AR6214-A SCWC Water Consolidation Project

Technical Memorandum

Subject	Consolidation Plan
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EXECUTIVE SUMMARY

On August 30, 2018, the California State Water Resources Control Board (Board), Division of Drinking Water issued a Compliance Order (Order No. 05-13-18R-002) to Sheep Creek Water Company (SCWC) for violating the California Health and Safety code, Section 116555(a)(3) and California Code of Regulations, Title 22, Section 64554 for source capacity violations. Under this regulation, a public water system must have adequate source capacity to meet the system's highest maximum day demand (MDD). DDW cited an MDD of 2.09 million gallons per day (MGD) and stated that SCWC's total source capacity as of August 2018 was 0.74 MGD, resulting in an MDD deficiency of 1.37 MGD. On January 3, 2020, DDW reduced the MDD to 1.97 MGD after it was determined that the 2014 Annual Report incorrectly reported a total production of 6.04 acre-feet/year, rather than the documented 6.4 acre-feet/year. As part of the compliance order, DDW imposed a service connection moratorium which states that SCWC shall not make any additional service connection to its water system, including any such service connections for which a "will serve" letter was issued at any time, but for which a building permit was not issued prior to the date of the Order.

To correct the deficiencies within the SCWC water system, several alternatives were evaluated. Consolidating the SCWC water system with a nearby water system was identified as the preferred alternative. Selection of this preferred alternative and the decision to pursue consolidation was affirmed by the SCWC Board of Directors on September 17, 2020, and by the Phelan Pinon Hills Community Services District (PPHCSD) Board of Directors on September 16, 2020. This technical memorandum describes the project components for the Consolidation Plan between SCWC and PPHCD to ensure that when the two water systems are consolidated, it can safely and reliably deliver potable water to its customers, and meet local, state, and federal regulations.

SCWC is classified as a small, disadvantaged community, and is therefore eligible for State funding. The following sources were identified to help fund the consolidation project; 1) Safe and Affordable Fund for Equity and Resilience (SAFER), which helps small disadvantaged communities; 2) Drinking Water State Revolving Fund Program (DWSRF), which assists water systems to meet the Safe Drinking Water Act (SDWA) requirements and to further the public health objectives of the SDWA; and 3) Water Infrastructure Improvements for the Nation (WIIN) Grant: Small, Underserved, and Disadvantaged Communities (SUDC) Grant Program, which assists public water systems in meeting SDWA requirements.

Depending on the available funding options and eligibility, the following project components, in order of priority, are proposed based on several analyses performed for the SCWC: 1) purchase SCWCs 3,000 acre-foot/year water rights within the El Mirage Basin; 2) construct 2 to 3 new wells; 3) rehabilitation of two existing wells; 4) 7 interconnections between SCWC and PPHCSD; 5) upsizing approximately 13,000 LF of piping for fire flow improvements 6) upgrading aging water meters to Advanced Metering Infrastructure (AMI); 7) implementation of Supervisory Control and Data Acquisition (SCADA) at the well, tank and interconnection sites; 8) rehabilitation of storage tanks; 9) installation of blow offs/flushing hydrants at dead ends; 10) installation of backflow devices to prevent cross contamination; and 11) water tunnel improvements. These improvements are necessary to meet local, state, and federal requirements.

The estimated construction and non-construction cost to consolidate the two water systems is $31,169,070, including purchasing SCWC's 3,000 acre-feet/year water rights within the El Mirage Basin.

As part of the consolidation agreement, SCWC will dissolve and become part of PPHCSD. SCWC's service area is within the boundaries and sphere of influence of PPHCSD, and therefore, there will be no jurisdictional change. In addition, SCWC is a private shareholder owned water company and there are approximately 8,000 shares that are held by approximately 1,400 shareholders. It is assumed that the water rights will be purchased from the shareholders based on an appraisal conducted in 2019 by Valuation Source for SCWC.

1.0 PURPOSE

As part of the voluntary water consolidation project between Sheep Creek Water Company (SCWC) and Phelan Pinon Hills Community Services District (PPHCSD), this technical memorandum (TM) describes the proposed Consolidation Plan for the two agencies. Major issues typically encountered when connecting two different water systems are different elevation pressure zones, varying pipe sizes and materials, water quality, operational flexibility (manual versus automatic control), water loses due to infrastructure age, and potential for over-pressurizing a historically lower pressure system.

The purpose of this TM is to document the necessary improvements to SCWC's existing water infrastructure to ensure that when the two systems are consolidated, it can safely and reliably deliver potable water to its customers. Planning for future growth projections is not included in the analyses presented in this TM.

Organized in separate sections, this TM summarizes the following information:

1. Purpose of TM
2. Background information
3. Description of existing SCWC water system
4. Current SCWC system deficiencies
5. Alternative solutions considered to address the deficiencies and analysis that resulted in the voluntary consolidation project
6. Recommended consolidation requirements, including water supply, water rights, and operational and system improvements, to provide safe and reliable water supply to customers under the consolidated water system
7. Potential funding sources
8. Project priorities and estimated improvement costs based on anticipated eligibility
9. Summary of Consolidation Project

2.0 BACKGROUND

SCWC is a private water company (CA3610109) that supplies potable water to unincorporated portions of San Bernardino County in Phelan, CA. The water system is operated under the Domestic Water Supply Permit No. 78-007 and is regulated by the California State Water Resources Control Board, Division of Drinking Water (DDW). On August 30, 2018, DDW issued a Compliance Order (Order No. 05-13-18R-002) for violating the California Health and Safety code, Section 116555(a)(3) and California Code of Regulations, Title 22, Section 64554 to SCWC for source capacity violations. Under the Title 22 regulation, a public water system must have adequate source capacity to meet the system's highest maximum day demand (MDD). DDW cited an MDD of 2.09 million gallons per day (MGD) and stated that SCWC's total source capacity as of August 2018 was 0.74 MGD, resulting in an MDD deficiency of 1.37 MGD. The Compliance Order can be found in Appendix A. On January 3, 2020, a request to reduce the MDD to 1.97 MGD was approved by DDW. SCWC submitted the 2014 Annual Report which showed a total production of 6.04 acre-feet/year (AFY), rather than the documented 6.4 AFY, which reduces the MDD value to 1.97 MGD. Therefore, DDW revised the MDD value from 2.09 MGD to 1.97 MGD in the amended compliance order to the system. This letter can be found in Appendix B.

As part of the Compliance Orders, the following reports were completed previously and are referenced herein:

1. "Final Feasibility Report Addressing Water Source Capacity Issues" (Feasibility Report), dated January 14, 2019, prepared by Infrastructure Engineering Corporation (Appendix C)
2. "Safe Drinking Water State Revolving Fund Applicant Engineering Report" (2019 PER), dated May 22, 2019, prepared by California Water Rural Association (Appendix D)
3. "Asset Management Plan" (AMP), dated December 15, 2020, prepared by Infrastructure Engineering Corporation (Appendix E)

SCWC serves a population of approximately 3,300 people with a median household income (MHI) of $55,153 based on US Census Data. As defined by DDW, a small community is defined as having a population less than 10,000 people and a disadvantaged community is defined as having an MHI less than 80% of the Statewide MHI. The 2019 California Statewide MHI is $75,235. Since the MHI within the SCWC water system is below $60,188 (80% of $75,235) and serves less than

10,000 people, SCWC is classified as a small, disadvantaged community, and is therefore eligible for State funding. In addition, as part of a voluntary consolidation, the Division of Financial Assistance (DFA) offers zero interest loans up to $10 million dollars for water systems that complete the consolidation of a small, disadvantaged water system and may be used for any water system infrastructure related project that the receiving water system desired.

3.0 SCWC'S EXISTING WATER SYSTEM

3.1 Water Supply

SCWC's source of water supply is groundwater pumped from six (6) local wells and a water supply tunnel. The majority of the wells (Well Nos. 2A, 3A, 4A, 4, and 8) and the tunnel are located within the El Mirage Valley Basin, while Well No. 10 is located within the Mojave Basin. A seventh well, located in the Antelope Basin Area, was completed but is not connected to the system. The tunnel is the primary source of water and was constructed in the 1920s and flows continuously by gravity within Swarthout Canyon. The groundwater is chlorinated at the wells and is stored in the systems storage tanks. SCWC's wells are summarized in **Table 3-1**, below. A map of SCWC existing water system is shown in **Figure 3-1**.

Table 3-1. Summary of SCWC's Existing Water Supply Capacity

	Operational Capacity[1]		
Source[2]	GPM	MGD	AFY
Well 2A	335	0.48	541
Well 3A	312	0.45	503
Well 4A	306	0.44	494
Well 5	302	0.43	487
Well 8	359	0.52	578
Well 10	0	N/A	N/A
Well 11	251	0.36	405
Tunnel	135	0.19	217
Total	**2,000**	**2.88**	**3,225**

[1] Average well production from January 2021 – August 2021.
[2] Well 10 is not in service.

Although recent source capacity (2.88 MGD) shows that SCWC meets the MDD (1.97 MGD), at the time Order No. 05-13-18R-002 was issued in August 2018, SCWC's total source capacity was 0.74 MGD, resulting in an MDD deficiency. The DDW has concerns regarding SCWC not meeting the MDD due to the current drought and historical production trends.

3.2 Storage Tanks

SCWC owns and operates seven (7) storage tanks that are located throughout the system at various elevations and allow the entire distribution system to be gravity fed. Five of the storage tanks are bolted steel and two are welded steel. The total storage capacity of the tanks is approximately 6.21 million gallons (MG). The storage tanks are summarized in **Table 3-2**, below.

Table 3-2. Summary of SCWC's Existing Water Storage Tanks

Tank No.	Diameter, ft	Height, ft	Volume (MG)	High Water Elevation, ft	Type	Manufacturer	Year Installed
2	55	24	0.42	23	Bolted Steel	Tri-State	1979
3	47	16	0.21	15	Bolted Steel	Unknown	1983
4	55	24	0.42	23	Bolted Steel	Unknown	1984
5	39	16	0.14	15	Bolted Steel	Unknown	1985
6	80	24	0.89	23.17	Bolted Steel	Unknown	1989
7	103	16	0.99	15.08	Welded Steel	Pittsburg Des Moines Steel	1993
8	150	24	3.14	23	Welded Steel	Crosno Construction	2009
Total	-	-	**6.21**	-	-	-	-

3.3 Distribution System

SCWC's distribution system network includes approximately 70 miles of pipeline ranging from 4-inches to 12-inches in diameter. The pipe material consists of steel (28% of the distribution system), asbestos cement (AC) (5%), and polyvinyl chloride (PVC) pipe (67%). The distribution system is summarized in **Table 3-3**. The exact date of installation of pipelines in most of the system is unknown. Based on information available about the formation of SCWC, it is assumed that most of the distribution system was installed in the 1950's and the system has had only a few replacements and new installations in the last 20 years.

Table 3-3. Summary of SCWC's Existing Distribution System

Pipe Diameter, in	Length, ft
≤ 4	62,792
6	133,918
8	135,898
≤ 10	33,893
Total	**366,501**

3.4 Water Meters

All service connections have a water meter that is read manually each month. As of August 2021, SCWC has 1,387 metered connections and there are approximately 1,165 active meters. A summary of the meters is shown in **Table 3-4**, below.

Table 3-4. Summary of SCWC's Existing Water Meters

User Type	No. of Connections	Meter Size		
		1-inch	2-inch	4-inch
Commercial	101	76	25	0
Multi-Family	13	9	4	0
Schools	17	7	9	1
Churches	14	13	1	0
Landscape	4	4	0	0
Residential	1,238	1,235	3	0
Total	**1,387**	**1,344**	**42**	**1**

3.5 Existing SCWC Owned Properties and Easements

The following properties and easements are owned by SCWC and will be transferred to PPHCSD following consolidation of the two water systems.

Table 3-5. Summary of SCWC's SCWC-Owned Properties and Easements

Location	Description	Parcel Number(s)	Acreage
6666 Hwy 2, Wrightwood	Land, Wells 2A, 3A, 4A, 5, and 8, Tanks 5 & 6	0356-021-02-0000	14.49
7788 Serrano Rd, Pinon Hills	Vacant land	3037-301-01-0000	40.00
4200 Sunnyslope Rd, Phelan	Main Office & Shop, Storage Yard, Tank 2, 4, and 8	3066-321-26-1000	4.39
4625 Walnut Rd, Phelan	Land, Well 11	3069-321-18-0000	2.50
263rd St, Black Butte	Land, Well 10	3089-012-004 & -008	2.36
Tanks 3 & 6	Tank 3 Easement (80' x 80') Tank 6 Easement (208' x 208')	Tank 3 (3036-62-115-0000) Tank 6 (3037-07-107-0000)	-
Total			**63.74**

4.0 SCWC WATER SYSTEM DEFICIENCIES

As outlined in the 2019 PER and AMP, the SCWC water system was noted to have deficiencies encompassing Water Supply, Storage Tanks, Distribution System, Water Meters, and Supervisory Control and Data Acquisition (SCADA). Each deficiency is summarized below.

4.1 Water Supply

The Compliance Order was issued due to inadequate source supply. Based on the Feasibility Report, a review of SCWC's production records found that the highest 10-year MDD of 1.78 MGD occurred on July 12, 2014, which is less than the 2.09 MGD cited in the Compliance Order. The discrepancy between the values was a result of Well 8 record production values on July 12, 2014, which accounted for two days of runtime instead of one day.

Per the Compliance Order, DDW imposed a service connection moratorium which states that SCWC will not make any additional service connection to its water system, including any such service connections for which a "will serve" letter was issued by the system at any time, but for which a building permit was not issued prior to the date of the Order.

Per the 2019 PER, well production has decreased due to age, condition, and groundwater level declines. The decline of production within the El Mirage Basin was due to fluctuations in snowpack and aged wells. SCWC has successfully rehabilitated wells and there are currently two wells (Well 4A and Well 8) that are in need of rehabilitation. When the wells were rehabilitated, it was shown that production rates have improved. A well investigation was performed by BESST, Inc in July 2018 for Wells 3A and 4A. The investigation noticed that the well casing for Well 3A and Well 4A has accumulated scale and bacteria and should be repaired. Well 3A was rehabilitated in 2019. As discussed in the AMP report, it was noted that the pumps for Wells 4A and 8 have passed their expected useful life and should be replaced.

4.2 Storage Tanks

SCWC's existing storage tanks were inspected in October 2018 by Associated Construction and Engineering (ACE). **Table 4-1** summarizes the recommended improvements based on the inspection to meet American Water Works Association (AWWA), Occupational Safety and Health Administration (OSHA), Division of Safety and Health (DOSH), and seismic requirements, and to increase the reliability and life expectancy of the storage tanks.

Table 4-1. Recommended Storage Tank Improvements

Tank	Recommendations[1]	Reason for Improvement
2, 3, 4, 5, 6	Install seismic flexible pipe couplings, roof hand railing, and interior ladder	Seismic/OSHA Standards
	Engineer tank for sloshing wave and reduce overflow elevation and install air-gap at overflow line	Meet AWWA Standard for Freeboard/DOSH Requirement
	Blast interior coating and re-coat	Extend life of tank
	Pressure wash and re-coat exterior	Extend life of tank
	Replace liquid level indicator[2]	Improve operations
7	Spot repairs	Extend life of tank
	Blast interior coating and re-coat	Extend life of tank
	Pressure wash and re-coat exterior	Extend life of tank
8	Spot repair all rafter ends	Extend life of tank
	Spot repair roof delamination	Extend life of tank
	Interior spot repairs - TBD based on detailed interior inspection	Extend life of tank

[1] Recommendations per ACE Inspection performed in October 2018.
[2] Per SCWC staff, liquid level indicators were replaced on Tanks 2 – 7.

Tank 8 was found to be in excellent condition and only spot repairs were recommended. The complete Tank Inspection Report can be found in Appendix D.

As outlined in the AMP, in November 2018, LiquiVision Technology Diving Services performed an underwater inspection on Tanks 2 through 7. As a result of the inspections, it was found that the tanks have some deficiencies including signs of corrosion and rust. Based on the underwater inspection, it was recommended that the interior of Tank 5 and 6 be relined.

4.3 Distribution System

Low Pressure: A hydraulic model of the system was analyzed as part of the 2019 PER and the service areas described below experience low pressures.

1) Nilsen Tract – receives potable water through Tanks 6 and 7 through a 10-inch transmission line. At certain conditions, this area experiences low pressures that require SCWC operators to manually open the valves to the bypass line.
2) Storage Tank No. 6 – The area served by Storage Tank No. 6 receives potable water through Storage Tank No. 7 or through a 10-inch bypass line. Under drought conditions, flow and pressure is unable to fill Storage Tank No. 6.

However, based on the hydraulic model conducted as part of this TM, low pressure was not observed at these locations. Further discussion can be found under Section 6.2 Operational Requirements.

Fire Flows: Due to undersized pipes within the distribution system, SCWC does not have adequate fire flow. The California Fire Code requires that each hydrant should have the capacity to provide 1,500 gpm of flow and adequate pressure (minimum of 20 psi) for a duration of two hours for firefighting purposes. However, PPHCSD fire flow requirements for commercial and institutional land uses are 3,000 gpm with a duration of 3 hours and fire flow requirements for residential land uses are 500 gpm with a duration of 2 hours.

Based on the 2019 PER, approximately 60% of the 50 fire hydrant locations modeled were unable to meet the fire flow requirements. It was determined that many of the distribution mains are undersized and that the minimum pipe size should be 8-inches to meet the fire flow demand. In addition, there are approximately 27 dead ends within the distribution system that allows water to stagnate and may lead to bacterial growth and bad tasting water.

A separate fire flow analysis was conducted in support part of this TM and can be found under the Section 6.2 Operational Requirements section.

4.4 Water Meters

Water meters within the system vary in age with the oldest being over 30 years old. Each meter is read manually, and SCWC does not have an automated system to read the meters. The AMP states that SCWC has recorded water losses based on water production and consumption from 2015 to 2019, the average water loss per year was 15%. The Environmental Protection Agency (EPA) considers 10% to 15% as an acceptable range for losses within a system, as referenced in the *Control and Mitigation of Drinking Water Losses in Distribution System*. However, many of the meters are beyond their useful life. These water meters should be replaced with better technology to help measure water consumption, define leakage in the system more accurately, and to allow remote reading capabilities.

4.5 Supervisory Control and Data Acquisition (SCADA)

Per the 2019 PER, SCWC does not have SCADA capability to collect data or control the pumps or storage tanks. The SCWC water system is required to be monitored at each facility site and controlled manually, which is limited to a few times a day. In addition, access to SCWC's well field (Wells 2A, 3A, 4A, 5, and 8 and Tanks 5 and 7) is difficult during inclement weather and issues may go unnoticed for extended periods of time. It is recommended that SCADA be implemented for continuous monitoring of the wells, storage tanks, and pressure reducing stations, to ensure smooth operation with PPHCSD existing SCADA system.

5.0 EVALUATION OF ALTERNATIVES TO CORRECT SCWC SYSTEM DEFICIENCES

As part of the 2019 PER, three alternatives were evaluated to correct the deficiencies within SCWC water system. Each alternative is summarized below followed by identification of the recommended alternative.

- Alternative 1: No Action: Under this alternative, no action would be taken to address the system deficiencies. This alternative is not feasible since SCWC received a Compliance Order from DDW which requires taking immediate steps to increase their source capacity. If no action is taken, DDW could issue penalties to SCWC and may even suspend or revoke their water permit. Therefore, this alternative was not selected.
- Alternative 2: System Upgrades: This alternative would entail upgrading the SCWC system in two phases. Phase 1 would include rehabilitation of existing wells 2A, 3A, and 4A to restore production and extend the life of the wells. Phase 2 includes upgrades to the distribution pipelines including replacing undersized pipes, installing hydrants to improve fire flow, meter replacement, booster pumps to improve inadequate pressure areas, rehabilitate storage tanks, and a new SCADA system. Per the 2019 PER, the total capital cost estimate for this alternative was $6,538,000 with an annual operations and maintenance (O&M) cost of $39,000. A detailed cost breakdown can be found in Appendix D.
- Alternative 3: Consolidation: This alternative entails consolidation of SCWC's water system with PPHCSD (CA3610120). PPHCSD is a water retail agency that is regulated by the DDW and serves unincorporated communities in Phelan and Pinon Hills in San Bernardino County and surrounds the SCWC water system. An emergency intertie connect the two systems together and PPHCSD has supplied SCWC with emergency water in 2016 and 2018. In return, SCWC supplies replacement water to PPHCSD. Under this alternative, SCWC's existing infrastructure would need to be improved and additional connection points between the two systems will need to be constructed. Recommended improvements to SCWC's system encompass interconnection pipelines, booster pump station, new water meters to meet PPHCSD standards, replacement of undersized pipelines, storage tank rehabilitation and installation of tank mixers, and SCADA controls. Per the 2019 PER, the total capital cost for this alternative is estimated to be $7,309,000 with an annual O&M cost of $39,000. The existing infrastructure will remain in place. A detailed cost breakdown can be found in Appendix D. Since SCWC is a private-owned company, consolidation with PPHCSD would require the distribution of SCWC's assets owned by its shareholders and SCWC would be dissolved.

An additional alternative was evaluated in the Feasibility Report that consisted of adding four (4) new supply wells to SCWC's system. Under this alternative, it is assumed that the four new wells would have a well production of 250 gpm, based on the recently drilled production rate of Well 11, and would be located at APN 3069-321-18. As part of this alternative, 4 new wells would be drilled and equipped, and include piping from the well to the existing distribution system. As discussed in the Feasibility Report, the cost, including administrative, CEQA, and property acquisition, is approximately $5,420,000, with an annual O&M cost of $129,600.

As described in the 2019 PER, Alternative 3: Consolidation with PPHCSD provides SCWC's customers with regulatory compliance and the best long-term reliability and was therefore selected as the preferred alternative. Selection of this preferred alternative and the decision to pursue consolidation was affirmed by the SCWC Board of Directors on September 17, 2020, and by the PPHCSD Board of Directors on September 16, 2020.

6.0 CONSOLIDATION REQUIREMENTS

Based on the decision to combine the SCWC system with PPHSCD, the existing SCWC system was evaluated to determine what would be needed so that the consolidated system meets PPHCSD, American Water Works Association (AWWA), California Waterworks Standards, and local standards. To define these improvements, a number of inspections and analyses were completed; each is discussed further below with the respective reports presented in the attached appendices.

6.1 Water Rights and Water Supply

A Technical Analysis of Water Rights was prepared and summarizes the existing water rights owned by SCWC and PPHCSD, including expected ramp downs, current and future allocations and current water availability, and costs associated with pumping.

It is recommended that PPHCSD purchase, with reimbursement by the State, the SCWC water rights in the El Mirage Basin to provide PPHCSD with an additional 3,000 AFY to the consolidated water system. For 2021 – 2022, combining SCWC water rights with PPHCSD's water rights will result in a total of 6,000 AFY of free production allowance (FPA) and 8,035 AFY of base annual production (BAP). In addition, it is recommended that additional wells (2 or 3 depending on the production rate) be constructed.

The report "Technical Analysis of Water Rights" dated February 3, 2022, prepared by Ardurra and the report "Sheep Creek Water Company Water Rights", dated February 2, 2022, prepared by Paris, Kincaid, Wasiewski are presented in Appendix F and Appendix G, respectively.

Response to Climate Change

Per PPHCSD's 2020 Urban Water Management Plan (UWMP), PPHCSD's annual average maximum temperature is projected to increase by approximately 4.4 °F, and the average annual precipitation is projected to decrease by 0.7 inches in the next 30 years. The increase in temperature and decrease in precipitation can lead to water demand increase. PPHCSD's primary source of water supply is groundwater pumped from the Mojave Basin Area (MBA), which is adjudicated by MWA. MWA has diversified water supplies and manages its supplies to address drought conditions. MWA captures and stores surplus imported water in normal and wet years that can be used to meet regional demands in dry years. MWA's 2020 UWMP has concluded that it can provide stable and reliable water supplies to meet current through 2065 water demands in its service area under normal, single dry, and five consecutive dry years conditions. In addition, PPHCSD is continuously implementing demand management measures to promote water conservation awareness and demand reduction practices.

6.2 Operation and Maintenance

PPHCSD's existing system operation and maintenance practices include but are not limited to the following:

- Perform routine inspection and preventative maintenance works of its facilities such as pumps, motors, engines, valves, and reservoirs in accordance with established guidelines, repair or replace as needed
- Maintain production facilities and assist in performing repairs or adjustments to wells and pump stations
- Inspect distribution system for proper operation, safety, and regulatory compliance
- Test chlorine residuals and maintain adequate chlorine levels to ensure water quality
- Water quality flushing
- Checks on water meters reading accuracy, function, and condition, and repair or replace as needed
- Investigate customer complaints involving malfunctioning meters, leaks, low and/or high pressure, water quality, etc.
- Inspect possible source of leakage
- Send notifications and water use audits to customers who are responsible for the leak issues and maintain communication with the audited customers to verify the leak repair
- Operate the telemetry system and responds to telemetry failures
- Assist with enforcement of conservation ordinance and customer awareness

Water operations and maintenance expenditures account for 69% of PPHCSD's total expenditures in Fiscal Year 2021-2022.

O&M activities that may occur after consolidation are site visits to the well sites, tank sites, and interconnections to ensure the infrastructure is working properly. Several of the tanks and wells are in remote locations that are difficult to access during inclement weather. In addition, if a leak or a problem occurs with the infrastructure, it may take several days for the problem

to be noticed and resolved. Implementing SCADA for SCWCs infrastructure and replacing water meters with AMI will help detect issues within the system and allow staff to respond and fix the issues quicker.

6.3 Operational Requirements

In support of the water system consolidation project between SCWC and PPHCSD, a hydraulic analysis was performed to evaluate system performance with the proposed interconnects mentioned above.

The first phase of the hydraulic analysis included building and calibrating SCWC's existing water system model and then merging this model with PPHCSD's water system model. SCWC's model network was built from a Geographic Information System (GIS) database developed as part of this project. Meter (x,y,z) locations were surveyed via Global Positioning System (GPS) technology by Ardurra field staff in order to link billing data to the point of water consumption for more accurate demand allocation in the model. SCWC does not classify its billing data by customer type, but PPHCSD does. As indicated in PPHCSD's 2020 UWMP, commercial water use accounted for approximately 3.2% of PPHCSD's 2020 water usage and PPHCSD has no industrial water use. PPHCSD does not anticipate any significant commercial and industrial growth within its service area, so commercial water users are not anticipated to have significant impact to the water demand.

Elevation data input in the model came from United States Geological Survey (USGS) Digital Elevation Model (DEM) as well as GPS-ed data collected per meter site. System facilities and boundary conditions were input in the model based on several discussions with SCWC staff. The SCWC hydraulic model was calibrated in a steady state (SS) condition based on results from five (5) fire flow tests conducted on January 5, 2022 (Appendix H), and pressure recording data from 15 locations of the SCWC system collected from various time periods. Results from the SCWC model calibration conclude that the model could be used for planning-level purposes. The calibrated SCWC hydraulic model was then merged with the latest PPHCSD water model which was developed as part of PPHCSD's 2020 Water System Master Plan (WSMP).

The second phase of the hydraulic analysis involved evaluating the performance of the PPHCSD-SCWC consolidated system under the following scenarios: 1) evaluation of the consolidated system with the proposed interconnections under maximum day demand (MDD) and peak hourly demand (PHD) conditions; 2) evaluation of the consolidated system under maximum day demand plus fire flow (MDD + FF) condition; and 3) evaluation of the consolidated system with changes made to pressure reducing stations (PRS) to optimize operation and maintenance.

The hydraulic analysis resulted in a number of recommended system improvements that are described in the subsections below.

6.3.1 System Interconnections

The SCWC system and PPHCSD system are proposed to be consolidated with six (6) new connections with 8-inch pipes and two (2) existing interconnects as shown in **Figure 6-1**. The two existing interconnects (Connection 7 and Connection 8) have been historically used for emergency purpose only. Connection 7 was recently installed in November 2021 with a CLA-VAL valve. The CLA-VAL is a pressure reducing valve with a check feature and is assumed to be set with similar hydraulic grade line (HGL) as SCWC's Nilsen Tract Zone with an HGL of approximately 4,451 feet (ft).

As mentioned above, the PPHCSD-SCWC system was analyzed under non-fire flow conditions including MDD and PHD at steady-state. Model results indicate that pressure differences pre- and post-consolidation vary within -20 pounds per square inches (psi) to +20 psi in most areas under MDD condition. Resulting pressures are within 40 psi to 150 psi in most areas. Per discussion with SCWC staff, most customers in the SCWC system have pressure regulators installed. Areas with pressure differences of more than 20 psi are near Connection 4 and Connection 6. System pressures on the 4-inch PVC pipe on Smoke Tree Rd east of Connection 4 needs to be kept under 100 psi to avoid damage to the pipe per SCWC staff recommendation. Although pressures increase more than 20 psi near Connection 4, the resulting pressures are within 100 psi on the 4-inch PVC pipe on Smoke Tree Rd, therefore, a PRS is not recommended for this interconnection. A PRS is recommended for Connection 6 to prevent excessive pressures of over 150 psi near Pegasus Way and Rattlesnake Gulch Rd within Pressure Zone 9G of the PPHCSD system.

Model results indicate that most model demand nodes of the consolidated system meet the PPHCSD's minimum pressure criteria of 40 psi under PHD condition except a few model nodes. These nodes experience lower pressures regardless of consolidation of the two systems as they are located either near tank sites, near downstream of PRS sites, or at locations with higher elevations relative to the pressure zone hydraulic grade.

Table 6-1 summarizes the proposed connections, pressure zones merged resulting from the proposed connections, and improvements needed to maintain adequate pressures in the consolidated system.

Table 6-1. Summary of Proposed Connections

Connection	Location	Description	PPHCSD		SCWC		Merge Zones?
			Zone	HGL (ft)	Zone	HGL[1] (ft)	
1	Johnson Rd north of Aragon Rd	~190 LF of new 8-inch line on Johnson Rd connecting the existing 8-inch PPHCSD line north of Aragon Rd and the existing 8-inch SCWC line south of Aragon Rd	3E	3,992	Smoke Tree	4,034	Yes
2	Phelan Rd between Blue Stake Rd and Lebec Rd	~1,640 LF of new 8-inch line on Phelan Rd connecting the existing 8-inch PPHCSD line on Blue Stake Rd and the existing 8-inch SCWC line on Lebec Rd	5W2	4,387	Nielson	4,330	Yes
3	Sunnyslope Rd and Sheep Creek Rd	~ 30 LF of new 8-inch line on Sunnyslope Rd connecting the existing 12-inch PPHCSD line on Sheep Creek Rd and the 12-inch SCWC line east of Sheep Creek Rd	6E	4,616	Tank 6	4,617	Yes
4	Smoke Tree Rd Between Mescalero Rd and Nugget Rd	~ 570 LF of new 8-inch line on Smoke Tree Rd connecting to existing 8-inch PPHCSD line on Beekley Rd and existing 4-inch SCWC line on Nugget Rd	4W2	4,192	Yucca Terrace	4,121	Yes
5	Sunnyslope Rd between Ailanthus St and Eaby Rd	~650 LF of new 8-inch line on Sunnyslope Rd connecting the existing 6-inch PPHCSD line on Eaby Rd and the existing 8-inch SCWC line on Ailanthus St	5E1	4,390	Tank 8	4,336	Yes
6	Academy Rd and Scrub Oak Dr	~1,545 LF of new 8-inch line bear Academy Rd and Scrub Oak Dr with a PRS connecting to the existing 8-inch PPHCSD line on Pegasus Way from the existing 10-inch SCWC line on Scrub Oak Dr	9G	5,134	Tank 5	5,245	No
7	Snowline Rd and Valle Vista Rd	Utilize the existing interconnect with pressure reducing valve (PRV)	6E	4,616	Nilsen Tract	4,451	No
8	Reservoir 6A (PPHCSD) and TANK 6 (SCWC)	Utilize the existing interconnect	6E	4,616	Tank 6	4,617	Yes

[1] HGL of each pressure zone is determined either by high water level (HWL) elevations of storage tanks or discharge settings of pressure regulating facilities serving the zone.

6.3.2 Fire Flow Improvements

Major commercial and institutional developments are located along Phelan Rd and Sheep Creek Rd south of Yucca Terrace Dr, north of Sunnyslope Rd, east of Beekley Rd and west of Johnson Rd, as shown in **Figure 6-2**. The system was analyzed for pre-consolidation condition and consolidation condition with a focus on this area to identify any fire flow deficiencies based on the planning criteria established in the PPHCSD's 2020 WSMP. Fire flow requirements for commercial and institutional land uses are 3,000 gallons per minute (gpm) with a duration of 3 hours and fire flow requirements for residential land uses are 500 gpm with a duration of 2 hours. Minimum residual pressure under MDD + FF condition is 20 psi, and maximum allowable velocity under MDD + FF condition is 15

feet per second (fps). **Figure 6-3** shows the available fire flows of the modeled hydrant nodes within the fire analysis study area meeting the aforementioned pressure and velocity criteria under pre-consolidation condition.

Based on the model results, nine (9) fire flow improvement projects were identified as shown in **Figure 6-4**. The fire flow improvements include construction of new pipes and upsizing of existing pipes with a total length of approximately 12,700 linear feet (LF) and installation of a new PRS. Details of the fire flow improvement projects are included in Appendix I.

6.3.3 PRS Analysis

The SCWC system contains 36 PRSs, which will increase complexity and challenges to operation and maintenance after consolidation. Part of the hydraulic analysis evaluated the consolidated system in order to make recommendations to reduce the number of PRSs in the system, with particular focus on the PRSs on Nielson Rd and Phelan Rd.

Based on the model results, PRS 7, PRS 10, and PRS 12 on Nielson Rd, and PRS 13, PRS 27, and PRS 32 on Phelan Rd of the SCWC system can be eliminated with boundary valves. Approximately 430 LF of 8-inch line needs to be added on Phelan Rd connecting to the existing 8-inch line on Johnson Rd and 8-inch line west of Centola Ave to serve the customers near Phelan Rd and Centola Ave north of PRS 12, as shown in **Figure 6-4**.

6.4 Tunnel Inspection

An inspection of the SCWC water tunnel was conducted by Burgex Mining Consultants on October 25, 2021, to determine the cause of the decrease in water flow. However, during the inspection, it was found that water flow does not appear to be significantly limited by any physical blockages or defects in the tunnel. Based on observations during the inspection, the following improvements are recommended:

- The shaft manway will need to be repaired and/or replaced to ensure safe entry in the future.
- The utility side of the shaft has loose lagging that will need to be secured in the future to prevent failure.
- Air problems were not detected, but it is recommended that the ventilation pipe be utilized for any significant work.
- Improve road access to site.
- Secure the entrance, alarm system, and manway cover.

The “Sheep Creek Water Tunnel Access & Reconnaissance Summary” (Tunnel Inspection), dated October 28, 2021, prepared by Burgex Mining Consultants is presented in Appendix J.

6.5 Cross Connection Study

A Cross Connection Study was conducted by Hamby’s Backflow Service. A field inspection was conducted between August 30 and September 8, 2021. A total of 1,434 service connections, including fire sprinklers and irrigation connections were reviewed. External site surveys of 1,268 connections were performed with the remaining 166 being inactive or unable to locate. Based on the external site survey, 1,041 service connections had adequate protection or no hazards were visible. A total of 195 service connections were not protected or did not have adequate protection and the remaining 32 connections were remote services, which are services where the water meter is not located near the property it serves. Based on the Cross Connection Study, installation of backflow devices is recommended depending on the degree of hazard, type of cross connection (direct vs. indirect), and type of water use to comply with Title 17 California Code of Regulations Related to Drinking Water and Title 24 Part 5 of the California Plumbing Code. The “Sheep Creek Water Company External Site Surveys” (Cross Connection Study), dated September 19, 2021, prepared by Hamby’s Backflow Service is presented in Appendix K.

7.0 FUNDING SOURCES

It is understood that the State will determine the funding availability and eligibility. For the purpose of this report, we have identified potential funding sources and eligibility based on improvement type. PPHCSD will be the grant recipient. PPHCSD prefers grants rather than loans as loans would require PPHCSD to establish a special district which will result in a higher rate or fee for its customers, who are considered a disadvantaged community (DAC), to pay back the loans. **Table 7-1** summarizes the Available Funding Source, Eligibility, and Key Elements for Project Eligibility.

Table 7-1. Summary of Available Funding Sources

Funding Source	Eligibility	Key Elements for Project Eligibility
Safe and Affordable Fund for Equity and Resilience (SAFER)	Small Community Funding is available to help small disadvantage communities (small DACs), providing drinking water service to less than 10,000 people or wastewater service to less than 20,000 people and having a median household income (MHI) of less than 80% the statewide MHI.	• Pay for any infrastructure needed for the consolidation
		• Offset increased O&M costs for the receiving system during the consolidation (i.e., until the consolidating system's customers begin receiving water service from the receiving system)
		• Pay for any additional infrastructure needed by the larger system in order to consolidate the smaller system to ensure existing customers are not impacted by the consolidation
		• Provide incentives for voluntary consolidations
Drinking Water State Revolving Fund Program (DWSRF)	Public water systems that need assistance to achieve or maintain compliance with Safe Drinking Water Act (SDWA) requirements and to further the public health objectives of the SDWA.	• Water sources, if necessary to comply with state or federal drinking water standards, including drilling costs, equipment, structures to protect the quality of source water, and purchase of source capacity in another water system.
		• Consolidation project costs, including but not limited to connection fees, source capacity charges, costs to secure or develop new water sources to meet the additional demand, and legal fees for preparation of documents are eligible;
		• Pipelines and water mains that are integral to the project and are necessary for the project to function properly.
		• Equipment and additional capacity to provide fire protection as required by the applicable governing fire code and incidental appurtenances for fire protection such as fire hydrants
		• Purchase and installation of water supply meters
		• Water rights are ineligible for funding, except when acquired through physical or managerial consolidation with another water system
		• Stationary and mobile equipment integral to the project. Equipment must be dedicated to the storage, treatment, or distribution facilities for which it was purchased
Water Infrastructure Improvements for the Nation (WIIN) Grant: Small, Underserved, and Disadvantaged Communities (SUDC) Grant Program[1]	States, territories, and tribes to assist public water systems in meeting Safe Drinking Water Act (SDWA) requirements.	• Transmission and Distribution (transmission/distribution mains, meters, appurtenances)
		•Development of new sources to replace a contaminated drinking water source or to increase drought resilience
		• Raw water intakes, wells or other constructed infrastructure that allows for movement of raw water into the treatment plant or into the distribution system
		• Storage (New or replacement/rehabilitation to maintain compliance and protect public health)
		• Consolidation (interconnections)
		• Purchase of water rights are ineligible unless water rights are owned by a system to be purchased for consolidation as part of a capacity development strategy

[1] WIIN Grant SUDC Grant Program eligibility and requirements can be found in Appendix L.

8.0 PROPOSED CONSOLIDATION PROJECT PRIORITIES AND COSTS

Based upon the funding options and eligibly discussed in Section 7.0, improvements to SCWC's water system are prioritized as follows:

1. Water Supply
    a. Water Rights
    b. New Wells
    c. Well Rehabilitation
2. Life Safety and Resiliency
    a. Interconnections

b. Fire Flow Improvements
c. Water Meters
d. SCADA

3. Water Quality
    a. Tank rehabilitation
    b. Blow-offs
    c. Cross Connections
    d. Tunnel Improvements

The first priority is to develop a consolidated system that will meet customers water demands with a reliable source of water and as ordered by the Compliance Order. These improvements consist of purchasing SCWC's water rights, installing new wells, and rehabilitation of existing wells. The next priority is being able to provide life safety and hydraulically balanced water system operations. This consists of installing interconnections between PPHCSD and SCWC water systems, providing minimum fire flow requirements, replacing aging water meters to help measure water consumption and define leakage in the system more accurately, and implementing SCADA. The third priority is being able to provide water quality that meets drinking water standards. These improvements consist of rehabilitating the existing tanks, installing blow-off valves at dead ends, and improving the SCWC water tunnel. Each of these priorities are discussed in greater detail in the sections below.

The opinion of construction cost estimates presented in this document are based on the level of detail available and are therefore preliminary in nature. Ardurra presents these estimates as general guidance and does not guarantee that they represent actual costs which may be affected by factors beyond Ardurra's control such as construction market forces and material cost escalation at the time of bidding. Unless otherwise noted, the cost estimates reflect 2022 dollars and do not include any escalation factor for potential future cost increases.

8.1 Water Supply

The first priority of the proposed project is to ensure the consolidated system has enough water rights and water supply to meet the consolidated systems demands. As ordered by the Compliance Order, the system must meet the combined MDD. This requires purchasing SCWC water rights, installing new wells, and rehabilitating existing wells.

8.1.1 Water Rights

As recommended in the Technical Analysis of Water Rights, SCWC's water rights within the El Mirage Basin should be purchased by PPHCSD and reimbursed by the State. With the additional 3,000 acre-feet per year of water rights, this will provide additional water rights for the consolidated system, allowing PPHCSD to meet the 10-year MDD while staying within their base annual production (BAP). Based on an appraisal conducted in 2019 by Valuation Source for SCWC, the value for SCWC's water rights is $13,030,000. If SCWC's water rights are not purchased, then PPHCSD will need to purchase replacement water which will lead to over drafting the Mojave Basin.

Under the Policy for Implementing the Drinking Water State Revolving Fund (DWSRF) Policy, Amended December 3, 2019 (Amended DWSRF Policy), Section XI.B.2.e, states that "Water rights, except when acquired through physical or managerial consolidation with another water system" are ineligible for funding. However, since SCWC will dissolve and their water system will be consolidated with PPHCSD, PPHCSD will be the remaining water system and SCWC's water rights should therefore be eligible for funding. In addition, under the WIIN Grant Section V, the purchase of water rights is eligible for funding if the water rights are owned by a water system to be purchased for consolidation as part of a capacity development strategy.

8.1.2 New Wells

It is recommended that 2-3 additional wells be installed within the Oeste and/or Alto Basin. Four locations are considered for the potential wells and are shown in Appendix M. It is recommended that a well siting study be performed to determine the best location for the wells. The estimated well capacity is assumed to be similar to the most recently drilled well, Well 11, located in the Alto Basin, which is 250 gpm. The estimated cost for installing three (3) new wells is $6,326,000. A breakdown of these costs can be found in **Table 8-1**, below. The estimated useful life of the new wells is approximately 25 – 30 years, as outlined in the AMP and 2019 PER.

Table 8-1. Estimated Cost of New Wells[1,2]

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Drill 1,500-foot 16-inch Well	EA	3	850,000	2,550,000
150hp Submersible Motor & Pump	EA	3	125,500	376,500
Electrical and Instrumentation	LS	3	95,000	285,000
Well Head and Site Work	LS	3	45,000	135,000
Well Offsite Piping	LS	3	150,000	450,000
			Subtotal	3,796,500
			30% Contingency	1,138,950
			Construction Cost	4,935,500
Non-Construction Costs				
Administration, Engineering, CM (25%)				1,233,875
CEQA[1]				86,250
Property Acquisition for Three Well Site Locations[1]				70,000
			Non-Construction Costs	1,390,125
Total Cost (Rounded)				6,326,000
Annual Operation and Maintenance Cost				97,000

[1] Cost estimated from AMP Report, dated December 2020 and recent construction costs (March 2022).
[2] The estimated well capacity is assumed to be similar to the most recently drilled well, Well 11, located in the Alto Basin, which is 250 gpm.

As defined by the Drinking Water State Revolving Fund Eligibility Handbook dated 2017 (DWSRF Handbook), Appendix B. Part A.2, constructing new wells is considered a resilient component as part of drought mitigation.

The new wells will help provide the infrastructure needed to meet the MDD, as required by the Compliance Order. These improvements are eligible for funding under the Amended DWSRF Policy, Section XI.B.1.c, which states that “consolidation project costs, including but not limited to connection fees, source, capacity charges, costs to secure or develop new water sources to meet the additional demand, and legal fees for preparation of documents” are eligible.

Under the WIIN Grant Section IV, development of new sources to increase drought resiliency, and raw water intakes, such as wells, that allows for movement of raw water into the distribution system are eligible for funding.

8.1.3 Well Rehabilitation

To help meet the MDD, rehabilitation of Wells 4A and 8 and is recommended. The estimated cost for rehabilitating these wells is $634,000 and includes replacing the pumps that have exceeded their useful life, column pipe, and tube and shaft assemblies. A breakdown of these costs can be found in **Table 8-2**, below. Following improvements, the estimated useful life of the pumps is approximately 10 – 15 years, as outlined in the AMP and 2019 PER.

Table 8-2. Estimated Cost for Well Rehabilitation[1]

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Well 4A Rehabilitation	LS	1	195,000	195,000
Well 8 Rehabilitation	LS	1	195,000	195,000
			Subtotal	390,000
			30% Contingency	117,000
			Construction Cost	507,000
Non-Construction Costs				
Administration, Engineering, CM (25%)				126,750
			Non-Construction Costs	126,750
Total Cost (Rounded)				634,000
Annual Operation and Maintenance Cost				40,000

[1] Cost estimated from recent construction costs, March 2022.

Rehabilitating wells is considered a resilient component as part of drought mitigation under the DWSRF Handbook Appendix B, Part A.2.

Well rehabilitation will help provide improvements to the infrastructure needed to meet the combined MDD, as required by the Compliance Order. Since this improvement is part of water sources, they are eligible for funding under the Amended DWSRF Policy, Section XI.B.1.b, which states "water sources, if necessary to comply with state or federal drinking water standards, including drilling costs, equipment, structures to protect the quality of source water, and purchase of source capacity in another water system" are eligible construction costs.

8.2 Life Safety and Resiliency

8.2.1 Interconnections

To consolidate PPHCSD's and SCWC's water systems, six (6) new interconnections are proposed between the existing water systems and one (1) existing interconnection will be utilized. An additional interconnection was recently constructed in November 2021, and therefore is not included for funding. The estimated cost for 7 interconnections, including flow meters at each interconnection (to help detect leaks) and PRS where required, is $2,885,000. A breakdown of these costs can be found in **Table 8-3**, below.

Table 8-3. Estimated Cost for Interconnections

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
8-inch diameter, PVC C900 Class 200	LF	5,100	300	1,530,000
Flow meters	EA	7	10,000	70,000
Pressure Regulating Stations	EA	1	175,000	175,000
			Subtotal	1,775,000
			30% Contingency	532,500
			Construction Cost	2,307,500
Non-Construction Costs				
Administration, Engineering, CM (25%)				576,875
			Non-Construction Costs	576,875
Total Cost (Rounded)				2,885,000
Annual Operation and Maintenance Cost				4,000

Interconnections are considered a resilient component as part of drought mitigation under the DWSRF Handbook Appendix B, Part A.2.

Since these interconnections are required for consolidating the system and maintaining adequate pressure, they are eligible for funding under the Amended DWSRF Policy, Section XI.B.1.c, which states that "consolidation project

costs, including but not limited to connection fees, source, capacity charges, costs to secure or develop new water sources to meet the additional demand, and legal fees for preparation of documents are eligible."

Under the WIIN Grant Section IV, installation of infrastructure to improve water pressure to safe levels is eligible for funding. In addition, Section IV states that interconnections for consolidation is eligible for funding.

8.2.2 Fire Flow

As described in the Water Analysis, fire flow improvements should be made to ensure reliable firefighting per PPHCSD standards. These improvements include replacing and constructing approximately 13,000 LF of pipe. The estimated cost for the fire flow improvement is $6,495,000. A breakdown of these costs can be found in **Table 8-4**, below.

Table 8-4. Estimated Cost for Fire Flow Improvements

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
8-inch diameter, PVC C900 Class 200	LF	11,840	300	3,552,000
10-inch diameter, PVC C900 Class 200	LF	1,270	350	444,500
			Subtotal	3,996,500
			30% Contingency	1,198,950
			Construction Cost	5,195,500
Non-Construction Costs				
Administration, Engineering, CM (25%)				1,298,875
			Non-Construction Costs	1,298,875
Total Cost (Rounded)				6,495,000
Annual Operation and Maintenance Cost				5,000

As stated in Capacity Limitations of the DWSRF Policy, funding for fire flow improvements may be eligible if required by the local fire authority. PPHCSD serves unincorporated communities in Phelan and Pinon Hills in San Bernardino County and follows the San Bernardino County Fire Protection District (SBC Fire) for fire flow requirements. The SBC Fire adheres to the 2019 California Fire Code which sets standards for determining fire flow requirements based on the structure building type, building square footage, and whether or not there is an automatic sprinkler system. Fire flow requirements for commercial and institutional land uses are 3,000 gpm with a duration of 3 hours and fire flow requirements for residential land uses are 500 gpm with a duration of 2 hours per the Fire Marshal. In addition, under the Amended DWSRF Policy, Section XI.B.1.h, states "equipment and additional capacity to provide fire protection as required by the applicable governing fire code and incidental appurtenances for fire protection such as fire hydrants" are eligible construction costs. Since these improvements will increase fire flow capacity, these improvements are expected to be eligible for funding.

8.2.3 Water Meters

Water meters within the SCWC system will need to be upgraded from automated meter reading (AMR) to Advanced Metering Infrastructure (AMI) to meet PPHCSD's current meter replacement program. In addition, as an Urban Water Supplier, the consolidated system is required to submit annual water loss audits under the California Water Code Section 10608.34. These meters will allow the consolidated system to remotely read the new meters which will improve water efficiency by monitoring water usage and help detect water leaks. Correspondence with the State noted that DFA will only fund multi-family, schools, and residential water meters. The estimated cost for upgrading these water meters is $875,000. A breakdown of these costs by type can be found in **Table 8-5**.

Table 8-5. Estimated Cost for Water Meters[1]

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Multi-Family	EA	4	500	2,000
Schools	EA	21	500	10,500
Residential	EA	1,051	500	525,500
			Subtotal	538,000
			30% Contingency	161,400
			Construction Cost	699,400
Non-Construction Costs				
Administration, Engineering, CM (25%)				174,850
			Non-Construction Costs	174,850
Total Cost (Rounded)				875,000
Annual Operation and Maintenance Cost				2,000

[1] Cost based on discussion with PPCHSD and SCWC staff 11/2021.

AMI meters are considered a green component as part of water efficiency under DWSRF Handbook Appendix B Part B.2.

The Amended DWSRF Policy, Section XI.B.i., states that the "purchase and installation of water supply meters" is eligible for funding.

8.2.4 SCADA Implementation

It is recommended that SCWC's water system be integrated with PPHCSD SCADA system to provide continuous monitoring capability to ensure uninterrupted operation. To do this, SCADA instrumentation, telemetry, and associated equipment would be required at the wells, storage tanks, and interconnections. The estimated cost for implementing SCADA within SCWC's water system is $1,317,100. A breakdown of the cost is shown in **Table 8-6**, below.

Table 8-6. Estimated Cost for SCADA Implementation

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
SCWC Office Site (Tank 2, 4, and 8) Read tank levels and flow meters	LS	1	75,000	75,000
Interconnections Read flow meters and valve position	EA	7	75,000	525,000
Well 11 New PLC, read well water level	LS	1	7,500	7,500
Tank 3 New Solar Panel System PLC, read flow meters and valve positions	LS	1	112,500	112,500
Tank 6 Read tank levels, flow meters, and valve position	LS	1	15,000	15,000
Well Field (Wells 2A, 3A, 4A, 5, and 8, Tanks 6 and 7) Read tank levels and flow meters	LS	1	75,000	75,000
			Subtotal	810,000
			30% Contingency	243,000
			Construction Cost	1,053,000
Non-Construction Costs				
Administration, Engineering, CM (25%)				263,250
			Non-Construction Costs	263,250
Total Cost (Rounded)				1,317,000
Annual Operation and Maintenance Cost				9,000

Under the Amended DWSRF Policy, Section XI.B.1.I, which states that "Stationary and mobile equipment integral to the project. Equipment must be dedicated to the storage, treatment, or distribution facilities for which it was purchased" are eligible for funding.

8.3 Water Quality

8.3.1 Storage Tanks

As discussed under System Deficiencies, the recommendations for rehabilitating Tanks 2, 3, 4, 5, and 6 to meet AWWA, OSHA, DOSH, and seismic requirements are: install seismic flexible pipe couplings, roof hand railings, and interior ladders, and replace interior linings and exterior coatings. An air-gap should be installed at the tanks at the overflow line and an analysis for sloshing wave and freeboard is recommended. Relining the interior and recoating the exterior of Tank 7 is recommended. Since Tank 8 was built in 2009 and in excellent condition, it is recommended that spot repairs be completed to repair the rafter ends and roof delamination. Rehabilitating the tanks will extend their useful life and bring the storage tanks to local and State standards. It will also provide the water system with a reliable source of water, improve water efficiency, maintain water quality, and maintain pressure in the system. The cost for rehabilitation of the storage tanks for Tanks 2 through 7 is estimated to be $3,465,000. A cost breakdown of rehabilitating the storage tanks can be found in **Table 8-7**. Following the improvements, the estimate useful life for tanks 2 through 6, and tank 7 and 8, is 10 to 15 years and 30+ years, respectively. This estimate is based on the tank inspection report as part of the 2019 PER.

Table 8-7. Estimated Cost for Tank Rehabilitation[1]

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Tank 2 Rehabilitation	LS	1	320,000	320,000
Tank 3 Rehabilitation	LS	1	215,000	215,000
Tank 4 Rehabilitation	LS	1	320,000	320,000
Tank 5 Rehabilitation	LS	1	160,000	160,000
Tank 6 Rehabilitation	LS	1	532,000	532,000
Tank 7 Rehabilitation	LS	1	585,000	585,000
			Subtotal	2,132,000
			30% Contingency	639,600
			Construction Cost	2,771,600
Non-Construction Costs				
Administration, Engineering, CM (25%)				692,900
			Non-Construction Costs	692,900
Total Cost (Rounded)				3,465,000
Annual Operation and Maintenance Cost				23,000

[1] Cost estimated from AMP Report, dated December 2020 and includes a 3% escalation/year.

Rehabilitating storage tanks to reduce water loss are considered a green component as part of water efficiency under DWSRF Handbook Appendix B Part B.2.

Under the Amended DWSRF Policy, Section XI.B.1.h, states "equipment and additional capacity to provide fire protection as required by the applicable governing fire code and incidental appurtenances for fire protection such as fire hydrants" are eligible construction costs. Rehabilitating the tanks will help ensure to maintain pressure during fire flow scenarios.

In addition, under the Policy for Developing the Fund Expenditure Plan for the Safe and Affordable Drinking Water Fund (SAFER), Section VIII.B.1.1, states that it may pay for "any additional infrastructure needed by the larger system in order to consolidate the smaller system to ensure existing customers are not impacted by the consolidation". Rehabilitating the existing storage tanks will help ensure that PPHCSD's existing water quality will be maintained to PPHCSD's customers.

The WIIN Grant Section IV, states that rehabilitation of existing structures to continue to maintain compliance and protect public health are eligible for funding.

8.3.2 Blow Offs/Flushing Hydrants

To prevent stagnant water, which can lead to bacterial growth and poor tasting water, blow-offs or flushing hydrants should be installed at dead ends. Adding blow-offs/flushing hydrants at dead ends will help improve water quality, redundancy, and pressure within the system. The estimated cost of installing 27 blow-offs/flushing hydrants is estimated to be $132,000, including a 30% contingency. A cost breakdown for installing blow offs/flushing hydrants can be found in **Table 8-8**. The estimated useful life for the blow offs/flushing hydrants is 35 – 40 years, as outline in the AMP and 2019 PER.

Table 8-8. Estimated Cost for Blow-off Valves/Flushing Hydrants[1]

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Blow-off Valves/Flushing Hydrants	EA	27	3,000	81,000
			Subtotal	81,000
			30% Contingency	24,300
			Construction Cost	105,300
Non-Construction Costs				
Administration, Engineering, CM (25%)				26,325
			Non-Construction Costs	26,325
Total Cost (Rounded)				132,000
Annual Operation and Maintenance Cost				400

[1] Cost based on recent construction costs.

These improvements are eligible for funding under Section VIII.B.1.1 of SAFER, which states that it may pay for "any additional infrastructure needed by the larger system in order to consolidate the smaller system to ensure existing customers are not impacted by the consolidation". In addition, under the WIIN Grant Section IV, installation of appurtenances to improve water pressure to safe levels are eligible for funding.

8.3.3 Cross Connections

To prevent contamination or pollutants from entering the potable water system, it is important that backflow devices be installed at cross connections. As reported in the Cross Connection Study, recommendations for preventing cross contamination were based on complying with Title 17 California Code of Regulations Related to Drinking Water and Title 24 Part 5 of the California Plumbing Code. Backflow devices are owned and operated by the private resident and initial correspondence with the State noted that DFA typically does not fund non-residential backflow preventors. However, a summary of the backflow devices and estimated costs for residential connections are shown in **Table 8-9** and may be eligible for State funding. The estimated cost for residential backflow device is $68,000. A breakdown of the cost for installing backflow devices can be found in **Table 8-9**.

Table 8-9. Estimated Cost for Backflow Preventors[1]

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Multiple Dwelling				
1" Reduced Pressure Principle Backflow Prevention Assembly	EA	1	1,500	1,500
Multiple Services				
1" Reduced Pressure Principle Backflow Prevention Assembly	EA	11	1,500	16,500
2" Reduced Pressure Principle Backflow Prevention Assembly	EA	1	3,000	3,000
Single Dwelling				
1" Double Check Valve Backflow Prevention Assembly	EA	11	1,200	13,200
2" Double Check Valve Backflow Prevention Assembly	EA	2	3,000	6,000
1" Reduced Pressure Principle Backflow Prevention Assembly	EA	1	1,500	1,500
			Subtotal	41,700
			30% Contingency	12,510
			Construction Cost	54,210
Non-Construction Costs				
Administration, Engineering, CM (25%)				13,553
			Non-Construction Costs	13,553
Total Cost (Rounded)				68,000
Annual Operation and Maintenance Cost				1,000

[1] Cost estimated from vendors, dated January 2022.

A letter was sent out by SCWC in November 2021 requiring owners to install the required backflow device was sent out. SAFER Section VIII.B.1.1, states that it may pay for any additional infrastructure needed by the larger system in order to consolidate the smaller system to ensure existing customers are not impacted by the consolidation". In addition, the WIIN Grant Section IV states that installation of appurtenances to prevent contamination cause by non-potable liquids entering the system through leaks or pipe breaks are eligible for funding.

8.3.4 Tunnel Improvements

As described in the Tunnel Inspection Report and mentioned above, improvements to the tunnel include repairing the manway shaft for safe entry, secure loose lagging on the utility side of the shaft, provide ventilation piping for significant work within the tunnel, improve access road, and secure the entrance, alarm system, and manway cover. Tunnel improvements are needed to improve safety and to maintain an existing water source. The tunnel is part of SCWC existing water system and will be consolidated with PPHCSD. The estimated cost for improvements to the tunnel is $212,000. A breakdown of these costs can be found in **Table 8-10**, below.

Table 8-10. Estimated Cost for Tunnel Improvements

Construction Cost	Unit	Quantity	Unit Cost, $	Total Cost, $
Access Road Improvements	SF	8,000	10	80,000
Secure entrance, alarm system, and manway cover	LS	1	20,000	20,000
Manway Shaft Improvements	LS	1	30,000	30,000
			Subtotal	130,000
			30% Contingency	39,000
			Construction Cost	169,000
Non-Construction Costs				
Administration, Engineering, CM (25%)				42,250
			Non-Construction Costs	42,250
Total Cost (Rounded)				212,000
Annual Operation and Maintenance Cost				27,800

Improvements to the tunnel will extend its useful life, protect the water source, and increase the safety when access to the tunnel is required. It will also provide the water system with a reliable source of water. Since this improvement is part of water sources, they are eligible for funding under the Amended DWSRF Policy, Section XI.B.1.b, which states “water sources, if necessary to comply with state or federal drinking water standards, including drilling costs, equipment, structures to protect the quality of source water, and purchase of source capacity in another water system” are eligible construction costs.

9.0 SUMMARY OF RECOMMENDED IMPROVEMENTS

Based on the recommended improvements described above, the total preliminary estimated opinion of construction cost and non-construction cost for improvements to SCWC’s water system, including a 30% contingency, is approximately $35,439,000 and includes the total cost for purchasing SCWC’s Water Rights estimated at $13,030,000. This preliminary estimated cost differs from the 2019 PER consolidated estimated cost ($7.3 million) because the 2019 PER does not include SCWC’s water rights and the additional identified infrastructure needs based on the investigations conducted after consolidation was agreed upon between PPCHSD and SCWC. In addition, material and construction costs have increased. A summary of the proposed improvements is presented in **Table 9-1**.

Table 9-1. Estimated Cost for Proposed Improvements

Description	Total Construction Cost[2], $	Non-Construction Cost, $	Total Cost (Rounded), $	Annual O&M Cost, $
Water Rights[1]	N/A	13,030,000	13,030,000	N/A
New Supply Well[2,3]	4,935,500	1,390,125	6,326,000	97,000
Well Rehabilitation[2,3]	507,000	126,750	634,000	40,000
Water System Interconnections[2]	2,307,500	576,875	2,885,000	4,000
Fire Flow Improvements[2]	5,195,500	1,298,875	6,495,000	5,000
Advanced Metering Infrastructure[2,3]	699,400	174,850	875,000	2,000
SCADA Implementation	1,053,000	263,250	1,317,000	9,000
Storage Tank Improvements[2,4]	2,771,600	692,900	3,465,000	23,000
Blow-off Valves/Flushing Hydrants[2,3]	105,300	26,325	132,000	400
Cross Connection Improvements[2,5]	54,210	13,553	68,000	1,000
Water Tunnel Improvements[2]	169,000	42,250	212,000	27,800
Total	17,798,010	17,635,753	35,439,000	209,200

[1] Total cost based on appraisal conducted in 2019 by Valuation Source.
[2] Cost includes 30% contingency.
[3] Cost based on recent construction costs.
[4] Cost based on AMP Report dated December 2020 and includes a 3% escalation/year.
[5] Cost based on vendor quotes dated January 2022.

As outlined in LAFCO 3187 County Service, Review for Water (Wholesale, Retail, Recycled), dated July 18, 2017 (Appendix N), SCWC's service area is within the boundaries and sphere of influence of PPHCSD, and therefore, there is no jurisdictional change.

As part of the consolidation agreement, SCWC will dissolve and PPHCSD will remain. The Supplemental Information Form for Consolidation will be completed by both parties once a decision is made by the State to fund the project. In addition, SCWC is a private shareholder owned water company. There are approximately 8,000 shares in the company and are held by approximately 1,400 shareholders. It is assumed that the water rights will be purchased from the shareholders based on an appraisal conducted in 2019 by Valuation Source for SCWC.

FIGURES

Legend

- SCWC Reservoir
- Tunnel
- SCWC Well
- SCWC Water Main
- PPHCSD Reservoir
- PPHCSD Pump
- PPHCSD Well
- PPHCSD Water Mains
- PPHCSD Water Service Boundary
- Parcel

N

3,500 1,750 0 3,500 Feet

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AR6214-A SCWC Water Consolidation Project

Existing SCWC System

Figure 3-1

Legend

- Proposed Interconnect
- Existing Interconnect
- SCWC Reservoir
- SCWC Well
- SCWC Water Main
- PPHCSD Reservoir
- PPHCSD Pump
- PPHCSD Well
- PPHCSD Water Mains
- PPHCSD Water Service Boundary
- Parcel

N

3,500 1,750 0 3,500 Feet

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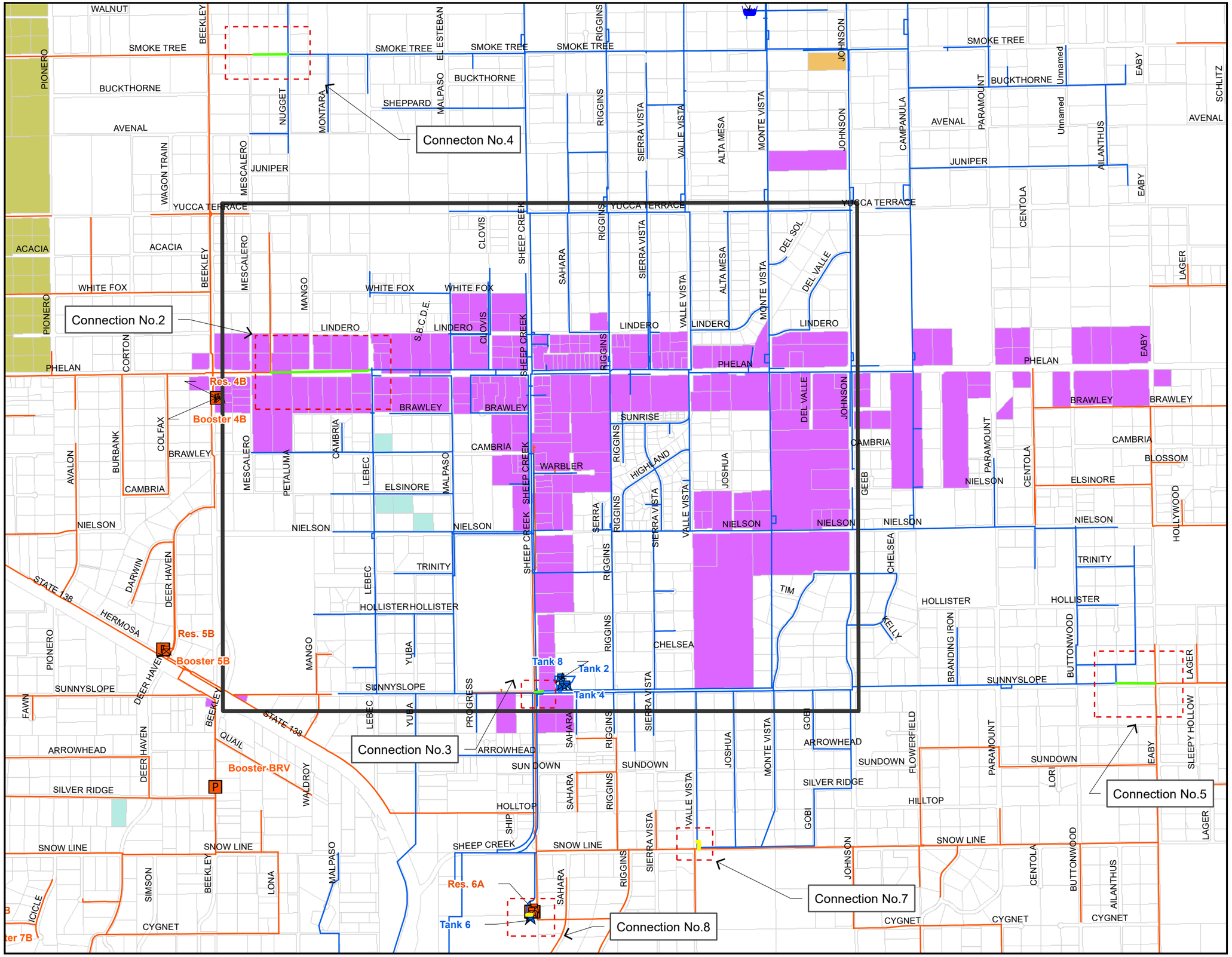
AR6214-A SCWC Water Consolidation Project

Proposed Consolidaton Interconnections

Figure 6-1



Legend

- Fire Flow Study Area
- Proposed Interconnect
- Existing Interconnect
- SCWC Reservoir
- SCWC Well
- SCWC Water Main
- PPHCSD Reservoir
- PPHCSD Pump
- PPHCSD Well
- PPHCSD Water Mains

Land Use Type

- AGRICULTURAL
- COMMERCIAL
- INDUSTRIAL
- PUBLIC FACILITIES
- SINGLE FAMILY RESIDENTIAL

N

1,500 750 0 1,500 Feet

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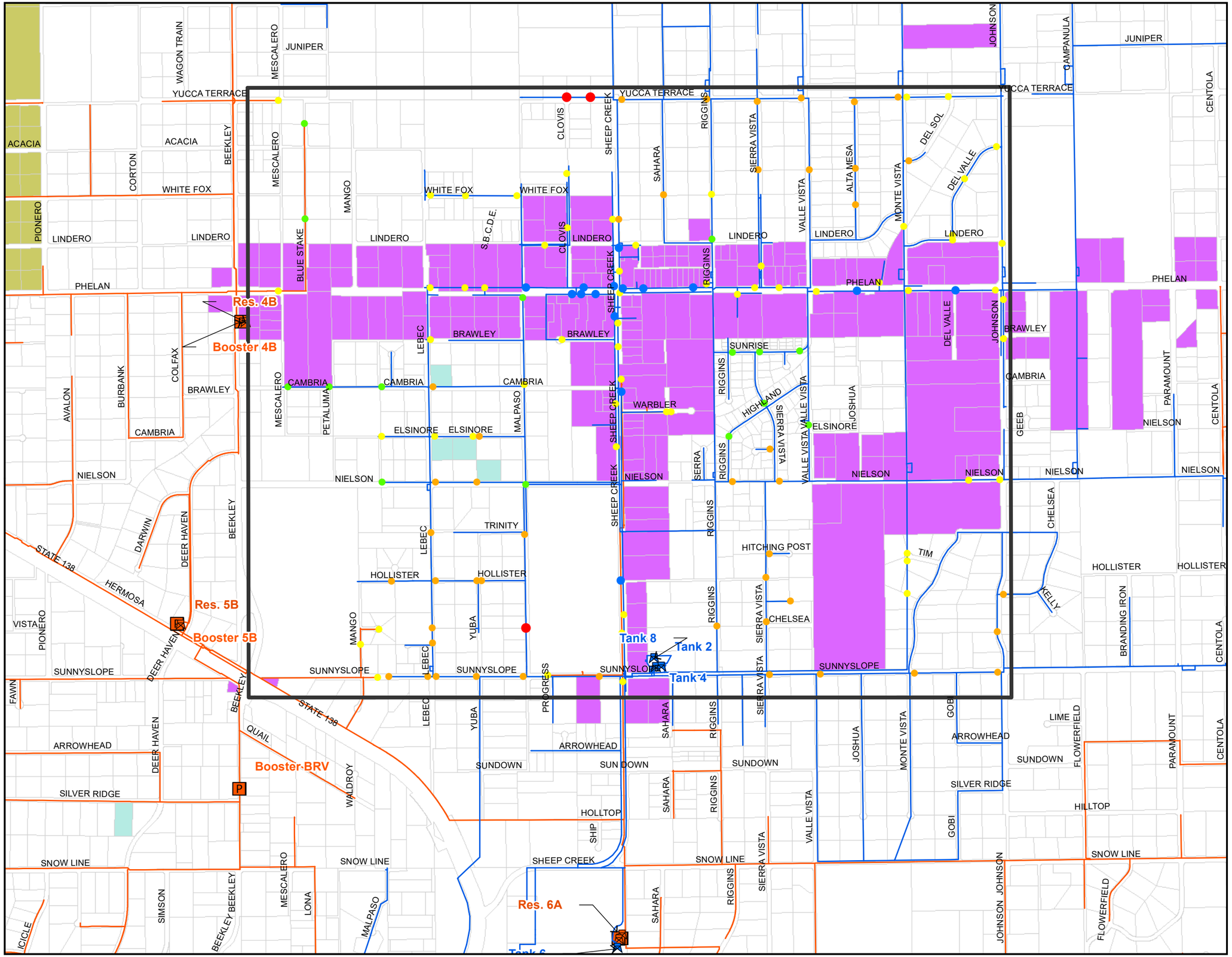
Office of Water Programs, Sacramento State University
AR6214-A SCWC Water Consolidation Project

Fire Flow Study Area

Figure 6-2



Legend

Available Fire Flow under MDD with Min. Residual Pressure of 20 psi or Max. Velocity of 15 fps

- Less than 500 gpm
- 500 - 1000 gpm
- 1000 - 1500 gpm
- 1500 - 2999 gpm
- 3000 gpm and greater
- Fire Flow Study Area
- SCWC Reservoir
- SCWC Water Main
- PPHCSD Reservoir
- PPHCSD Pump
- PPHCSD Well
- PPHCSD Water Mains

Land Use Type

- AGRICULTURAL
- COMMERCIAL
- INDUSTRIAL
- SINGLE FAMILY RESIDENTIAL

N

1,500 750 0 Feet

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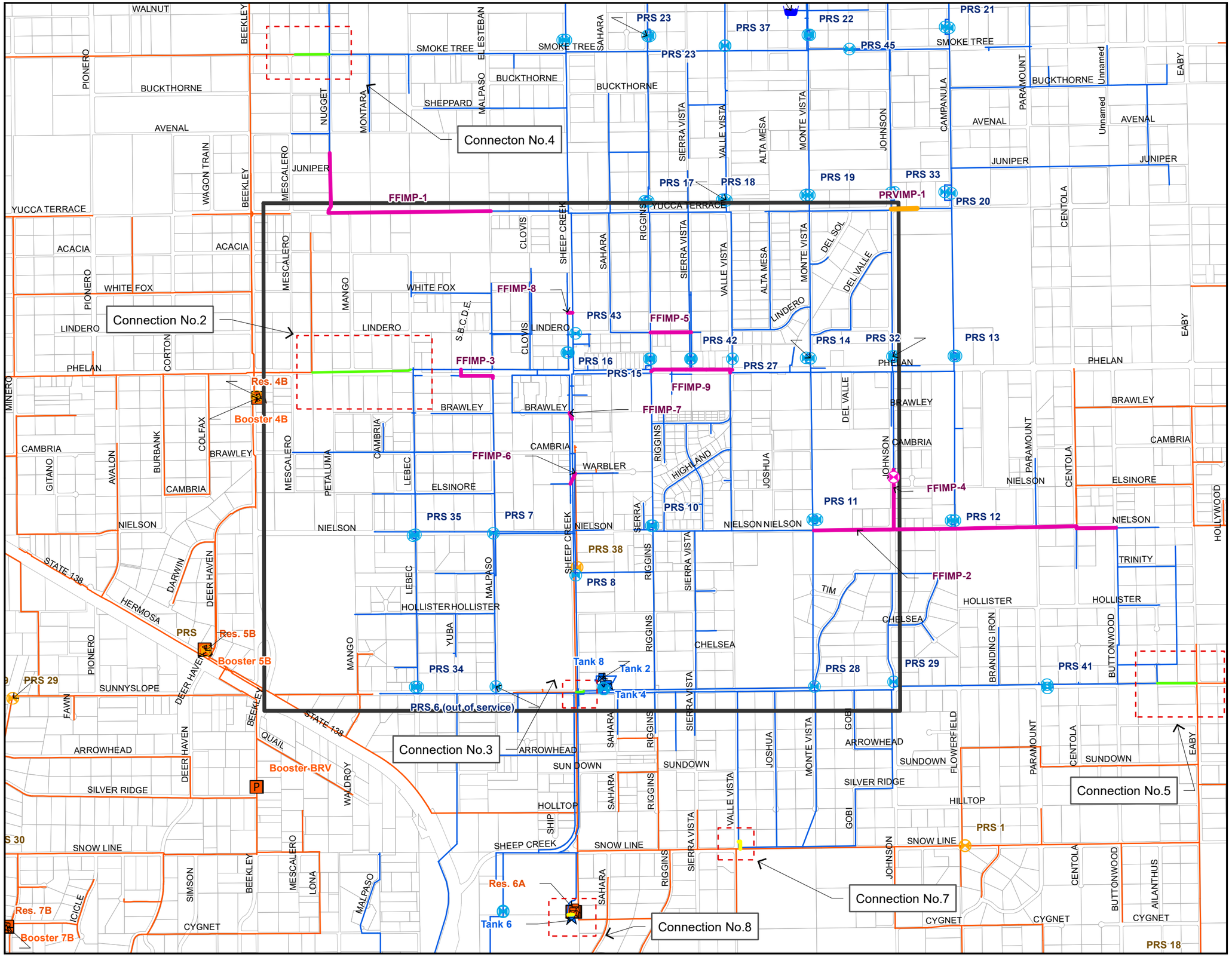
AR6214-A SCWC Water Consolidation Project

Fire Flow Analysis Results for Existing/Pre-Consolidaton Systems

Figure 6-3



Legend

- Proposed PRV
- Improvement Recommended for FF Analysis
- Improvement recommended for PRV Analysis
- Proposed Interconnect
- Existing Interconnect
- SCWC PRS
- SCWC Reservoir
- SCWC Well
- SCWC Water Main
- PPHCSD PRS
- PPHCSD Reservoir
- PPHCSD Pump
- PPHCSD Well
- PPHCSD Water Mains
- Parcel
- Fire Flow Study Area

N

1,500 750 0 1,500 Feet

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Office of Water Programs, Sacramento State University
AR6214-A SCWC Water Consolidation Project

Proposed Improvements

Figure 6-4

APPENDIX

APPENDIX A Compliance Order No. 05-13-18R-002

APPENDIX B Response to Corrective Action Plan for Compliance Order No. 05-13-18R-002

APPENDIX C Final Feasibility Report Addressing Water Source Capacity Issues

APPENDIX D Safe Drinking Water State Revolving Fund Applicant Engineering Report

APPENDIX E Asset Management Plan

APPENDIX F Technical Analysis of Water Rights

APPENDIX G Sheep Creek Water Company Water Rights

APPENDIX H Sheep Creek Fire Hydrant Testing

APPENDIX I Fire Flow Improvement Projects

APPENDIX J Sheep Creek Water Tunnel Access & Reconnaissance Summary

APPENDIX K Sheep Creek Water Company External Site Surveys

APPENDIX L Water Infrastructure Improvements for the Nation (WIIN) Grant: Small, Underserved, and Disadvantaged Communities (SUDC) Grant Program Implementation Document Updated for FY2021

APPENDIX M Potential Well Sites

APPENDIX N Relevant page from LAFCO 3187 County Service, Review for Water (Wholesale, Retail, Recycled)

APPENDIX A Compliance Order No. 05-13-18R-002

UNDER SEPARATE COVER

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UNDER SEPARATE COVER

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UNDER SEPARATE COVER

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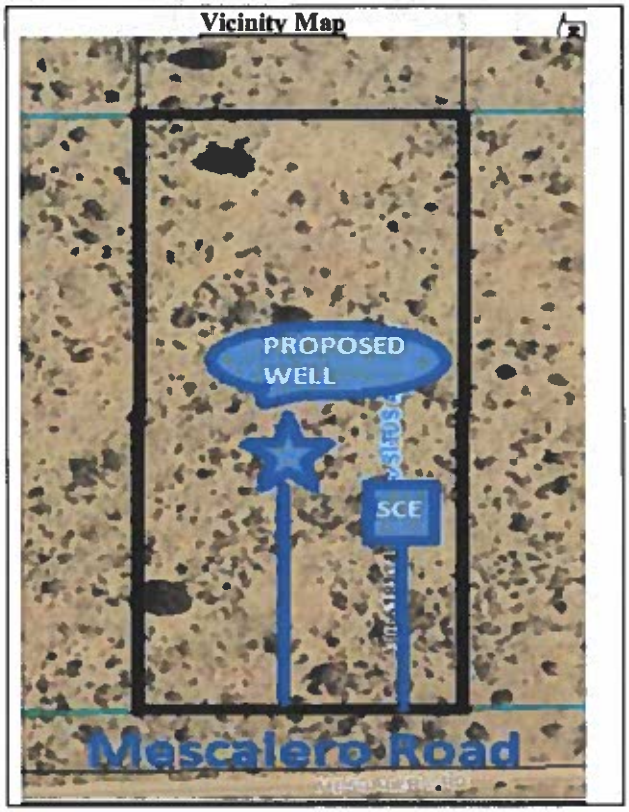
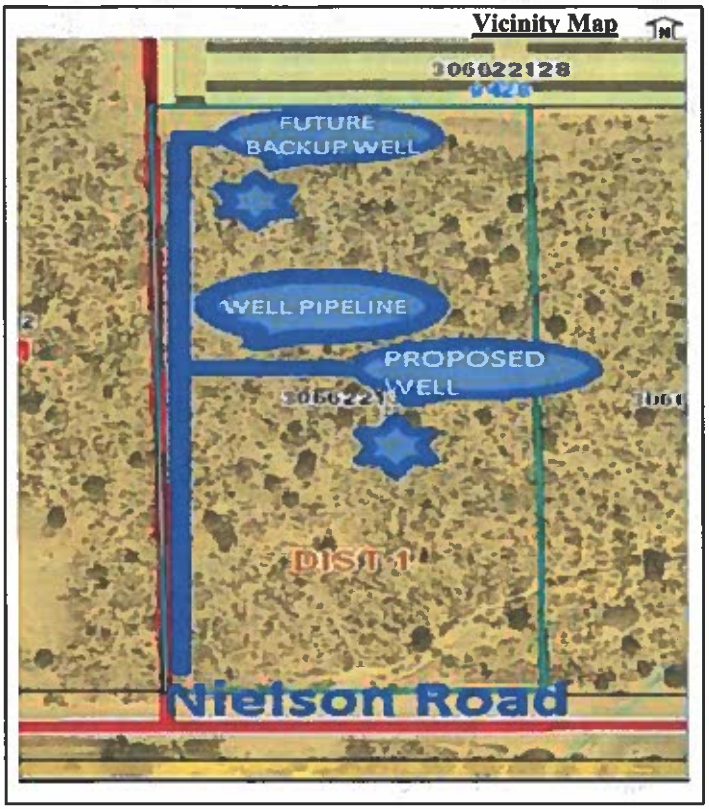
Proposed Project Sites





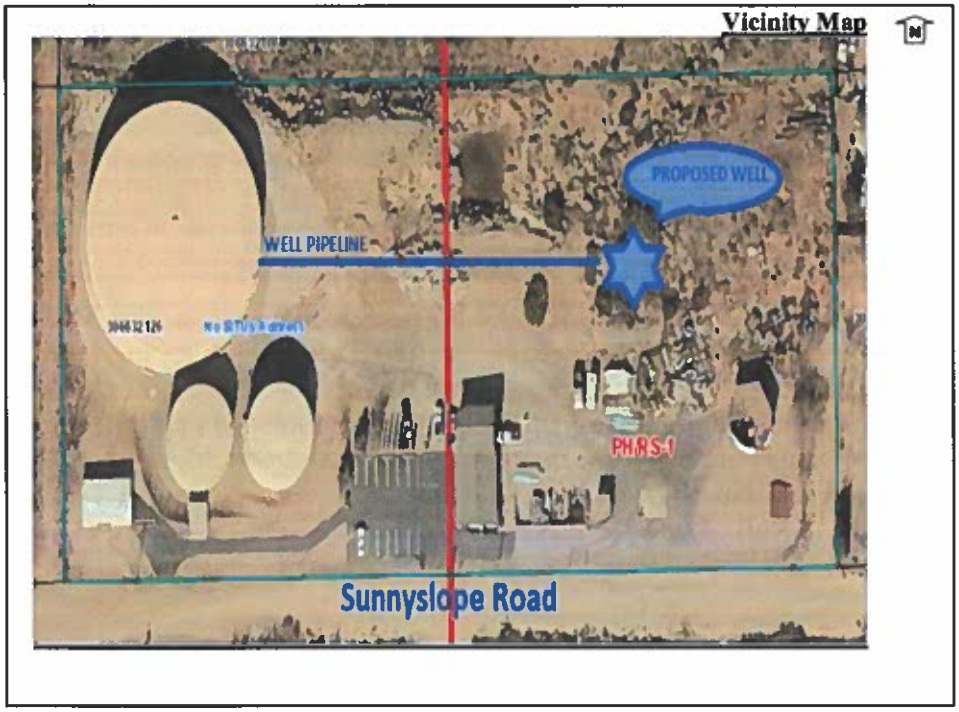


FIGURE 3

Tom Dodson & Associates
Environmental Consultants

Well 16 Site Location Map

The full documents can be found at the following links:

Sheep Creek Water Company Six Underground Water Wells

https://ceqanet.opr.ca.gov/Project/2020070042

Phelan Pinon Hills Community Services District Wells No. 15 and 16 Development Project
https://ceqanet.opr.ca.gov/2022030213

APPENDIX N Relevant page from LAFCO 3187 County Service, Review for Water (Wholesale, Retail, Recycled)

UNDER SEPARATE COVER