

### ENGINEERING REPORT

### PLUMAS-EUREKA COMMUNITY SERVICES DISTRICT

### SECONDARY CONTAMINANT WAIVER

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**Date:** March 2, 2020

**Subject:** Removal of Iron and Manganese



#### 1.0 PURPOSE

The purpose of this Engineering Report (Report) is to meet requirements of Title 22, Section 64449.2 of the California Code of Regulations (CCR) addressing Waivers for Secondary Maximum Contaminant Level (MCL) Compliance. This section allows a community water system to apply for a nine-year waiver of a secondary MCL if the average of four consecutive samples for the constituent is not greater than three times the secondary MCL. To apply for a waiver of a secondary MCL, the community water system must conduct a study (referred to herein as the “Customer Acceptance Study”) which includes:

- A water system complaint log along with any other evidence of customer dissatisfaction;
- An engineering report;
- The results of a customer survey; and
- A brief report summarizing a public meeting.

Per section 64449.2, this Report is required to “evaluate all reasonable alternatives and costs for bringing the water system into MCL compliance and include a recommendation for the most cost-effective and feasible approach.”

#### 1.1 BACKGROUND

The Plumas Eureka Community Services District (District) is located in the vicinity of Blairsdon and Graeagle in Plumas County. The District’s water system serves approximately 650 connections. On September 25, 2019, Division of Drinking Water (Division) staff conducted an inspection of the water system. The resulting Sanitary Survey Annual Inspection Report (Sanitary Survey) identified that the water supplied by the District’s wells does not meet the secondary standards for iron and manganese (0.3 milligrams per liter (mg/L) and 0.05 mg/L, respectively). The Sanitary Survey stated that either a compliance plan to address the secondary MCL exceedances or a Customer Acceptance Study must be submitted to the Division by October 31, 2020. At its January 8, 2020 meeting, the District Board determined to proceed with the Customer Acceptance Study and approved Farr West Engineering (Farr West) to prepare this Report. This Report relies on other studies and reports prepared by Farr West for the District within the last three years:

- Arsenic Mitigation Feasibility Study (June 2017),
- The Plumas Eureka Community Services District – Final Technical Design Report (June 22, 2018),

- Summary Report – Water, Wastewater and Fire Protection System Rate Study (April 30, 2018).

## 2.0 ALTERNATIVES ANALYSIS

Farr West completed an Arsenic Mitigation Feasibility Study<sup>1</sup> in June 2017 (Feasibility Study). The Feasibility Study analyzed six alternatives for arsenic contamination mitigation. Although the District has been able to meet the arsenic MCL through blending the water from its two supply wells, the alternatives included in the Feasibility Study also considered removal of iron and manganese in project alternatives. However, because the Feasibility Study focused on arsenic mitigation, additional treatment options were not considered which would only result in removal of iron and manganese.

As part of the Feasibility Study, pilot testing of the District’s water identified the type of treatment required to remove arsenic, iron, and manganese. It also found the iron in the District’s water supply is colloidal iron which is comprised of extremely fine particles of ferric iron which have combined with organic matter. This form of iron is the most difficult form of iron to remove, so options such as sequestration, ion exchange, and oxidizing filters are not viable options.

## 2.1 ALTERNATIVE SELECTION

The Feasibility Study identified a water treatment plant (WTP) with a dual-stage process of oxidation/filtration and adsorption polishing as the most effective contaminant removal alternative which will remove arsenic, iron, and manganese. Based on this determination, a total of 13 WTP locations were evaluated, and Farr West recommended design and construction of the WTP at the existing garage at the District office.

Following the selection of this alternative, Farr West completed an engineering design of the WTP. Technical design decisions were documented in a memorandum titled “PECSD WTP – Final Technical Design Report<sup>2</sup>,” dated June 22, 2018 (Design Report). After preparation of the Design Report, construction drawings were prepared. The following summarizes key design parameters and components.

- Treatment capacity based on maximum day demand of 350 gallons per minute (gpm).
- Transmission main from supply wells to the WTP including booster pump.
- Two-stage treatment train including coagulation with ferric chloride, pH adjustment with hydrochloric acid, oxidation with sodium hypochlorite, and adsorptive polishing.
- Backwash and waste discharge to sewer system.
- Building design and construction configured to accommodate future improvements.
- Design and configuration of the mechanical, electrical, control, and instrumentation components.

## 2.2 COST OF PREFERRED ALTERNATIVE

Initial design of the WTP resulted in a cost estimate of \$3.2 million for construction of the facility. In addition to the construction costs, annual operations and maintenance (O&M) must also be considered to estimate the financial impact of WTP construction and operation. Appendix B of the Feasibility Study includes life-cycle cost analyses which estimate annual costs. For the preferred alternative, annual O&M costs (i.e., power, labor, chemicals, solids disposal) were estimated to be about \$48,000 per year, and replacement costs for filter media and chemical pumps averaged \$35,000 per year based on a 20-year life cycle.

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<sup>1</sup> The Arsenic Mitigation Feasibility Study is available on the District’s website at: <https://www.pecsd.org/arsenic-remediation-project>

<sup>2</sup> The PECSD WTP – Final Technical Design Report is available on the District’s website at: <https://www.pecsd.org/water-system-sustainability-and-compliance>

The District determined that user rates would need to be increased to pay for construction of the WTP and fund ongoing O&M costs. Farr West completed a rate study which is summarized in the memorandum titled "Summary Report – Water, Wastewater and Fire Protection System Rate Study<sup>3</sup>," dated April 30, 2018 (Rate Study). At the time of the rate study, the District still intended to build the WTP to comply with the arsenic MCL. Assumptions for costs associated with the WTP were:

- A \$350,000 planning loan to be repaid over five years for design of the WTP;
- A \$3.2 million construction loan to be repaid over 20 years for construction of the WTP; and
- An additional \$83,000 per year for WTP O&M.

The rate study also included a cost of service analysis which distributed water system expenses to customer classes differently than before. Table 1 summarizes the water rates which were adopted by the District Board of Directors on June 27, 2018. These user rates were designed to cover the costs of the WTP as described above.

**Table 1: Monthly Rates for Fiscal Years 2017 – 2023<sup>i</sup>**

Customer Class	2017	2018	2019	2020	2021	2022	2023
Water - Developed [PEE, ESS, VAPP] <sup>ii</sup>	\$48.75	\$50.62	\$94.14	\$101.90	\$102.37	\$102.37	\$114.52
Water - Undeveloped [PEE, VAPP]	\$15.00	\$24.69	\$54.89	\$61.59	\$61.59	\$61.59	\$70.87
Water - Undeveloped [ESS]	\$27.50	\$24.69	\$54.89	\$61.59	\$61.59	\$61.59	\$70.87
Villas HOA #6 - Bulk Irrigation 2"	\$125.42	\$198.87	\$420.30	\$435.42	\$435.42	\$435.42	\$493.75
Villas HOA #6 - Water Developed	\$48.75	\$50.62	\$94.14	\$101.90	\$102.37	\$102.37	\$114.52
Villas HOA #7 - Bulk Irrigation 2"	\$125.42	\$198.87	\$420.30	\$435.42	\$435.42	\$435.42	\$493.75
Villas HOA #7 - Bulk Irrigation 1"	\$48.75	\$73.43	\$144.32	\$153.21	\$153.54	\$153.54	\$172.86
VAPP Water - Undeveloped	\$15.00	\$24.69	\$54.89	\$61.59	\$61.59	\$61.59	\$70.87
Golf Course - Water Developed	\$48.75	\$50.62	\$94.14	\$101.90	\$102.37	\$102.37	\$114.52
Swimming Pool - Water Developed 1"	\$48.75	\$50.62	\$94.14	\$101.90	\$102.37	\$102.37	\$114.52

<sup>i</sup> This table summarizes information presented in the table on Page 16 of the Rate Study.

<sup>ii</sup> PEE = Plumas Eureka Estates; ESS = Eureka Springs Subdivision; VAPP = Village at Plumas Pines.

Design of the WTP and preparation of the construction drawings also included an update to the cost estimate for construction of the WTP. The cost estimate was able to be more accurate because additional construction details were known. The updated estimate to construct the WTP was \$3.5 million; however, this cost estimate was prepared after completion of the rate study.

<sup>3</sup> The Summary Report – Water, Wastewater and Fire Protection System Rate Study is available on the District's website at: <https://www.pccsd.org/pccsd-rates-2019-2020>

### 3.0 UPDATES TO ALTERNATIVE DESIGN AND COST

The documents referenced in this Report were completed in 2017 and 2018 and were focused on the removal of arsenic from the treated water supply. At the time of the original design, sodium hypochlorite was identified as the most appropriate oxidant for arsenic removal; however, hydrogen peroxide has been identified as a more effective chemical for removal of colloidal iron. Hydrogen peroxide is a more expensive chemical to add for water treatment. Farr West reviewed the cost difference associated with hydrogen peroxide as compared to sodium hypochlorite and estimated that the additional cost would be approximately \$1.92 per customer per month.

Construction costs have increased since the final cost estimate for the WTP was prepared. Based on the updated design cost estimate and the Engineering News and Review Construction Cost index, the cost is now estimated to be \$3.6 million instead of \$3.2 million which was assumed at the time of the Rate Study. Assuming a 20-year construction loan with a 2% interest rate, the estimated additional cost would be approximately \$3.23 per customer per month.

Based on this information, construction and operation of the WTP would result in an additional expense of at least \$5.16 per customer per month. The District may need to evaluate whether or not to increase the customer rates as compared to those presented in Table 1 to ensure adequate revenues to cover the additional debt expense.

### 4.0 CONCLUSION

Construction of the recommended WTP, capable of removing iron and manganese to below the secondary MCL, will cost approximately \$3.6 million and may result in an additional monthly rate increase. Considering the current developed residential customer rate and the additional expenses described above, the cost of construction and operation of the WTP is approximately \$56.44 per month.