square foot, per year (43.5 gallon average) (page 13), and Southern California agencies consistently report savings of 45 gallons per square foot (page 13). The CSD therefore determined to use a conservative projected water savings of 35 gallons per square foot per year. The average rebate amount was assumed to be \$2,200.

Outdoor rebate water conservation equation:

- **Total water used = 39.9 acre-feet annually**
- **Assumed 50% participation (42 parcels eliminating 2,200 square feet of turf each) = 92,400 sq. ft. turf removed**
- **35 gallons per sq. ft./year (projected water savings) x 92,400 sq. ft. = 9.9 acre-feet/year (24.8% water savings).**

To determine projected water savings from the indoor appliance/fixture rebate program, the CSD first determined indoor water use patterns in California. Based on statewide usage patterns,^{xvi} water use is about equally divided between indoor and outdoor water use. Indoor water use would be 50% of current use, or 6.5 million gallons annually (or 10.0 acre-feet)

According to the American Water Works Association,^{xvii} 27% of all indoor water use is from toilets and 22% is from washing machines. The CSD used a conservative estimate of 45% of indoor use coming from combined toilet and washer use.

The CSD determined that water use from toilets and washers could be halved by using high-efficiency fixtures and appliances.^{xviii} The CSD conservatively assumed a participation rate of 40% based on a slightly lower motivation than the turf replacement program. It was assumed that local residents are highly motivated to retain their property values by maintaining their landscaping, while they may be slightly less motivated to purchase fixtures and appliances, especially after one full year of outdoor irrigation restrictions.

Indoor rebate water conservation equation:

- **Indoor water use 50% of total = 6,500,000 gallons (10.0 acre-feet)**
- **45% of all indoor use is from toilets and washers, so 45% of 6,500,000 = 2,925,000 gallons (8.97 acre-feet) attributable to toilets and washers**
- **50% reduction from using high efficiency toilets and washers = 2,925,000 gallons x 50% = 1,462,500 (4.48 acre-feet) potential water savings**
- **40% (participation rate) x 1,462,500 (potential savings) = 585,000 gallons (1.8 acre-feet or 4.5%) water savings from indoor rebate program**

In total, the two rebate programs would offer 11.7 acre-feet ($11.7/39.9 = 29.3\%$) in water conservation annually, once the programs were fully implemented in 2018.

4. Identification of all new facilities, policies, and actions required to obtain the physical benefits: The new water tank would be the only major new facility needed to obtain physical benefits claimed. The CSD would need to obtain building and grading permits from the County of Yuba to install the tank.^{xix}

Proposed studies and test wells associated with locating a potential new water source to better assure the longevity and resiliency of the system could eventually lead to additional actions, such as drilling and developing a new well. If NID or another water district conceptually expressed a willingness to provide water, discussion would likely proceed to the anticipated demand and cost of that supply. Securing a new surface water source could eventually lead to design and

construction of conveyance and treatment facilities. Permitting and other actions for developing a new surface water source would be speculative at this point.

The CSD has already drafted the applicable rules for both rebate programs, based on other successful programs in California; these now need to be approved by the CSD board. Residents would need to apply for the rebates, and be approved by the CSD. For the indoor program, residents would need to purchase approved models of fixtures and appliances and have them installed. For the outdoor irrigation program, appropriate turf replacement materials would need to be purchased and installed.

5. Description of any potential adverse effects and impact mitigations: Dust, noise, and traffic disruption from construction of the tank and installation of exploratory wells are assumed to be short-term and minimal. Only a few hours of traffic control would be necessary for delivery of the water tank. No other traffic issues are anticipated and no traffic control plan is required. A water-quality control plan would be prepared by the CSD to minimize and mitigate dust and any non-stormwater runoff from construction areas (i.e., well drilling and new tank construction).

Short-term disruptions to water service would result from the CSD's need to disinfect any new lines running from the new tank, and/or from a new water source, if located. To mitigate disruption from disinfecting lines, the CSD would issue a notice to customers to let water run for a few minutes to eliminate the strong chlorine smell. Lines at hydrants would be flushed to eliminate hyper-chlorinated water. Notice would likely be given to the 84 customers by email or by door hangers. A notice would also be posted at the public bulletin board next to community mailboxes at one central location. Treatment options for a new water source would be dependent on the water quality found and secured; therefore, any associated impacts and mitigations are unknown at this time.

Over the long term, the tributary to Sanford Creek would receive 585,000 gallons (1.8 acre-feet) less water per year from the wastewater treatment plant, but still carry water volumes several times higher than pre-development conditions. If not for wastewater, this ephemeral tributary would only convey water for a short period every year.¹

Short-term overdrafting of the aquifer to fill the new tank is not likely to be an issue. It is the cumulative daily use of water (with 51,115 gpd at peak summer usage²) that drains the existing storage tank more quickly than it can refill.

Without the project, it is likely that basic water supply needs of this DAC, and thus the Human Right to Water Policy, could not be met, both because of a lack of storage and potentially because demand could outstrip supply if the aquifer was overdrafted. Conservation of an estimated 11.7 acre-feet per year would not occur, nor add to drought resiliency in the DAC or the region. Conserved water from the project would remain in the aquifer, making the existing groundwater supply more sustainable. Absent the rebate program for reducing outdoor irrigation, much of the water associated with irrigation water would be lost to evapotranspiration.

6. Description of whether the project effectively addresses long-term drought preparedness: The Gold Village Drought Resiliency Project uses a multifaceted approach to achieve drought preparedness – from improving infrastructure, to an exhaustive search for alternative supply, to both indoor and outdoor conservation rebate programs that will also enhance public awareness of water-supply issues. The community's reliance on a single fractured bedrock aquifer that is generally reliant on snowpack for recharge (and a single well that produces 81% of its water) makes it particularly vulnerable to supply disruption.

Since residents have experienced previous disruptions to their water service and now live under a water-use restriction, they support the urgent need for a solution via this project. Part of that support is expressed by a high level of interest^{xxx} in participating in the conservation rebate programs. The potential to reduce withdrawals on the aquifer by 11.7 acre-feet year coupled with a supplemental water storage tank able to deliver water at times of peak demand assures a more sustainable and reliable water supply. A shift toward a water-conservation ethic will also likely take place through the educational aspects of the water-conservation rebate programs. In total, all aspects of this project combine to effectively establish long-term drought preparedness.

Direct Water-Related Benefit to a DAC

DAC status: A Median Household Income (MHI) survey conducted by the Rural Community Assistance Corporation^{xxxi} and approved by the State, determined River Highlands/Gold Village as a DAC, with an MHI of no higher than \$41,796. The project is entirely within a DAC, and 100% of the benefits from this project accrue to a DAC.

¹ Dan Peterson, P.E., CFM; Yuba County Public Works Department, pers. comm., June 11, 2015.

² File name: *Gold Village tank levels_chart_north_well_stats* sheet 1 tank levels

Need: This project concerns the critical water supply needs of the 84-household River Highland/Gold Village DAC. Neither current storage capacity nor daily well production of 31,200 gpd can meet daily summer demand of 51,115 gallons. Absolutely no water surplus exists in case of an emergency, such as extremely hot weather, a residential or wild fire, a pump malfunction, or damage to a hydrant.

In July 2013, the community's water tank was emptied by demand exceeding storage capacity. Cumulative daily use of 36,000 gpd on average, with even greater peak summer usage, exceeds daily well production of 31,200 gpd. The water system is further jeopardized because it relies on one primary and two backup wells within the same fractured bedrock aquifer. From April-June 2014, depth to groundwater dropped precipitously in the primary-source well due to overdrafting. This prompted an emergency declaration in July 2014, still in effect, that prohibits all outdoor use of potable water.

Further, the CSD's water supply operating costs have not been covered by service rates. The CSD has partially addressed this by completing the Proposition 218 process to convert to a tiered, metered water rate. Since electricity costs from water pumping are the water system's second-largest annual budget expense at \$19,000,^{xxii} the district also could become more economically sustainable by reducing these costs via engaging residents in water savings under the proposed conservation rebate programs.

How project addresses need: This project is projected to: add 250,000 gallons of storage capacity to improve supply reliability, especially at peak summer demand and in case of a system emergency, such as a pump failure; improve system sustainability by conserving 11.7 acre-feet per year through reducing indoor/outdoor water consumption by 29.3%; address critical supply and drought resiliency by seeking a potential new water source; and improve public understanding and participation in conservation via two rebate programs. Energy savings from reduced pumping due to water conservation are projected 26,616 kWh per year (17%) with an associated reduction in operating costs to the CSD of \$5,338/year.

Further, the IRWMP's vulnerability assessment identified reduced water supply reliability, declining snowpack (and thus diminished groundwater recharge), increased occurrence of drought, and increased groundwater extraction in reaction to climate change as regional vulnerabilities. The project addresses those vulnerabilities and offsets the costs of conservation for those who might not otherwise benefit, achieves water conservation and greater energy efficiency, and contributes to the district's economic sustainability. This project will help the CSD sustainably provide its customers with safe, clean, affordable, and accessible water for drinking, bathing, sanitation, and cooking to meet basic human needs, thus addressing the Human Right to Water Policy. Without the project, the CSD will likely be unable to meet the policy because provision of domestic water is currently uncertain given the lack of adequate storage to meet peak demand, heavy reliance on a single well where levels have dropped precipitously, and where low well and tank levels have resulted in water use restrictions.

Project Performance Monitoring Plan

The CSD has established monitoring measures to ensure that the physical benefits claimed for water supply from the storage tank and rebate programs will meet their intended targets. The Performance Monitoring Plan contained in **Table 6** would be conducted annually by the CSD to analyze targeted outcomes. Data records would be housed at the CSD offices and reviewed to measure progress against targets. Monitoring available water from the storage tank could be accomplished in no other way than examining how many gallons were supplied during peak demand months of June, July, and August.

Water metering is the most widely accepted and readily available tool for measuring use and associated costs; therefore, that was the tool chosen for the rebate programs' performance monitoring over the long term. All households on the water system are metered, the total from which will provide overall water usage figure comparisons.

Table 6 – Project Performance Monitoring Plan

Project Name: Gold Village Drought Resiliency

Proposed Physical Benefit	Targets	Measurement Tools and Methods
Water Supply Produced Storage Tank	1.4 AFY produced	The CSD will conduct an annual performance assessment from 2017 through 2058 for the new 250,000-gallon storage tank. In 2017, it will review how many gallons of water were supplied from the tank for the months of June, July, and August to demonstrate that the target benefit of 2,469 gpd (0.7 AFY – half year of total benefits) was met. From 2018 to 2058 it will be verifying that a target benefit of 4,938 gpd (1.4 AFY) was available to meet peak summer demand, using the same methodology as described above.
Water Supply Saved Rebate Programs	11.7 AFY saved	Monitoring of the rebate programs will be accomplished each year from 2018 through 2028, by comparing total metered usage against a target reduction of 11.7 AFY – from 39.9 AFY to 28.2 AFY per year.

Although the CSD is not required under this grant to monitor the energy savings associated with the rebate programs, PG&E bills provide metered energy usage and associated costs. An annual comparison of before and after energy use will be made for improving understanding of project benefits and for informing future actions of the CSD.

Table 7 – Cost Effective Analysis

Project Name: Gold Village Drought Resiliency

Question 1	The project benefits shown in Table 5 are water supply produced: Water 1.4 AFY produced via a new 250,000-gallon storage tank, and 11.7 AFY water conserved via implementation of indoor and outdoor rebate programs.
Question 2	<p>Yes, alternative methods were considered for the water storage tank.</p> <p>Alternative methods considered – Water Storage tank: Post-rebate program peak summer demand results in an additional storage need of 4,938 gpd, or total peak summer demand storage need of 1.4 acre-feet (4,938 gpd x 92 days = 454,296 gallons [1.4 acre-feet]). The alternative of installing a smaller tank was discarded because it did not meet the projected demand. The option of installing multiple small tanks was also discarded as it would be more expensive (both to install and in terms of long-term operation and maintenance) than installing a single tank. Tank sizing was based on a 92-day peak summer demand total of 454,926 gallons — 250,000 of available storage = 204,926 of needed storage. Thus, the proposed tank is sized at 250,000 gallons. The possibility of exploring a pipeline connection to a surface water purveyor is already part of this project, as is the option of evaluating potential new well sites to augment supply (and subsequently develop and bring such wells online). However, the outcomes of this alternative are uncertain and do not offer immediate, comparable, or reliable physical benefits of an assured water storage and delivery system. Additionally, regardless of whether these new sources actually prove to be feasible, the District will still need to have additional storage to provide sufficient water to accommodate unexpected system emergencies. Finally, the possibility of imposing permanent water restrictions was also considered. However, while this is a lower-cost alternative, it does not address the Human Right to Water Policy and would require the residents of this DAC to live on less than half the State average water usage. Further, while ultimately saving on infrastructure costs, it would reduce individual property values, resulting in greater socioeconomic costs. It also would not address potential critical system emergencies, nor a primary project objective of meeting basic human water needs.</p> <p>Yes, alternative methods were considered for the Rebate Program.</p> <p>Alternative methods considered – Rebate Program: For water supply saved/conserved, the least-cost alternative is to impose permanent water restrictions. While comparable benefits might be achieved in water savings, this alternative does not address the Human Right to Water Policy and, while lowering costs, would require the residents of this DAC to live on less than half the State average water usage. Further, it would reduce property values, ultimately saving on infrastructure costs, but resulting in greater socioeconomic costs. It also would not address potential critical system emergencies, the need for a back-up supply to achieve operation and maintenance needs, or a primary project objective of meeting basic human water needs. The option of raising water rates further was discarded because the District recently implemented rate increases through the Proposition 218 process, whereby water rates are being raised over the next three years.</p> <p>While permanent outdoor irrigation restrictions would achieve conservation, there are no alternatives to the rebate programs that would deliver equivalent benefits.</p>
Question 3	None of the options considered (with the exception of doing nothing) was of less cost than the proposed project.
Comments:	

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- ⁱ July 2013 Water Outage. Please see file: Water Outage – Emergency Notice 9-5-13. This event pre-dated (actually, initiated) the installation of SCADA on the tank and wells.
- ⁱⁱ 2010 Outage: no written record. Event described by Mr. Sean Powers, Finance and Administration Manager, Yuba County Community Development & Services Agency (personal communication, April 17, 2015). Please note that this event pre-dated the County’s official assumption of responsibility for running the water system.
- ⁱⁱⁱ Calculated from North Well Production Records for June, July, and August 2014.
- ^{iv} Depth to groundwater dropped from 182 to 280 feet below ground surface – personal communication, Dan Peterson, P.E., CFM; Yuba County Public Works Department, June 11, 2015. North Well Production Records for April through June 2014.
- ^v File name: *Gold Village tank levels_chart_north well stats* sheet 1 tank levels
- ^{vi} Figure derived from Word File: *Gold Village PG&E bills from June 2013 to June 2014*. Page 1
- ^{vii} CSD email survey of households about rebate program timing and participation, prepared by Dan Peterson, P.E., CFM; Yuba County Public Works Department, June 2015. File name: *Email results of Gold Village rebate survey*
- ^{viii} Figure derived from Word File: *Gold Village PG&E bills from June 2013 to June 2014*. Page 1
- ^{ix} <http://www.pge.com/en/about/environment/pge/cleanenergy/index.page>
- ^x <http://www.epa.gov/cleanenergy/energy-resources/refs.html>
- ^{xi} Data show average 125 gallons per capita per day in CA in November 2014. <http://pacinst.org/new-data-show-residential-per-capita-water-use-across-california/> Page 1.
- ^{xii} CSD email survey of households about rebate program timing and participation, prepared by Dan Peterson, P.E., CFM; Yuba County Public Works Department, June 2015.
- ^{xiii} *California Water Plan Update 2013*. [Re: statewide residential indoor use 2.7 million acre-feet, outdoor use 3.0 million acre-feet.] Chapter 3, Page 8.
- ^{xiv} File name: *Gold Village tank levels_chart_north well stats*
- ^{xv} *California Urban Water Conservation Council | Turf Removal & Replacement: Lessons Learned*. Brianna Seapy. March 2015, CUWCC.
- ^{xvi} *California Water Plan Update 2013*. (States statewide residential indoor use 2.7 million acre-feet, outdoor use 3.0 million acre-feet.) Chapter 3, Page 8.
- ^{xvii} http://www.water.ca.gov/calendar/materials/vol3_urbanwue_apr_release_16033.pdf
- ^{xviii} <http://www.home-water-works.org/indoor-use/toilets> and <http://www.home-water-works.org/indoor-use/clothes-washer>
- ^{xix} Dan Peterson, P.E., CFM; Yuba County Public Works Department, personal communication, June 11, 2015.
- ^{xx} CSD email survey of households about rebate program timing and participation, prepared by Dan Peterson, P.E., CFM; Yuba County Public Works Department, June 2015. File name: *Email results of Gold Village rebate survey*.
- ^{xxi} *River Highlands Community Services District Median Household Income Final Report*, State of California. State Water Resources Control Board, Safe Drinking Water State Revolving Fund Training and Technical Assistance Project Agreement Number: 11-10084, Feb. 2015, Page 2.
- ^{xxii} Figures derived from Word file: *Gold Village PG&E bills from June 2013 to June 2014*. Page 1.