

ATTACHMENT 7 – TECHNICAL JUSTIFICATION OF PROJECTS

Project A: Joint Leak Detection and Repair Program

1. Summary of types of physical benefits:

New leak detection equipment will pinpoint a leak, avoiding the need to open large sections of pipe, or worse, open up a whole section to find a small leak. The new detection equipment will cut in half the cost of locating leaks: a \$12,000 annual savings, so critical to the DAC communities of Burney, McArthur, and Fall River Mills. If the districts can plug 80% of the leaks, it would save them \$48,800 per year. The proposal has a projected payback of 2.5 years.

2. Description of Project's expected physical benefits for the following:

a. Recent and historical conditions-

The FRVCSD pumps 21 million gallons of water per year are that unaccounted for. This water is not always returned to the water table as most of the system's water lines lies above a layer of clay; it is presumed that most of this water is lost to evaporation. Further, leaks from outside the system are possible sources of bacterial intrusion into the distribution system.

b. Estimates of without-project conditions-

The FRVCSD will continue losing through leakage between 17% and 48% of the water pumped. The current method of finding leaks involves waiting until the water surfaces, which take months before leaks become visible. Some of the leakage overlies lava flows that remain undetected because they seep back into the aquifer.

c. Description of Projects relationship to other projects-

The focus of this application is to address regional DAC communities' critical water supply and conservation efforts. If all water districts involved in Project A (FRVCSD, Bieber, and Burney) plugged 80% of their leaks:

- FRVCSD will conserve 16,716,000 gallons of water per year and save \$16,510 per year in electricity costs.
- Bieber Water District will save about 4,500,000 gallons of water per year and \$4,444 per year in electricity costs.
- Burney Water District will save about 9,500,000 gallons per year and save \$9,000 in electricity costs.

d. Description of methods used to estimate physical benefits-

Cost savings are based on an average cost of \$0.98766 per 1000 gallons pumped. Leak detection equipment will be able to bring the average loss down to under 10%--the upper level of the industry standard of acceptable loss levels.

e. New facilities, policies, and actions required to obtain physical benefits-

The leak detection equipment that will be purchased has proven successful elsewhere with similar infrastructure characteristics. The training required for successful and consistent detection will be provided to multiple staff members in all participating jurisdictions. Water purveyors have long-term experience in leak repair.

f. Uncertainty of benefits and factors leading to uncertainty-

There is no uncertainty of the benefits as the methods used to find the leaks are well established.

g. Description of potential adverse physical effects-

No adverse physical effects from Project A.

3. Table 9 – Annual Physical Benefits

Table 9 Annual Project Physical Benefits			
Project name: Joint Leak Detection & Repair			
Type of Benefit Claimed: Cost Savings			
Measure of Benefit Claimed (name of units):			
Additional Information About this Measure			
(a)	(b)	(c)	(d)
Physical Benefits			
Year	Without Project	With Project	Change Resulting from Project
2013			
2014	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2015	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2016	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2017	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2018	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2019	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2020	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2021	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2022	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2023	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2024	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2025	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2026	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2027	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
2028	\$ 3,000.00	\$ 91,204.00	\$ (88,204.00)
Comments:			
Without Project costs due to cost of current leak detection by independent contractor 2.5 times per year @ 1,200 per visit.			
Assumptions:			
	New leaks will continue to pop us at the same rate as before.		
	Leaks are fixed as they are found.		
Cost Savings			
Annual Electricity Savings because less pumping			
	FRVCSD	\$ 16,510.00	@ \$0.98766 per 1000 gallons
	Bieber	\$ 4,444.00	
	Burney	\$ 9,000.00	
Rental savings			
	Rental of Leak Detection company: 22 days @1,500 per c	\$33,000	@ 50% of repair costs
	Rental of Backhoe: 90 days @ \$225	\$20,250	
	Rental of Hot-tap machine: 4 days @ 2000 per day	\$8,000	
	Labor and materials costs are assumed to be the same using "owned" or "rented" equipment		
	Total Annual Savings	\$ 91,204.00	

Project B: McArthur Water Tank

1. Summary of types of physical benefits:

Project B is critical to water supply in the Fall River Valley as it creates:

- Reduction in water quantity pumped during peak electric rates as water can be stored in a tank for consumption during peak hours. Only a small booster pump will be used to augment the pressure during peak hours.
- Reduction in miles driven to inspect water levels in existing tank and turning pump on/off.
- Because water destined for consumption in McArthur will now be able to be stored in McArthur, as opposed to being pumped to Fall River Mills, and then flow back to McArthur, pumping costs will be reduced.
- Reduction in overflow at existing tank since the telemetry will control old and new tanks, and the pumps.
- Availability of enough water during a catastrophic failure of well or pump.
- Availability of enough water during a major structural fire in McArthur.

2. Description of Project's expected physical benefits for the following:

a. Recent and historical conditions-

The FRVCSD began as municipal service, then was purchased by a private citizen in 1904 and operated unchanged until the Pacific Gas and Electric Company began to develop the Pit River for electricity. After the construction of the Pit River Powerhouse #1 in the early 1920s, a pipe was installed from the intake structure to deliver water to a sump and storage system of four redwood water tanks throughout town. It was combined with a privately owned and managed system for firefighting in subsequent years, resulting in inefficiencies for replacement and repair as well as in pressure throughout this antiquated system.

b. Estimates of without-project conditions-

- Additional development in the region, as well as age, has placed substantial burdens on the system. It is not currently adequate for the needs of the region for the following reasons:
- Only one production well for both Fall River Mills and McArthur is located in McArthur and the only tanks in the system are in Fall River Mills. Therefore, to store and then deliver water to McArthur, water is pumped from McArthur to the tanks in Fall River and then the water, when demanded, flows back to McArthur, 6 miles away. Along the way, the water pressure drops dramatically unless the well is kept pumping during peak hours.
- The storage capacity is currently insufficient. According to the engineering study to provide McArthur with the legally minimum quantity of water required to

fight fire an additional 360,000 gallons of storage capacity is needed. The California Department of Public Health has identified the FRVCSD as being in non-compliance with their storage requirements.

- All three of the above problems can be solved by installing a 350,000 gallon storage tank in McArthur. An added benefit is that it will not be necessary to pump water between noon and 6 PM; the FRVCSD will be able to take advantage of off-peak electricity rates. The 350,000 tank will be on-grade, with 2 booster pumps and one generator. The tank will be linked to the other components of the FRVCSD water delivery system with telemetry, allowing remote operation and monitoring of the tank level and pumps.
- Largely due to the conditions described above, the pressure available to fight fires in McArthur is not adequate, presenting health and safety concerns.

c. Description of Projects relationship to other projects-

All three of the above problems can be solved by installing a 350,000 gallon storage tank in McArthur. An added benefit is that it will not be necessary to pump water between noon and 6 PM; the FRVCSD will be able to take advantage of off-peak electricity rates. The 350,000 tank will be on-grade, with 2 booster pumps and one generator. The tank will be linked to the other components of the FRVCSD water delivery system with telemetry, allowing remote operation and monitoring of the tank level and pumps.

d. Description of methods used to estimate physical benefits-Tank placement was identified based on (1) the availability of land, (2) proximity to existing water lines, (3) low visual impacts, (4) reasonable distance from residences, and (5) accessibility of the site.

The system is well known and thoroughly documented. The need for the new tank has been similarly documented through pressure monitoring. Local hydrology and geology are well known due to the longevity of the district. Site conditions have already been documented and are appropriate for a new tank. The collateral infrastructure needed to connect the tank to the distribution system is well known and thoroughly researched to identify the appropriate technology. Storage tank technology is utilized across the Upper Pit region in multiple jurisdictions and is an acceptable and well-proven technology.

e. New facilities, policies, and actions required to obtain physical benefits-

Pressure will be monitored throughout the system both pre- and post-project implementation. The district has demonstrated capacity to manage its infrastructure in response to a wide variety of operational situations and those same policies and procedures will be applied to maximizing the benefits of the tank.

f. Uncertainty of benefits and factors leading to uncertainty-

There are no uncertainties of benefits and factors for Project B

g. Description of potential adverse physical effects-
There are no known adverse physical effects for Project B.

3. Table 9 – Annual Physical Benefits

Table 9 Annual Project Physical Benefits					
Project name: McArthur Tank					
Type of Benefit Claimed: Costs Savings					
Measure of Benefit Claimed (name of units):					
Additional Information About this Measure					
(a)	(b)	(c)	(d)		
Physical Benefits					
Year	Without Project	With Project	Change Resulting from Project	Discount	NPV
2013				1.000	\$0.00
2014	\$49,070.83	\$16,643.25	\$32,427.58	0.943	\$30,579.21
2015	\$51,157.93	\$17,351.13	\$33,806.80	0.890	\$30,088.05
2016	\$53,333.79	\$18,089.11	\$35,244.68	0.840	\$29,605.53
2017	\$55,602.20	\$18,858.48	\$36,743.72	0.792	\$29,101.03
2018	\$57,967.09	\$19,660.58	\$38,306.52	0.747	\$28,614.97
2019	\$60,432.57	\$20,496.79	\$39,935.78	0.705	\$28,154.73
2020	\$63,002.91	\$21,368.56	\$41,634.34	0.665	\$27,686.84
2021	\$65,682.57	\$22,277.42	\$43,405.15	0.627	\$27,215.03
2022	\$68,476.20	\$23,224.93	\$45,251.27	0.592	\$26,788.75
2023	\$71,388.65	\$24,212.74	\$47,175.91	0.558	\$26,324.16
2024	\$74,424.98	\$25,242.56	\$49,182.41	0.527	\$25,919.13
2025	\$77,590.44	\$26,316.19	\$51,274.26	0.497	\$25,483.31
2026	\$80,890.54	\$27,435.48	\$53,455.07	0.469	\$25,070.43
2027	\$84,331.01	\$28,602.37	\$55,728.64	0.442	\$24,632.06
2028	\$87,917.80	\$29,818.90	\$58,098.91	0.417	\$24,227.24
2029	\$91,657.15	\$31,087.16	\$60,569.99	0.394	\$23,864.57
2030	\$95,555.54	\$32,409.37	\$63,146.17	0.371	\$23,427.23
2031	\$99,619.74	\$33,787.82	\$65,831.92	0.350	\$23,041.17
2032	\$103,856.80	\$35,224.89	\$68,631.91	0.331	\$22,717.16
2033	\$108,274.07	\$36,723.09	\$71,550.98	0.312	\$22,323.91
2034	\$112,879.22	\$38,285.01	\$74,594.21	0.294	\$21,930.70
2035	\$117,680.23	\$39,913.36	\$77,766.88	0.278	\$21,619.19
2036	\$122,685.45	\$41,610.96	\$81,074.48	0.262	\$21,241.51
2037	\$127,903.55	\$43,380.78	\$84,522.77	0.247	\$20,877.12
2038	\$133,343.58	\$45,225.86	\$88,117.72	0.233	\$20,531.43
2039	\$139,014.99	\$47,149.42	\$91,865.57	0.220	\$20,210.43
2040	\$144,927.62	\$49,154.80	\$95,772.83	0.207	\$19,824.98
2041	\$151,091.73	\$51,245.46	\$99,846.27	0.196	\$19,569.87
2042	\$157,518.01	\$53,425.05	\$104,092.96	0.185	\$19,257.20
2043	\$164,217.62	\$55,697.34	\$108,520.28	0.174	\$18,882.53
2044	\$171,202.18	\$58,066.28	\$113,135.90	0.164	\$18,554.29
2045	\$178,483.81	\$60,535.98	\$117,947.83	0.138	\$16,276.80
2046	\$186,075.14	\$63,110.71	\$122,964.42	0.130	\$15,985.38
2047	\$193,989.35	\$65,794.96	\$128,194.39	0.123	\$15,767.91
2048	\$202,240.16	\$68,593.37	\$133,646.79	0.116	\$15,503.03
2049	\$210,841.91	\$71,510.81	\$139,331.10	0.109	\$15,187.09
2050	\$219,809.50	\$74,552.33	\$145,257.18	0.103	\$14,961.49
2051	\$229,158.51	\$77,723.21	\$151,435.30	0.103	\$15,597.84
2052	\$238,905.16	\$81,028.96	\$157,876.20	0.103	\$16,261.25
2053	\$249,066.35	\$84,475.31	\$164,591.04	0.103	\$16,952.88
			\$3,271,956.12		\$889,857.39
Electricity used at the McArthur Well					
	120612 KWH per year, Rate A1	120612 KWH per year, Rate VB			
	\$22,045.68	\$16,643.25	\$4,600.89		
		4380 KWH per year booster, A1			
		\$801.54			
Reduction in miles driven for inspections & activating/deactivating pumps					
	Truck: 2 trips per day 6.4 miles one way, 365 days per year				
	\$5,195.26	\$-	\$5,195.26		
	Labor: 2 trips per day 15 min one way, 365 days per year, at \$33.75/hour				
	\$12,318.75	\$-	\$12,318.75		
Reduction in electricity by reducing the head pressure from 80 PSI to 50 PSI because the well pump need not pump against the water in the Fall Rive Mills tanks.					
	20% savi	\$4,409.14	\$-	\$4,409.14	
Overflow reduction					
	5% of water pumped: 5% of electricity used at well				
	\$1,102.00	\$-	\$1,102.00		
Well pump's life extended by 5 years or 20%, twice in the life of the project					
	\$40,000 pump * 20% * twice / 40 year life expectancy of project = annual savings				
	\$4,000.00	\$-	\$4,000.00		
Water availability during catastrophic failure of well: unmeasurable.					
Water availability during fire in McArthur: unmeasurable.					
Subtotal	\$49,070.83	\$16,643.25	\$32,427.58		
Inflation assumptions					
			Weight		
	Electricity	6.76%	\$5,702.89	385.458	
	Truck	4.00%	\$5,195.26	207.811	
	Labor	3.20%	\$12,318.75	394.200	
	Weighted average inflation rate	4.25%	\$23,216.90	987.469	

Project C: Bieber Water Tank

1. Summary of types of physical benefits:

The present Bieber water tank has significant deferred maintenance. By refurbishing the water tower, the community can expect another 30 years of use. An engineer's estimate for a new elevated tank is \$1,922,000. The community cannot afford this cost as 60% of the Bieber population has income less than \$36,000 per year. By refurbishing now, annual maintenance costs are reduced and water reliability is increased.

2. Description of Project's expected physical benefits for the following:

a. Recent and historical conditions-

The water tower was built in 1939. It is currently out of OSHA (Exhibit 7C) and US Dept of Homeland Security compliance. The tank has not been refurbished since 1978 and is in deplorable condition. The inside tank bowl is in fair condition. The outside tank and the risers and legs are failing. The ladder, balcony and railing are not up to OSHA standards. All metal parts still have good adhesion, which allows refurbishing as opposed to replacing. The foundation is in good condition.

b. Estimates of without-project conditions-

The water tower is now unsafe for maintenance crew and customers. The district's insurance carrier has serious concerns about the structure and safety of the maintenance crew. The site has no fencing, which allows/encourages tampering. If not refurbished, in a few years the tank will be beyond repair.

c. Description of Projects relationship to other projects-

The focus of this application is to address several DAC communities' critical water supply projects. Many other entities in the region with shovel-ready projects to address restoration and agricultural water efficiency lacked the capacity to prepare a project application at this time.

d. Description of methods used to estimate physical benefits-

e. New facilities, policies, and actions required to obtain physical benefits-

f. Uncertainty of benefits and factors leading to uncertainty-

There is no uncertainty of benefits to the community for Project C.

g. Description of potential adverse physical effects-

There are no known adverse physical effects for Project C.

