Preliminary Engineering Report

Mendocino City Community Services District Wastewater Treatment Facilities Improvements and Recycled Water System Expansion

Prepared for:

Mendocino City Community Services District

SHN Engineers & Geologists

335 South Main Street
Willits, CA 95490-3977
707-459-4918

April 2017
416076

CONSULTING ENGINEERS & GEOLOGISTS, INC.

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Reference: 416076

April 28, 2017

Mr. Mike Kelley
Mendocino City Community Services District
P.O. Box 1029
Mendocino, CA 95460

Subject: **Preliminary Engineering Report for Wastewater Treatment Facilities Improvements and Recycled Water System Expansion Project**

Dear Mr. Kelley:

Attached is the preliminary engineering report for the Mendocino City Community Services District wastewater improvements projects and recycled water system expansion. This report is formatted to meet the funding application requirements of the United States Department of Agriculture Rural Development program (USDARD). This report provides estimated debt service budgets for the proposed projects assuming 100% loan financing as required by USDARD. Grant funding to offset loan obligations is determined on a case-by-case basis by USDARD. This report also provides preliminary engineering plans, costs, and design criteria for the proposed projects, including expanding the recycled water distribution system, installing a new onsite hypochlorite generation system, installing a new recycled water chlorine contact chamber and 50,000-gallon underground storage tank, constructing a new storage and equipment building on top of the underground storage tank, rehabilitating the sludge drying beds, replacing the filter backwash controls, and replacing the ocean discharge equalization basin liner. This report focuses on these ancillary unit operations; it is not intended as a full facilities plan for the wastewater collection, treatment, and recycling systems.

Sincerely,

SHN Engineers & Geologists

Thomas M. Herman, PLS
Regional Principal

Thomas A. Hunt, PE
Senior Civil Engineer

TMH:TAH/CRS:lms

Enclosures: Preliminary Engineering Report

c. w/Encl: Mike Kelly, MCCSD

Reference: 416076

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Abbreviations and Acronyms

gal	gallon
gpd	gallons per day
gpm	gallons per minute
gpm/sf	gallons per minute per square foot of filter surface area
hp	horsepower
lbs	pounds
LF	linear feet
LS	lump sum
min-mg/L	minute milligram per liter
MGD	million gallons per day
mg/L	milligrams per liter
ml/L	milliliters per liter
MPN/100 ml	most probable number per 100 milliliters
NTU	nephelometric turbidity units
psi	pounds per square foot
sf	square feet
ug/L	micrograms per liter

AAF	average annual flow
AC	asbestos-cement
ADWF	average dry weather flow
AWWF	average wet weather flow
BOD	Board of Directors/ biochemical oxygen demand
C/O	clean out
CCR	California Code of Regulations
CDP	Census Designated Place
CEQA	California Environmental Quality Act
CIP	capital improvement program
CIWQS	California Integrated Water Quality System
CT	chlorine residual concentration and contact time
DDW	Division of Drinking Water
EDU	equivalent dwelling unit
EFF-#	effluent sample-number
EPA	U.S. Environmental Protection Agency
ESD	equivalent single-family dwelling
FAC	free available chlorine
FOG	fats, oil, and grease
hr	Hills Ranch
I/I	infiltration and inflow
INF-#	influent sample-number
MCCSD	Mendocino City Community Services District
MH	manhole
MHI	median household income
MMDWF	maximum month dry weather flow
MMWWF	maximum month wet weather flow
MOS	mixed oxidant solution
MOU	memorandum of understanding
MUSD	Mendocino Unified School District
NA	not applicable
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NR	no reference
O&M	operations and maintenance
OIT	operator interface terminal
P/A	present worth (annual)
PDF	peak day flow
P/F	present worth (future)
PER	preliminary engineering report
PIF	peak instantaneous flow
PLC	programmable logic controller
PVC	polyvinyl chloride
PW	plant water
P.W.	present worth
RD	rural development
REC-#	recycled water sample-number
ROW	right-of-way
RWQCB	North Coast Regional Water Quality Control Board
SHN	SHN Engineers & Geologists
SSO	sanitary sewer overflow
SWRCB	State Water Resources Control Board
TSS	total suspended solids
USDA	U.S. Department of Agriculture
UV	ultraviolet
WDR	Waste Discharge Requirement
WWTF	wastewater treatment facility

Part 1 Project Planning

a) Location

The town of Mendocino is located on a scenic headland in northern California surrounded by the Pacific Ocean, approximately 10 miles south of the city of Fort Bragg in Mendocino County (Figure 1). An aerial map of the community identifying the locations of the wastewater treatment facility (WWTF) and recycled water application area is included as Figure 2. The Mendocino City Community Services District (MCCSD) is an independent special district of the State of California which serves the town of Mendocino.

b) Environmental Resources Present

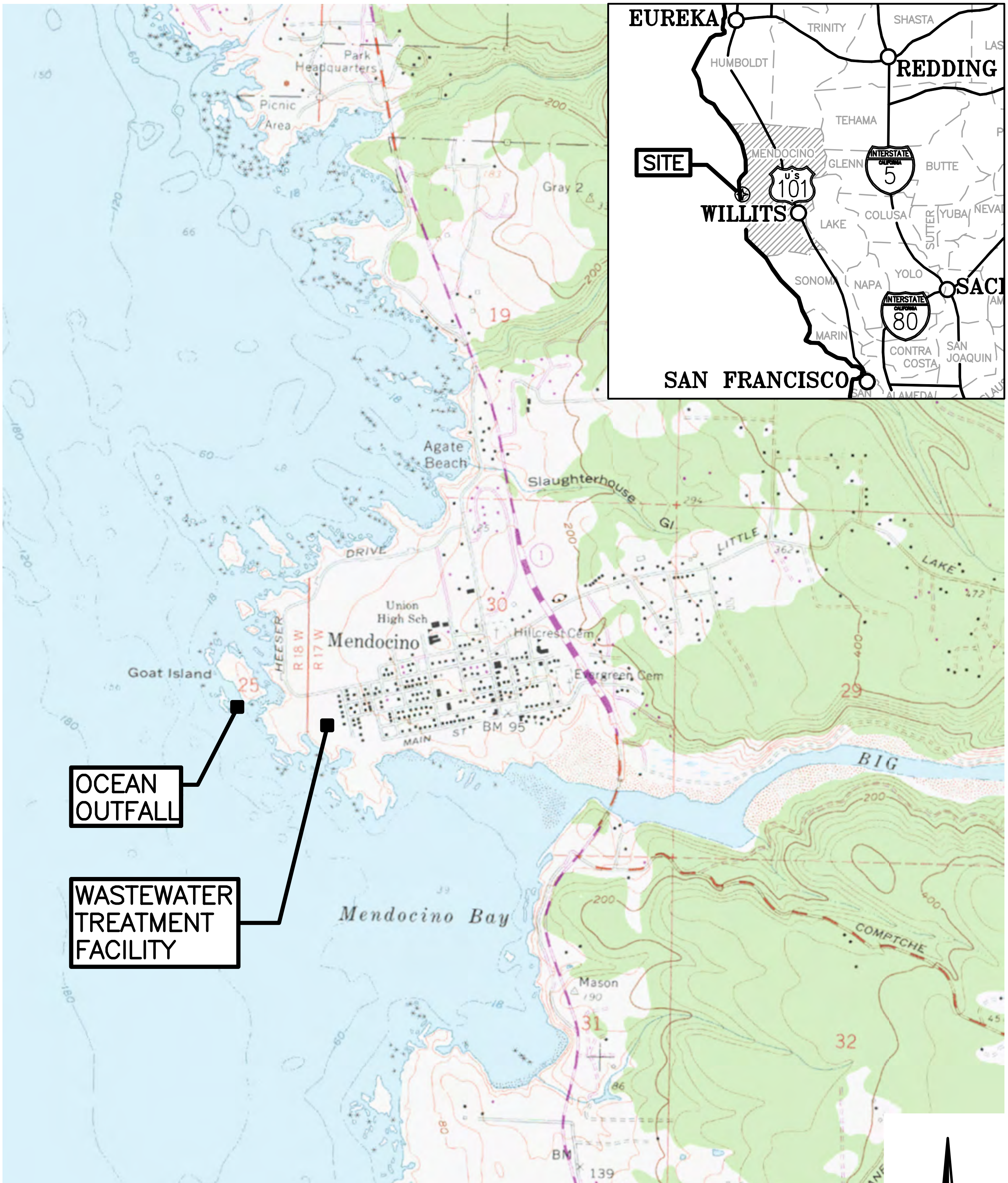
The WWTF is situated at an existing developed site located at the western edge of the residential area of the town of Mendocino. It is surrounded by fields with several pedestrian trails associated with the Mendocino Headlands State Park. The vegetative habitat within the WWTF is comprised of an assortment of grasses, which are mowed on a regular basis and kept close to the ground. There are no trees within the WWTF site. MCCSD vehicle traffic and parking occur within the WWTF site. Vegetation habitat along the proposed pipeline development route varies, but ground disturbing activities associated with pipe development will be primarily confined to areas covered by paved roadways. The project site does not contain any wetland areas.

National Environmental Policy Act (NEPA) compliance (pending) is anticipated to consist of a Categorical Exclusion through U.S. Department of Agriculture (USDA), using Rural Development (RD) Form 1970-B, Exhibit C. California Environmental Quality Act (CEQA) compliance (pending) is anticipated to consist of a Categorical Exemption, to be filed by MCCSD as the CEQA lead agency. Because proposed ground disturbing activities have some potential to impact biological and/or cultural resources, biological and cultural resource studies are being completed as part of the CEQA and NEPA documentation. These reports will recommend any necessary avoidance and/or mitigation measures that may be required. It is anticipated that no significant environmental impacts will result from the project.

Groundwater resources in the MCCSD service area are limited, and exhibit signs of stress during drought periods. The town of Mendocino does not have a potable water system; instead, residents rely on approximately 400 groundwater wells for their drinking water supply. Water elevations are measured at approximately 25 of the 400 groundwater wells within the service area. Depth to groundwater has been measured monthly since October 2002; depth to groundwater in wells in the service area during this period averaged approximately 5 to 25 feet.

c) Population Trends

The town of Mendocino's population increased from 824 persons in 2000 to 894 persons in 2010, indicating an average increase of 7 people per year, or a 0.8% growth rate (U.S. Census Bureau, 2000 and 2010). The 2010 census shows an average household size in the Mendocino Census Designated



SOURCE: MENDOCINO USGS 7.5 MINUTE QUADRANGLE

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1"=2000'±

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SHN Consulting Engineers & Geologists, Inc.	Mendocino City CSD Preliminary Engineering Report Mendocino, California	Site Location Map SHN 415065
	December 2016 / 415065-LOCATION-PRELIM	Figure 1

SHN Consulting Engineers & Geologists, Inc.	Mendocino City CSD Preliminary Engineering Report Mendocino, California	Wastewater Treatment and Reuse Locations SHN 416076	
	February 2017	Figure2_WWTreatmentReuseLocations	Figure 2

Place (CDP) as 1.86 persons, indicating an annual growth rate of 3.76 households per year. The Mendocino CDP encompasses the entire MCCSD service district and its sphere of influence, along with some additional outlying areas.

Considering MCCSD records for the period between 2005 and 2015, the total number of recorded equivalent single family dwellings (ESDs) on the system has decreased by approximately 10 ESDs. Note that MCCSD data uses the term ESD; however, the term "equivalent dwelling units (EDUs)" is used throughout in this report to comply with USDA guidelines. District staff members have indicated that new development has been offset by decreases in existing use. Some reasons for the decrease are associated with loss of restaurant dining area, decreases in student enrollment in Mendocino Unified School District (MUSD), sewer use reductions at the Russian Gulch State Park in 2004 and the Hills Ranch Subdivision in 2010, and many small changes in sewer use in the commercial district of Mendocino.

Staff has also stated, "Although there are about 1 to 3 ESDs (sic), or more, of new development per year, this increase has been erased by decreases in existing use. Viewed from this perspective, there was no growth in Mendocino over the last ten years." Based upon the above information and for purposes of this report, growth is being projected at three EDUs per year. If the rate of growth between 2000 and 2010 continues, the projected 20-year planning horizon population will be approximately 1,083.

d) Community Engagement

The MCCSD Board of Directors (BOD) is comprised of five directors and is generally elected to alternating 4-year terms. The BOD conducts appropriately noticed monthly and special meetings at the MCCSD offices. The public is encouraged to attend the BOD meetings and members of the news media often attend the meetings. The Wastewater Treatment Facilities Improvements and Recycled Water System Expansion (Project) has been on the BOD agenda and discussed in detail beginning in June of 2016. At its November meeting, the BOD reviewed in detail the three alternatives for the Project and decided to limit the Project to only those improvements identified for the wastewater treatment plant. At a special meeting of the BOD in early January 2017, a fourth alternative including the limited recycled water distribution system to Mendocino High School was adopted. At this meeting, it was noted that the estimated Project construction costs, if funded by a grant/loan from USDA Rural Development, could be included in the existing MCCSD rate structure without a rate increase or a Proposition 218 vote. During this period, the Mendocino Beacon Newspaper reported on the progress of the Project in September and December of 2016 and in January of 2017. The January article described the chosen alternative and discussed the potential to fund the construction of the Project within the MCCSD existing rate structure.

Part 2 Existing Facilities

a) Location

The WWTF includes preliminary treatment by automatic bar screen; secondary treatment by extended aeration, secondary sedimentation, and sludge treatment by means of aerobic digestion, belt filter press, and a biosolids dryer; and tertiary treatment by dual media filtration and post-chlorination and dechlorination. Plant effluent is discharged to a flow equalization basin, which provides a constant discharge through a 996-foot outfall to the Pacific Ocean. A facilities map identifying the location of existing treatment facilities is included as Figure 3.

The recycled water system begins with re-chlorination following initial chlorination for disposal through the ocean outfall. Recycled water is then pumped up to a storage tank at the local high school where it is used for irrigation of athletic fields. The location of the WWTF and athletic fields are shown in Figure 2.

MCCSD serves an area of approximately 700 acres including Russian Gulch State Park located approximately 1 mile north of the District. Within this area, the District has constructed and maintains nearly 8.6 miles of gravity pipelines, 0.42 miles of force main piping, 148 sanitary manholes, 27 clean-outs, and three pump stations. A map of the collection system is included in Figure 4.

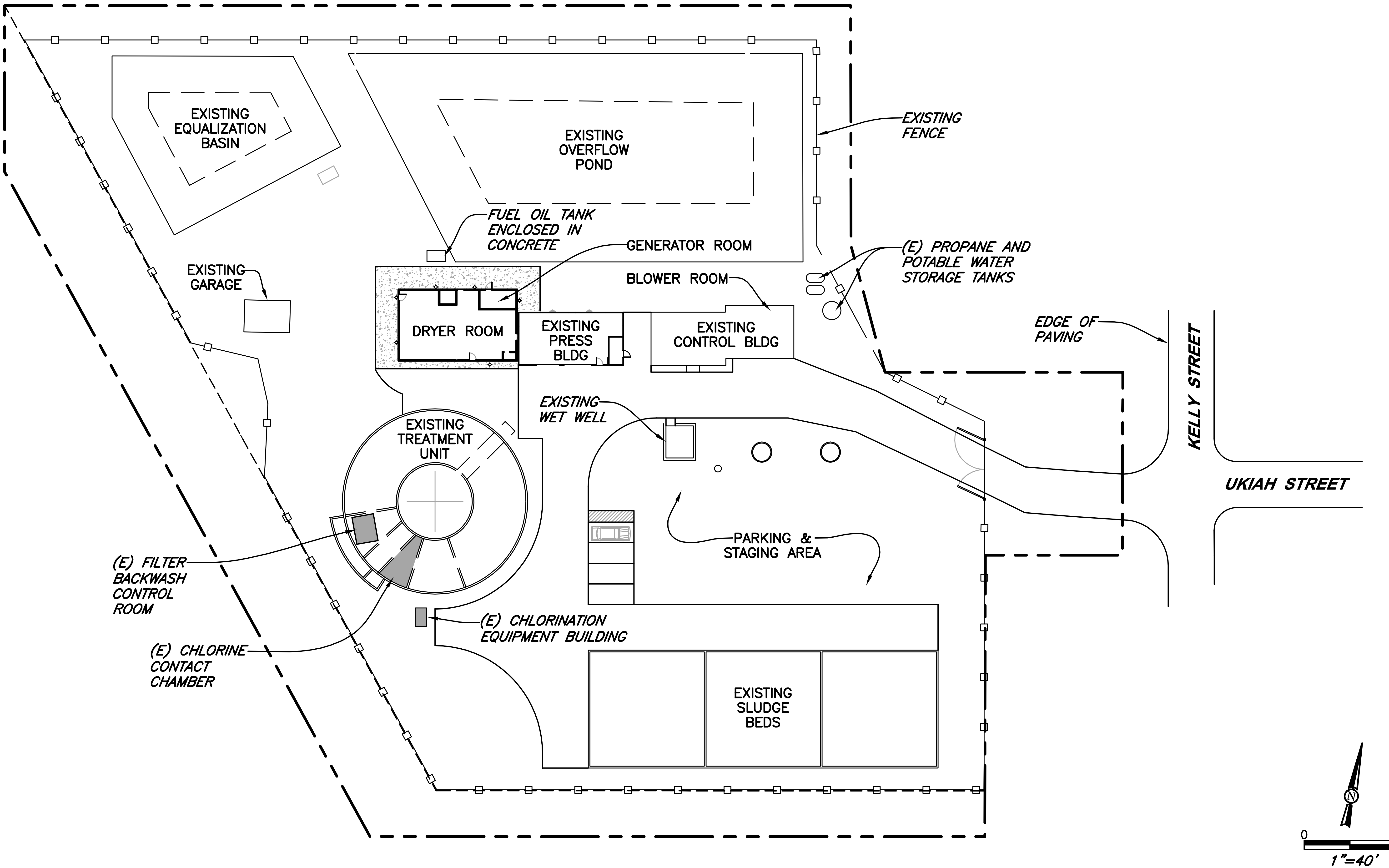
b) History

The MCCSD wastewater collection, treatment, and disposal system was originally constructed in 1975; significant maintenance and improvements projects conducted at the facility are summarized in Table 1.

Table 1
Wastewater Collection, Treatment, and Disposal System History
Mendocino City Community Services District

System Component	Year Constructed	Year(s) Renovated	Description of Renovation
Ocean Outfall	1975	2009, 2012, 2014	Inspection and minor repair of the ocean outfall.
Recycled Water	1998	NA[1]	NA
Treatment	1975	2015	Replaced Aeration Basin Blower, Replaced Standby Generator
SCADA	NA	NA	NA
Disinfection	1975	2009	Switched from chlorine gas to liquid sodium hypochlorite system.
Sludge/Biosolids	1975	1994 2000 2006	1994–Added sludge dewatering facility 2000 –Added sludge belt press 2006–Added sludge/biosolids dryer
Pump Station(s)	1975	2000-2016	Various pump, auto dialer, access, and bypass upgrades and replacements.
Collection System	1975	NA	MCCSD inspects and cleans approximately 20% of the collection system annually.

1. NA: not applicable



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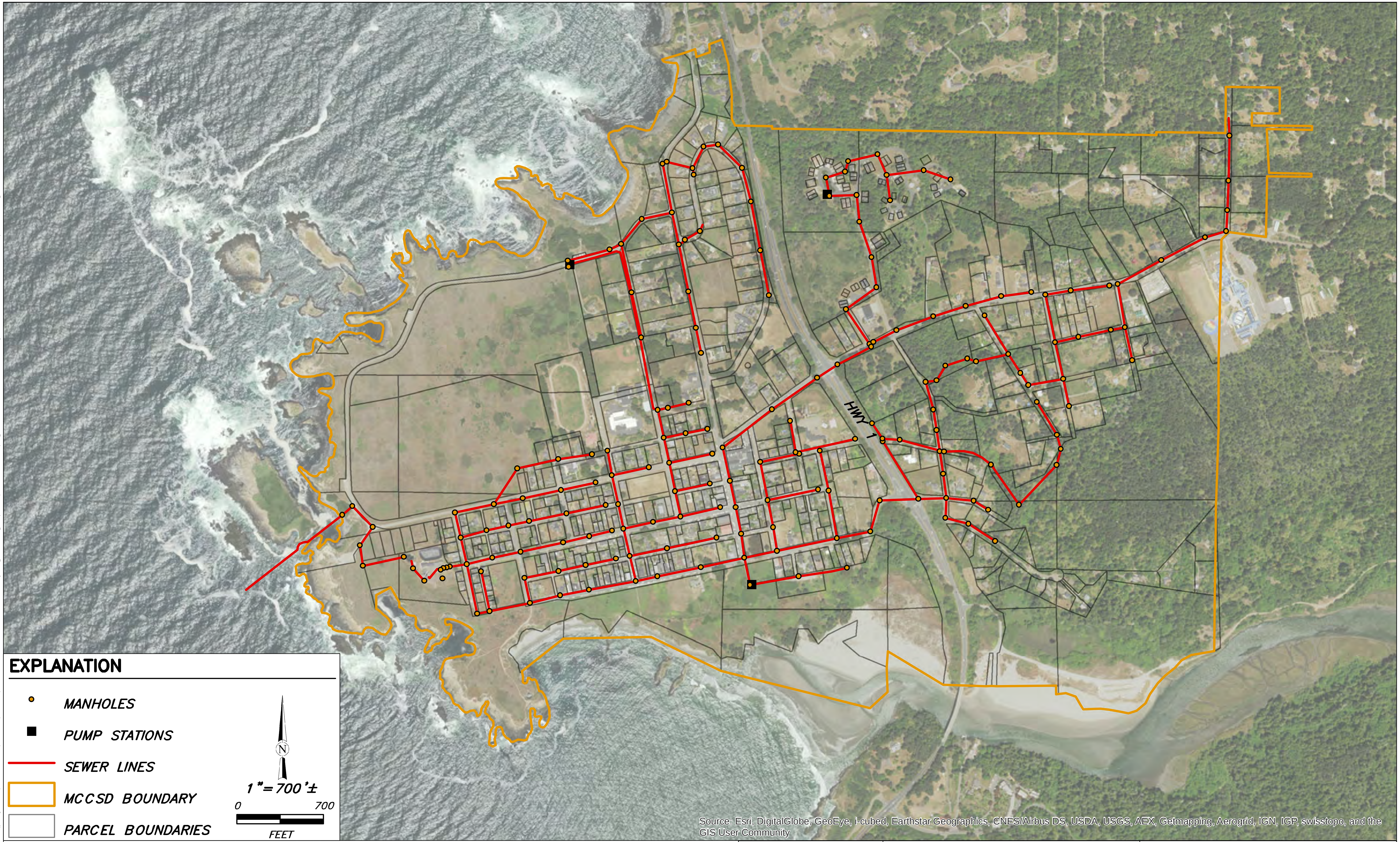
Existing Site Plan

SHN 416076

February 2017 | 416076-SITE-PER

Figure 3



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Preliminary Engineering Report
Mendocino, California

Sewer Collection System
SHN 416076

March 2017 | Figure4_SewerCollectionSystem | Figure 4

c) Condition of Existing Facilities

(i) Regulatory Compliance

MCCSD is in good standing with respect to regulatory compliance; a copy of the current Waste Discharge Requirements (WDRs) for the MCCSD WWTF is included as Appendix A. The following is a brief description of regulatory violations incurred by MCCSD.

MCCSD has not had any violation related to the recycled water program or biosolids treatment and disposal program, and has only had two violations with respect to treatment. Both treatment violations resulted from the same exceedance due to the weekly and monthly average oil and grease limits being exceeded. Oil and grease are measured one time each month at the MCCSD WWTF such that a single exceedance can result in violations of multiple statistical limits. The exceedance occurred in November 2015 and has not recurred since. MCCSD has a fats, oil, and grease (FOG) ordinance and monitoring program in place to enforce FOG capture and disposal by local businesses, and reduce sanitary sewer overflows (SSOs) due to FOG blockages in the collection system. MCCSD experienced two SSOs during 2015; both SSOs were caused by blockages from rags that were cleared immediately. No discharge to surface water resulted from either SSO.

(ii) Influent Flow Analysis

Flow data is divided into dry weather and wet weather seasons to describe how much rainfall affects inflow to the WWTF and to characterize wastewater flow rates during the dry season when recycled water is needed for irrigation at the high school athletic fields. Rainfall data collected daily between January 2000 and December 2016 indicate that the dry season in the town of Mendocino is between May and September (Table 2). Average monthly inflow rates during the dry season ranged from 0.063 MGD in September to 0.075 MGD in May and average monthly wet weather flows ranged from 0.061 MGD in November to 0.109 MGD in March.

Table 2
WWTF Influent Flow and Rainfall Summary[1]
Mendocino Community Services District

Month	Average Monthly Flow (MGD[2])	Average Monthly Rainfall (in[3])
January	0.101	5.73
February	0.106	5.88
March	0.109	5.26
April	0.094	2.96
May	0.075	1.00
June	0.069	0.65
July	0.072	0.07
August	0.071	0.09
September	0.063	0.36
October	0.062	2.77
November	0.061	3.77
December	0.095	8.88

1. Data collected daily at the MCCSD WWTF between January 2000 and December 2016.
2. MGD: million gallons per day
3. in: inches

Critical systems (such as, conveyance and treatment systems) must be conservatively designed to account for peak flows. However, it is not typically cost effective to design ancillary systems (such as, the recycled water system) to treat peak flows; therefore a lower flow rate must be selected to optimize the cost versus use of ancillary systems.

Drought conditions during recent years have been characterized by less annual rainfall, and have coincided with decreasing inflow rates at the WWTF (Figure 5). Assuming drought conditions do not continue indefinitely, selecting a more recent period to characterize design flow rates would result in lower average design flows. Selecting a historical period when flows were higher could result in over-sized systems and added costs. Therefore, the entire period of 2000-2016 is selected as the characteristic design flow period to account for variable flow conditions. Note that wet weather and dry weather flow rates have decreased at the same rate between 2000 and 2016, as indicated by the equal slopes of the linear regression lines for each data set (Figure 6).

Figure 5
Total Annual Rainfall and Average Annual Flow 2000-2016(1)
Mendocino Community Services District

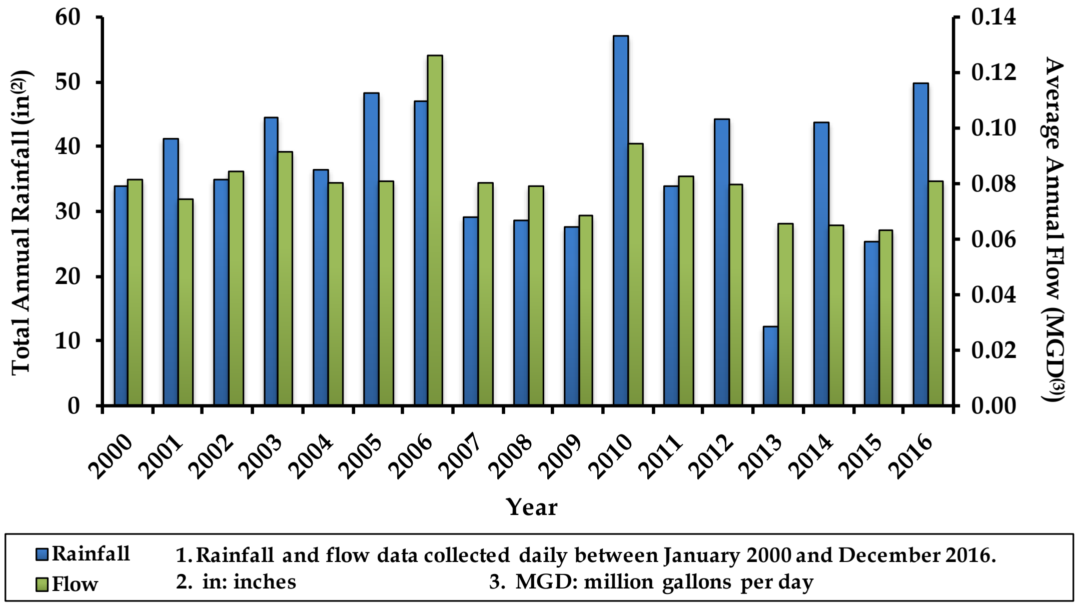
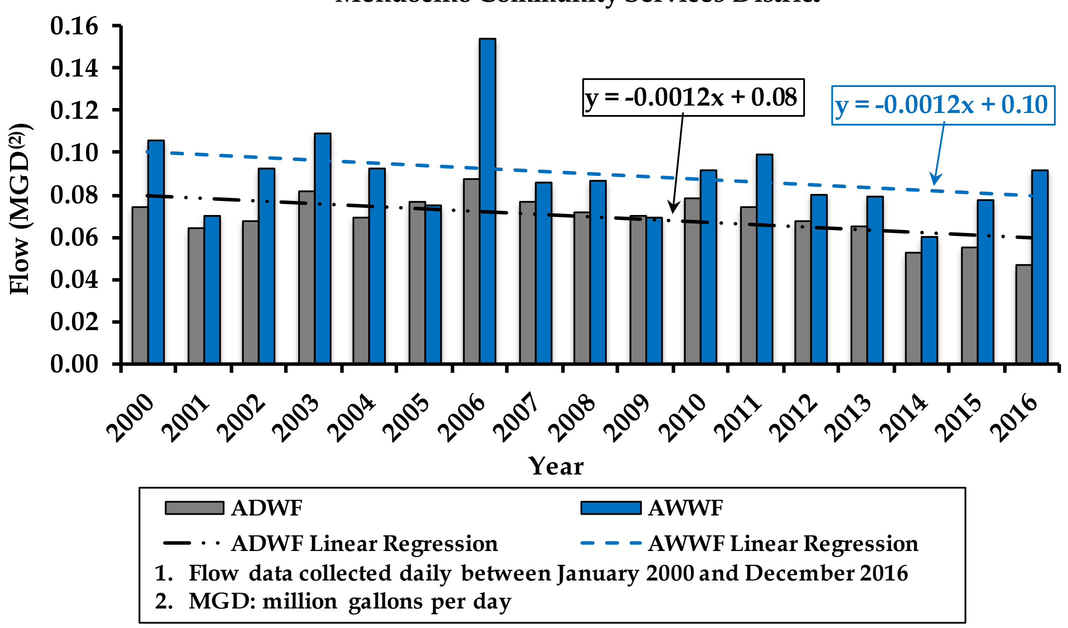


Figure 6
Average Dry and Wet Weather Flows 2000-2016(1)
Mendocino Community Services District



For design purposes, wet and dry season inflow rates are characterized by peak, average, and maximum-monthly flow rates (Table 3). Note that the peak hourly design flow for the existing WWTF is reported as 1.0 MGD, whereas the peak daily flow (PDF) was 1.154 MGD between 2000 and 2016. Flow in excess of 1.0 MGD may be stored in a 300,000 gallon storage pond located at the WWTF. Once peak flows subside, water stored in the pond is pumped back to the headworks of the treatment system. The average design flow rate for the WWTF is 0.3 MGD. Compared with the average annual flow (AAF) between 2000 and 2016 of 0.081 MGD, the WWTF is currently operating at approximately 27% of its design hydraulic capacity.

Table 3
WWTF Influent Flow Summary 2000-2016(1)
Mendocino Community Services District

Flow	Flow (MGD(2))
Average Dry Weather Flow (ADWF)	0.070
Maximum Month Dry Weather Flow (MMDWF)	0.075
Average Annual Flow (AAF)	0.081
Average Wet Weather Flow (AWWF)	0.090
Maximum Month Wet Weather Flow (MMWWF)	0.109
Peak Day Flow (PDF)	1.154
Peak Instantaneous Flow (PIF)	2.550

1. Influent flow data collected daily between January 2000 and December 2016.
2. MGD: million gallons per day

(iii) Ocean Outfall

The MCCSD WWTF discharges to the Pacific Ocean through an 8-inch diameter, 996-foot long ocean outfall pipe. Treated, disinfected, and dechlorinated wastewater flows from the chlorine contact chamber into a flow equalization basin, and then into the outfall pipe. The discharge capacity of the outfall pipe is reportedly 1.0 million gallons per day (MGD; James, 2005). In an emergency, peak flows above 1.0 MGD can be diverted into a 300,000-gallon storage pond. The most recent inspection of the ocean outfall in 2014 by Alpha Diving Industries reported that it was operational and intact, but needed repairs related to anchoring and cathodic protection.

The liner in the equalization basin was installed in 1975 during the construction of the treatment system and is in need of replacement after reaching the end of its useful life.

(iv) Recycled Water

MCCSD re-chlorinates and pumps filtered effluent from the WWTF to a storage tank located at the MUSD High School where it is used to irrigate approximately 4.3 acres of athletic fields. MCCSD and MUSD approved a memorandum of understanding (MOU) and Joint Resolution 97-1 in support of the recycled water system at the regular Board of Directors meeting on February 24, 1997. The MOU and Joint Resolution 97-1 are included as Appendices to the Title 22 engineering report for the MCCSD recycled water system included as Appendix B. The North Coast Regional Water Quality Control Board (RWQCB) originally approved the water reclamation system on

August 27, 1997, with Water Reclamation Requirements Order Number 97-66, and more recently with approval of WDRs and Water Recycling Requirements Order Number R1-2015-0039 on August 13, 2015.

In accordance with California Code of Regulations (CCR) Title 22, Division 4, MCCSD maintains an engineering report (Title 22 report) to ensure proper operations and maintenance of the recycled water system to protect public and environmental health. A copy of the current Title 22 report is included in Appendix B; the Title 22 Report is currently under review for approval by the RWQCB and Division of Drinking Water (DDW).

The existing recycled water system begins with secondary chlorination of WWTF effluent following the primary chlorination step used for discharge to the ocean outfall. The purpose of the secondary chlorination step is to ensure recycled water meets the minimum required 450-minute milligram per liter (min-mg/L) chlorine residual concentration and contact time (CT) for tertiary treated recycled water use. The secondary chlorination step raises the chlorine residual to a minimum of 5 milligrams per liter (mg/L) while the transfer and storage time provides the minimum 90 minute contact time by storing recycled water for over 24 hours. During the 24-hour hold time, bacteriological testing is completed by MCCSD staff to ensure recycled water meets permit limits. Once the bacteriological tests confirm that the water is safe for use, the high school is notified that the water is safe and can begin using for irrigation at-will.

Recycled water is currently pumped to a 55,000-gallon concrete storage tank at the high school in batches of approximately 34,000 gpd, up to 3 days per week. Recycled water is pumped using a submersible 5-horsepower (hp) vertical turbine pump located at the end of the existing chlorine contact chamber. Pumping recycled water to the high school occurs at night and not during normal operating hours, which eliminates conflicts between using the same pump for the plant water (PW) system and the recycled water system.

The existing recycled water system is operational having undergone normal routine maintenance without major renovations since initial construction in 1997. At nearly 20 years old, these components are nearing the end of their useful life and may need replacement soon. The primary concern is the pressure pipe that delivers water from the WWTF to the MUSD storage tank. The 2-inch line is reportedly in fragile condition and may need replacement. The pipe is also not a purple pipe as required by California state law, therefore, it needs to be replaced with the appropriately colored pipe, and notification should be posted indicating that it is carrying recycled water that is not for potable use.

(v) Plant Water

The plant water (PW) system supplies reuse water for cooling water in the biosolids sludge dryer, process water in the sludge belt press, and water for equipment wash-down and cleaning. The sludge dryer uses approximately 39,000 gpd, 2 days per week, and the belt press uses approximately 19,200 gpd, 1 day per week; equipment wash-down and cleaning do not consume a significant amount of water, and are, therefore, omitted from the general discussion of the water balance.

The PW system is operated with the same submersible pump that supplies the recycled water system. The recycled water system is currently supplied at night while the majority of the PW system demands are supplied during normal business hours. The biosolids dryer and belt press require a significant amount of water for operation and must be operated on different days to prevent operational problems that result from using them both at the same time (a more detailed description of these operational issues is included in the section below on aging infrastructure).

(vi) Treatment

The treatment process includes preliminary treatment by automatic bar screen; secondary treatment by extended aeration, secondary sedimentation, and sludge treatment by means of aerobic digestion, belt filter press, and a biosolids dryer; and tertiary treatment by dual media filtration, post-chlorination, and dechlorination (Figure 7). Plant effluent is discharged to a flow equalization basin, which provides a constant discharge through a 996-foot outfall to the Pacific Ocean. The facility has a reported treatment capacity of 1.0 MGD, and an average daily flow rate of 0.081 MGD (based on daily influent flow measurements collected between January 2000 and July 2016). Treated water quality data for influent (INF-001), effluent (EFF-001, EFF-002, and EFF-003), and recycled water (REC-001) discharge points compared with WDR are included as Table C in Appendix C.

1) Current Conditions

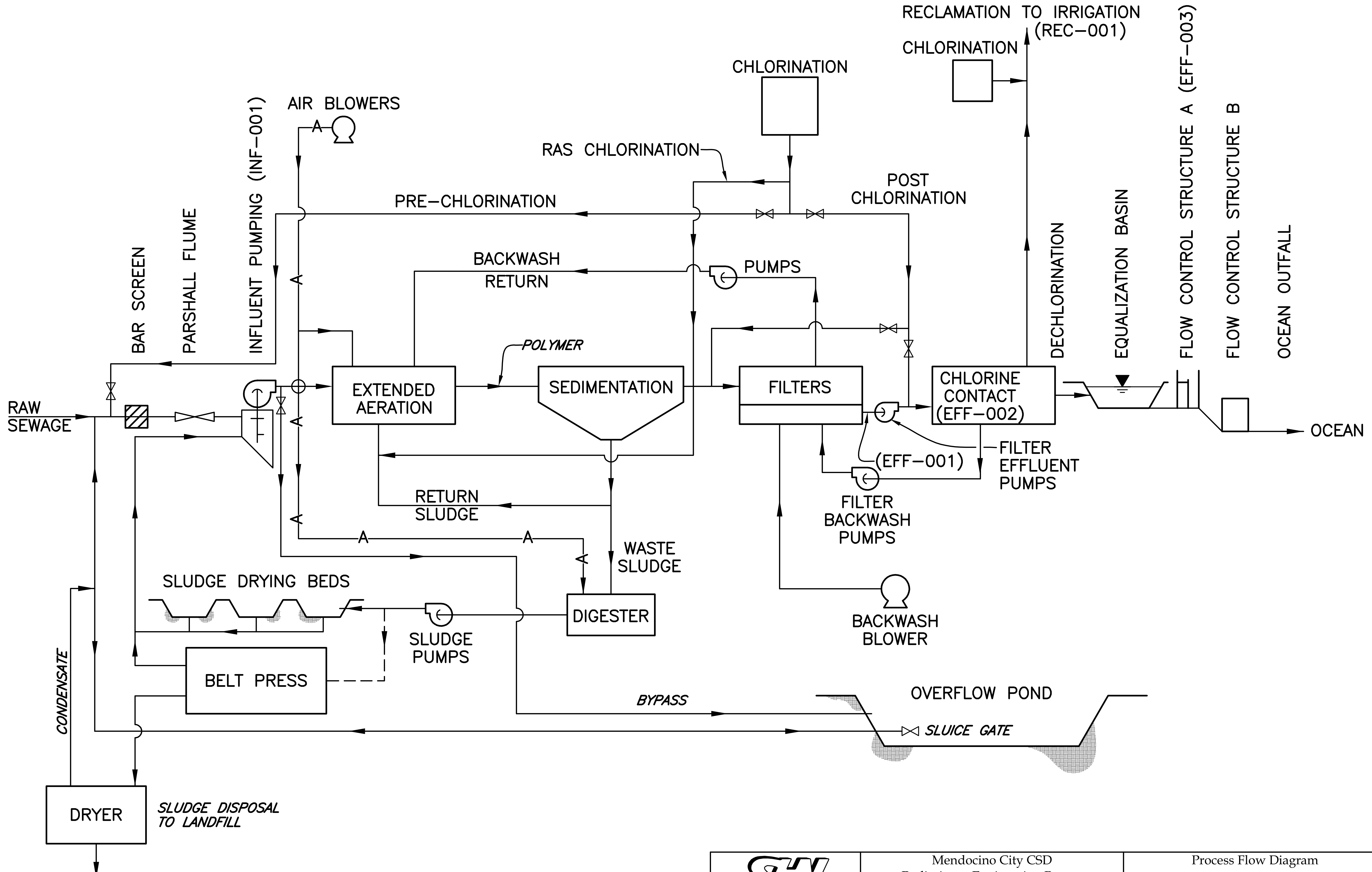
The dates of major treatment system renovation projects are listed in Table 1. Current conditions of individual treatment system components are described in more detail in the following sections.

2) Adequacy of WWTF and Suitability for Continued Use

The MCCSD WWTF meets all regulatory permit requirements with periodic and infrequent violations (compliance data are presented in Table C in Appendix C). The WWTF is currently operating at approximately 27% of its design hydraulic capacity, with an AAF rate of 0.081 MGD and an average design flow rate of 0.3 MGD. A more in-depth discussion of the projected 20-year population increase and impacts to design flows is included below in the section entitled "Reasonable Growth."

(vii) Disinfection

The existing primary disinfection system of the ocean outfall consists of liquid sodium hypochlorite for chlorination and calcium thiosulfate for dechlorination. A calcium hypochlorite tablet feeder is maintained as a backup chlorination system and a second liquid sodium hypochlorite injection system is used to meet additional disinfection requirements for recycled water pumped to the MUSD high school storage tank. All flow is chlorinated with the primary ocean outfall chlorination system through the existing chlorine contact chamber. For the recycled water system, a pump pulls water from the existing contact chamber and sodium hypochlorite is injected into the line before delivery to the high school storage tank. A Hach Cl-17 continuous chlorine analyzer is used to monitor the chlorine residual for the recycled water system, activating an alarm if residuals do not remain above 5 mg/L at all times. Contact time for the recycled water is achieved in the delivery pipe to the storage tank, and inside the storage tank where recycled water is held for over 24 hours prior to use.



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Preliminary Engineering Report
Mendocino, California

Process Flow Diagram

SHN 415065

March 2017 | 415065-PID

Figure 7

The recycled water disinfection system includes a liquid sodium hypochlorite injection pump and a Hach Cl-17 continuous chlorine analyzer. The feed pump was installed in 1998 and is at the end of its useful life. The recycled water chlorine analyzer was installed in 2015 with a useful life expectancy of 15 years; it will require replacement by 2030.

The existing concrete chlorine contact chamber for the ocean outfall was constructed in 1975 as a part of the original facility and has an average useful life expectancy of 75 years; it will require replacement by 2050. The chamber is an approximately 16,700-gallon concrete basin that is integrated into the rest of the activated sludge aeration and filtration units.

Chlorine residual for the ocean outfall is manually tested in the laboratory and the injection system is manually adjusted to ensure that the chlorine residual remains between approximately 0.5 and 1.0 mg/L in the contact chamber. The ocean outfall hypochlorite injection pump was installed in 2016 as a replacement for a chlorine gas system, and the calcium thiosulfate dechlorination feed system was installed in 2009; these systems are adequate until 2026, at which time MCCSD will update the technology.

A free available chlorine (FAC) dose of approximately 6.0 mg/L is used for the ocean discharge and an FAC dose of approximately 7.1 mg/L is used for the recycled water system. Records indicate that the WWTF design flow rate of 0.3 MGD was exceeded approximately one day per year between January 2000 and October 2016; flows in excess of 0.3 MGD can be stored in the 300,000-gallon storage pond. The peak FAC use at 0.3 MGD and 6.0 mg/L is approximately 15 pounds per day (ppd). The recycled water system currently produces approximately 34,000 gpd; at an FAC dose of 7.1 mg/L, this creates an FAC demand of less than 5 ppd. Since the peak WWTF flow rate of 0.3 MGD would occur during the wet season when no recycled water is being used, the peak daily FAC dose is approximately 15 ppd.

(viii) Sludge/Biosolids

The plant digester is usually filled once a week, and the sludge is pressed to 10 to 12% solids with the plant belt press. Pressing the digester sludge volume (46,000 gallons of 1 to 1½% solids) takes about 6 hours, 1 day per week. Once the biosolids pass through the belt press, they are fed into an 8-yard hopper. A Fenton RK-36 biosolids drying unit operates automatically once the 8-yard hopper has been filled, drying the contents to Class-A biosolids. The unit is equipped with an odor control air scrubber. The dehydration unit meets or exceeds all 503 federal regulations for Class-A treatment of biosolids.

The Class-A biosolids are moved to an onsite waste transfer box and hauled to the Redwood Landfill in Novato, California at regular intervals. Biosolids disposal is regulated under a National Pollutant Discharge Elimination System (NPDES) permit (No. CA0022870). The regulations are enforced by the U.S. Environmental Protection Agency (EPA), and include an annual self-monitoring report and assurances that the process does not result in objectionable odors or groundwater contamination.

The current biosolids treatment process has no redundancy if any component were to need replacement or require service taking more than a week. The current facility primarily uses a dryer to process the biosolids. The dryer is over halfway through its projected 20-year lifespan, and MCCSD reports a drastic increase in maintenance of the unit in the past several years. Service records from the past several years indicate that reliability of the dryer in the next 10 years could become an issue. Servicing the unit requires a contract with an out-of-the-area contractor adding substantial cost to the operational budget.

(ix) Pump Stations

There are three lift stations in the MCCSD service area (Figure 4). The MCCSD owns and operates two lift stations: one on Main Street, and one on Heeser Drive. Another lift station exists for the Hills Ranch subdivision, which is owned and operated by the subdivision. The Hills Ranch lift station was updated by the subdivision developer in 2013.

The Main Street lift station serves only a few connections and little (or no) build out is expected in this area. Although there is no alarm telemetry, the large amount of wet well storage allows pump station problems to be discovered on daily rounds before overflows occur. Bypass pumping is accomplished with the use of a portable generator and a submersible pump, when required. The backup generator and pump are located at the treatment plant, which connects to the force main through a pipe that terminates at the top of the dry-pit. Overflows at the Main Street lift station are unlikely due to the long residence time in the oversized wet well.

The Heeser Street lift station is the largest lift station in the MCCSD system. MCCSD has installed pump controls at the top of the hatch, because the dry pit arrangement makes the pumps cumbersome to access. There is a connection to the force main that MCCSD uses in conjunction with the portable submersible pump and generator for bypass of the station. The Heeser Street station has an auto-dialer that calls out on high water and power failure, but for more reliable back-up, MCCSD plans to install the generator that is currently at the WWTF (scheduled for replacement) and an automatic transfer switch in 2017.

(x) Collection System

MCCSD serves an area of approximately 700 acres, including Russian Gulch State Park, which is located approximately 1 mile north of the District boundary. Within this area, the District has constructed and maintains nearly 8.6 miles of gravity pipelines, 0.42 miles of force main piping, 148 sanitary manholes, 27 clean-outs, and three pump stations. The inventory of the collection system ranges in size from 6-inch to 15-inch diameter pipe for the gravity system, and 4-inch and 6-inch pipe for the pressure pipelines. An inventory of existing gravity piping is provided in Table 4; pipeline locations are shown on Figure 4.

Table 4
Inventory of Gravity Sewer System Pipe
Mendocino City Community Services District

Pipe Dia. (inches)	Vitrified Clay (feet)	PVC(1) (feet)	AC(2) (feet)	Total
6	4,570	6,299	3,384	**14,253**
8	23,730	1,768	784	**26,282**
10	1,665	NA(3)	NA	**1,665**
12	2,234	NA	NA	**2,234**
15	744	NA	NA	**744**
TOTAL	**32,943**	**8,066**	**4,168**	**45,177**

1. PVC: polyvinyl chloride
2. AC: asbestos-cement
3. NA: not applicable

MCCSD does not accept septage at the WWTF.

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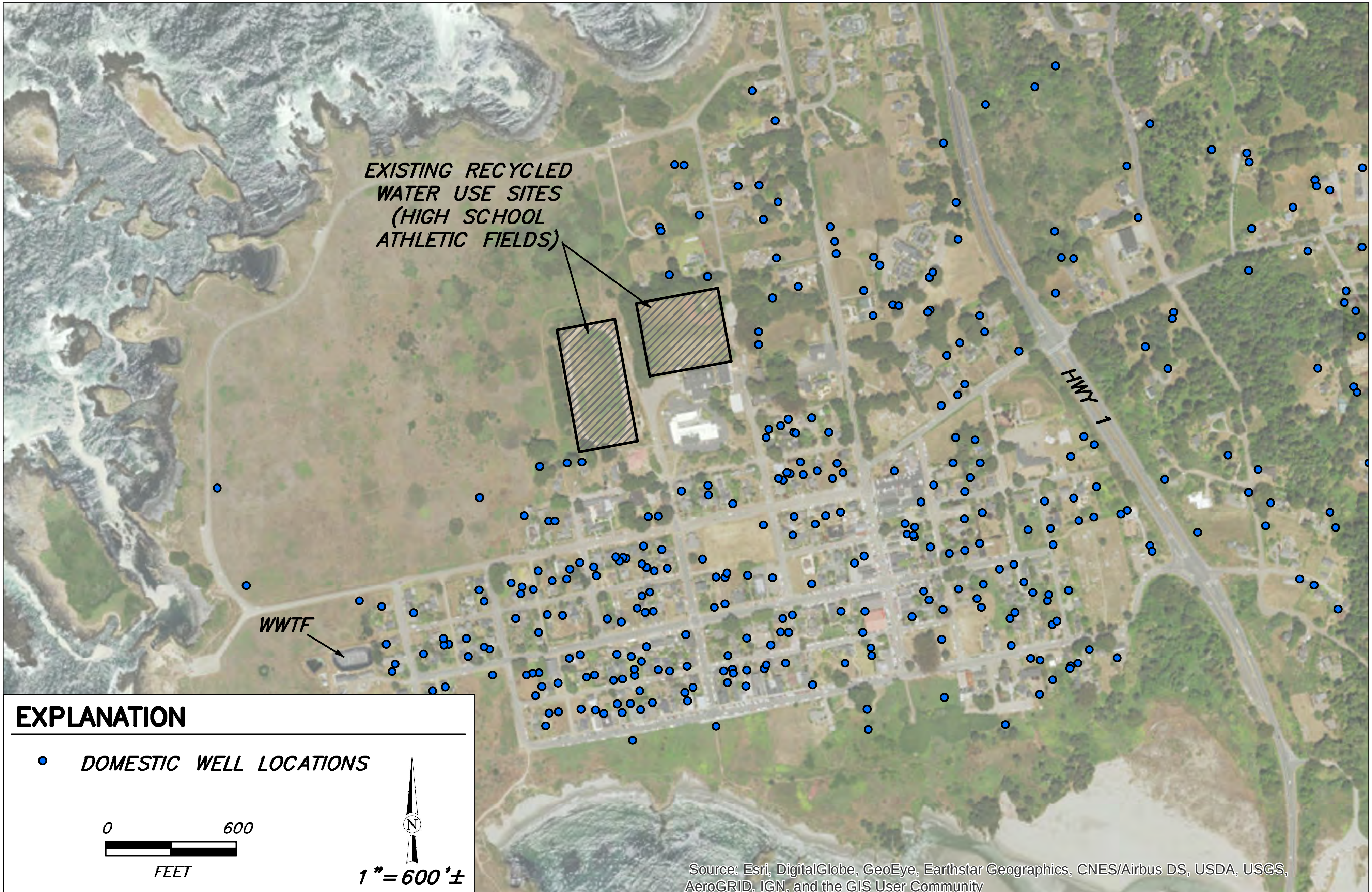

SHN Consulting Engineers & Geologists, Inc.

Mendocino City CSD
Preliminary Engineering Report
Mendocino, California

Domestic Well Locations

SHN 416076

February 2017 | Figure7_DomesticWellLocations | Figure 8

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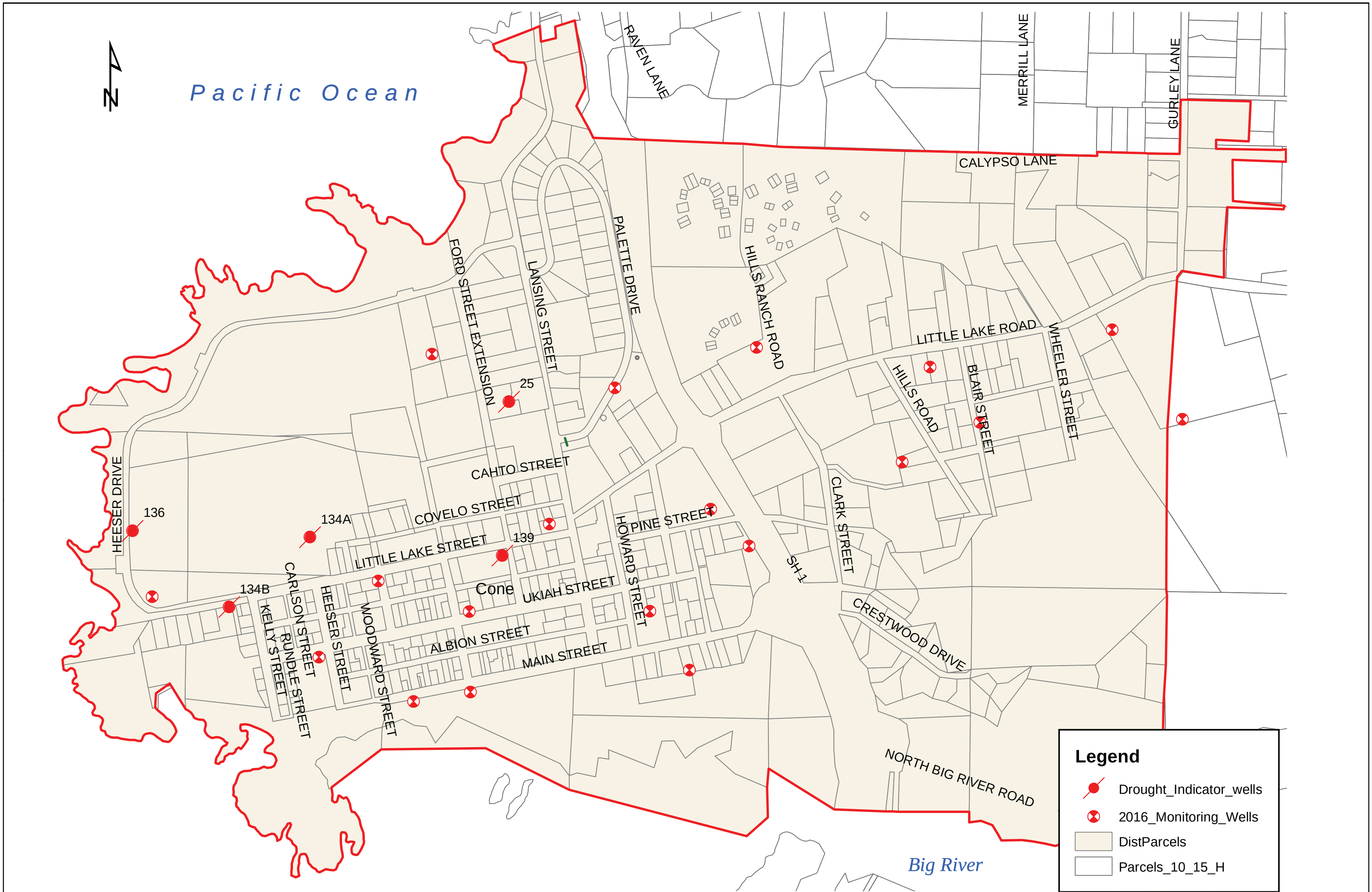


BASEMAP FROM MENDOCINO CITY CSD (2016)	SHN Consulting Engineers & Geologists, Inc.	Mendocino City CSD Preliminary Engineering Report Mendocino, California	MCCSD 2016 Monitoring Well Locations SHN 416076
		March 2017 / Figure9_2016MonitoringWells.ai	Figure 9

(xi) Groundwater Monitoring

There are approximately 400 groundwater wells located within the MCCSD service area that provide the potable water supply for the community. Figure 8 shows the locations of groundwater wells in relation to the WWTF and the high school athletic fields where recycled water is applied for irrigation. Figure 9 shows the location of monitoring wells within the MCCSD service area. Water elevations are measured at approximately 25 of the 400 groundwater wells within the service area. Depth to groundwater has been measured monthly since October 2002; depth to groundwater in wells within the service area during this period averaged approximately 5 to 25 feet. Groundwater monitoring by MCCSD is mandated by the State of California under the California Water Code CCR §10800.

(xii) Operational Management

MCCSD does not have a SCADA system in place.

A Grade 3 wastewater operator is required to run the MCCSD WWTF. The MCCSD WWTF is exempted from the Grade 4 certification for tertiary treatment facilities, because the design flow is less than 1.0 MGD. MCCSD employs 3 full-time licensed operators: 1 Grade 4 operator, 1 Grade 3 operator, and 1 Grade 2 operator. Additionally, MCCSD has 1 “retired” operator on staff part-time. Current staffing levels are sufficient to operate the facility.

d) Financial Status of Existing Facilities

(i) Service Connections

The MCCSD wastewater collection system currently has 692 total service connections and 420 residential service connections. A tabulation of the sewer user categories is included in Table D (Appendix D).

(ii) Income and Rate Structure

The median household income (MHI) in the Mendocino CDP is $50,951 per year, which is 82% of the California MHI of $61,818 (US Census Bureau, 2016). The current sewer fee is $50.60 per EDU; an EDU is defined as 200 gpd (County of Mendocino, 1989).

Table 5 includes a breakdown of the total annual revenues for MCCSD during fiscal year 2017. MCCSD provides groundwater monitoring services, because the community does not have a centralized potable water system.

Table 5
2016-2017 Annual Revenues
Mendocino City Community Services District

Revenue Source	Amount
Sewer Use Fees	$ 614,274
Groundwater Management	$ 68,506
State Parks	$ 24,956
MUSD	$ 29,279
Other Users and Fees	$ 31,893
County Taxes	$ 87,672
Savings Interest	$ 2,505
Total Revenues	**$ 859,085**

(iii) Equivalent Dwelling Unit Information

The County of Mendocino has specified standard water use and sewage flow rates for different types of water users (County of Mendocino, 1989). This standard sets forth an EDU water use rate of 200 gpd, which has been adopted by the MCCSD for setting the wastewater rate. A tabulation of the different user types, the number of each type of user, the units used to quantify waste flows from each type of user, and the EDU's per unit for each category are included in Table D (Appendix D).

(iv) Current Operations and Maintenance Costs

Table 6 summarizes wastewater operations and maintenance (O&M) expenses for fiscal year 2017.

Table 6
Annual Wastewater Operating Expenses 2016-2017
Mendocino City Community Services District

Expense	Amount
Salaries	$ 178,116
Benefits	$ 68,259
Taxes	$ 23,172
Professional Service Fees	$ 15,500
Utilities	$ 64,044
Insurance	$ 12,607
Annual Repairs and Maintenance	$ 35,000
Supplies	$ 69,180
Solids Handling	$ 3,000
Training and Education	$ 868
Total Expenses	**$ 469,746**

(v) Existing Capital Improvements Programs

Table 7 summarizes the MCCSD capital improvements program (CIP) through the year 2025. Note that many of the items listed in this CIP are included in this project, and the estimated value of each component of the project listed here in Table 7 may not match updated 2017 estimated costs resulting from this preliminary engineering report (PER).

Table 7
Capital Improvements Program Summary
Mendocino Community Services District

Project Description	Year	Average Life	Estimated 2016 Value
Outfall survey	2016	20	$ 21,900
Upgrade plant and recycled water systems	2018	20	$ 1,048,500
Upgrade drying beds	2018	40	$ 216,000
Backwash PLC controls	2018	30	$ 80,000
Replace equalization basin liner	2018	40	$ 60,000
Storage unit	2025	40	$ 500,000
Collection system improvements	2023	40	$ 697,731
Wastewater outfall additional cost over replacement	2025	45	$ 3,500,000

(vi) Existing Debts and Required Service Accounts

Table 8 summarizes the MCCSD fiscal year 2017 operating budget. Note that this budget includes a capital improvements fund ($51,730) and an equipment replacement fund ($150,000) for a annual total of $201,730 reserve funding set aside for items included in this project PER. Currently, MCCSD has more than $612,607 in cash reserves, and more than $200,000 in annual revenues to add to reserves for capital improvements and equipment replacement. Based on these available funds, a portion of the projected annual revenues can be used for debt service on new project funding without any changes to the existing user fees. No rate structure adjustment is planned due to this proposed project; however, when the future ocean outfall replacement project takes place, a request for a rate structure adjustment, including a proposition 218 vote, is expected.

Table 8
2016-2017 Budget
Mendocino City Community Services District

Item	**Expenses**	**Revenues**
Total Operating Revenues		$ 859,085
Wastewater Operating Expenses	$ 469,746	
Loan payment on sludge dryer	$ 35,380	
Groundwater monitoring and administration costs	$ 151,367	
Total Expenses	$ 656,493	
Total Net Revenue		$ 202,592
Capital Improvements Fund	$ 51,730	
Equipment Replacement Fund	$ 150,000	
Net Residuals		**$ 862**

Table 9 summarizes the MCCSD fiscal year 2018-19 operating budget. The estimated new loan debt based on an opinion of cost for the proposed improvements will be $109,864. The balance of the revenues will be used to continue funding the capital improvement reserve in the amount of $51,730 and the equipment replacement reserve in the amount $40,136 for future use.

Table 9
2018-2019 Projected Budget
Mendocino City Community Services District

Item	**Expenses**	**Revenues**
Total Operating Revenues		$ 859,085
Wastewater Operating Expenses	$ 469,746	
Loan payment on sludge dryer	$ 35,380	
Groundwater monitoring and administration costs	$ 151,367	
USDA Loan Payment on WWTF Improvements and Recycled Water System Expansion Project (estimated)	$ 109,864	
Total Expenses	$ 766,357	
Total Net Revenue		$ 92,728
Capital Improvements Fund	$ 51,730	
Equipment Replacement Fund	$ 40,136	
Net Residuals		**$ 862**

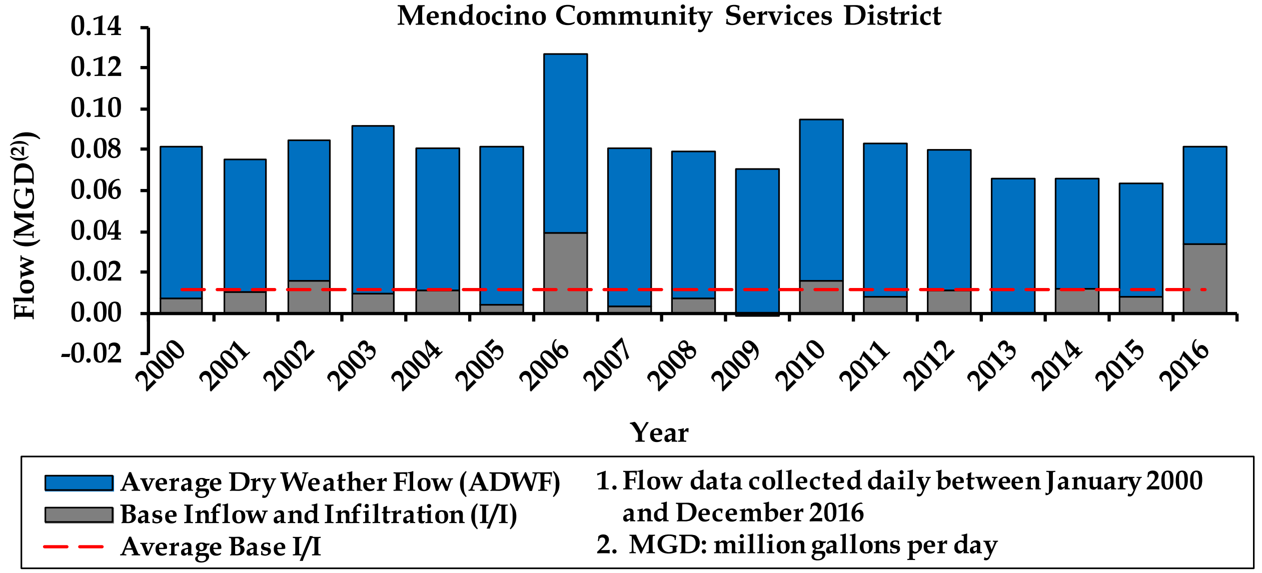
e) Water/Energy/Waste Audits

(i) Infiltration/Inflow Evaluation

Base I/I is estimated as the difference between the AAF and ADWF, and is based on the assumption that during the dry weather season, there is little or no I/I into the sewer system. A sewer system capacity analysis conducted in 2010 concluded that Base I/I contributions to the MCCSD sewer collection system between 2006 and 2009 were approximately 0.015 MGD. This level of I/I was considered non-excessive according to EPA standards (SHN, 2010). This study concluded that MCCSD had an older collection system that was well maintained, in fair to good condition, with localized I/I impacts associated with the most extreme wet weather events. The highest historical base I/I occurred in 2006 (0.039 MGD) and the second highest historical base I/I occurred in 2016 (0.034 MGD), indicating that base I/I in the sewer system has not significantly increased since the 2010 sewer system capacity analysis, and that the system is likely in similar condition (Figure 10).

According to inflow data collected daily at the MCCSD WWTF between January 2000 and December 2016, the AAF was 0.081 MGD and the ADWF was 0.070 MGD, indicating an average base I/I contribution of 0.011 MGD (Figure 10). Note that in 2009, base I/I was negative (approximately -0.001 MGD) due to the ADWF being slightly greater than the AWWF. Also note that recent base I/I flow rates (2011 through 2015) were below-average due to drought conditions that resulted in below-average wet weather flows. Therefore, short-term base I/I estimates reflect a lower-than-normal base I/I due to the drought conditions, and long-term base I/I estimates account for natural variation in annual rainfall.

Figure 10
Yearly Average Annual Flow (Base I/I plus ADWF) 2000-2016(1)
Mendocino Community Services District



(ii) Energy Audit

No energy audit has been completed for the MCCSD WWTF at this time.

Part 3 Need for Project

a) Health, Sanitation, and Security

The town of Mendocino's potable water supply is currently drawn from approximately 400 public and private wells. Recent drought conditions have resulted in decreased groundwater levels during the dry summer season, increasing water shortages and impacts to groundwater resources. The town currently recycles wastewater to irrigate athletic fields at the local high school; however, increasing recycled water use will reduce the need to use groundwater resources.

The current wastewater collection and treatment systems have remained in compliance with the RWQCB NPDES, WDR, and water recycling requirements Order R1-2015-0039 (Appendix A) with the exception of one oil and grease violation in November 2015. Two sanitary sewer overflows (SSO) occurred in 2015, one caused by a t-shirt, and one caused by rags and paper. The first SSO was estimated at 100 gallons and the second was estimated at 1,500-2,000 gallons. Both SSOs were cleared by MCCSD staff and were reported online using the California Integrated Water Quality System (CIWQS), in accordance with state regulations.

The MCCSD does not currently have any regulatory violation letters for the WWTF or collection system, and has remained in compliance with all regulatory agencies and standards during 2015 and 2016.

b) Aging Infrastructure

(i) Previous Repair/Maintenance Projects

The original WWTF was constructed in 1975 and numerous repairs and upgrades have occurred since. The following major repair and maintenance projects were undertaken to keep the wastewater treatment system operational.

- **Onsite Treatment Systems**
  In 2016, the backup power generator, aeration chamber blowers, pipe gallery actuators and motors, backwash pumps, and high level alarm were replaced. In 2013, the overflow pond liner was installed. In 2011, a new bar screen and washer were installed. In 2009, a new chemical feeder and chlorinator were installed to replace the existing chlorine gas system, and influent and effluent pumps were replaced.
- **Sludge Handling Systems**
  In 2013, the two sludge pumps were replaced; in 2006, the biosolids dryer was installed; and in 2000, a sludge belt press was installed.
- **Collection System Cleaning**
  In September 2015, MCCSD conducted video inspections and pressure cleaning of 14,870 feet of sewer mains as a part of their 5-year cleaning and videotaping program adopted in 2014. Inspections found no structural problems with the system. However, several areas were impacted with grease that was cleaned using a pressure nozzle.

- **Ocean Outfall Inspection and Repairs**
  MCCSD has had inspections and repairs conducted of the ocean outfall pipe, supports, anchors, and diffuser by Alpha Diving Industries in 2008, 2009, 2012, and 2014. During the most recent inspection in 2014, Alpha Diving Industries reported the outfall was intact and operational noting that previous repairs were intact and operational. Anchor assemblies in shallow rocky regions showed significant corrosion and some sand and gravel anchors were missing along with cathodic protection to prevent corrosion. Alpha Diving Industries recommended annual inspections to monitor further deterioration of the infrastructure.

(ii) Needed Repair/Maintenance Projects

The following treatment and collection system components have been identified as needing repair or replacement.

- **Recycled Water Distribution System**
  Recycled water is currently pumped from the WWTF to a 55,000-gallon concrete tank at the high school through a 2-inch polyvinyl chloride (PVC) pipe. The pipe was installed in 1997 when the original system was constructed and is reportedly in fragile condition. This pipe should be replaced to ensure continued operation of the system.

- **Filter Backwash Control Panel**
  The existing backwash control panel was installed in 1975 during the original WWTF construction. Although the backwash control system has performed well over the years, the control panel has outlived its expected life. The existing control panel is based on timer and relay technology, which has become obsolete. Spare parts required for routine maintenance are no longer available when components wear out or break. In order to ensure the continued performance of the filter backwash system, the existing backwash control panel requires replacement with a state of the art programmable logic controller (PLC).

- **Sludge Drying Beds**
  The existing drying beds have surpassed their useful life expectancy and are in need of repair or replacement. The drying beds provide much needed redundancy to the current sludge/biosolids treatment process. The WWTF digester fills in 1-2 weeks, at which point biosolids are moved through the belt press and dryer unit. There is currently no back up process to treat the overflow biosolids if either of the mechanical units were to fail. The drying beds would provide a minimum of one additional month of treatment.

- **Equalization Basin Liner**
  The ocean outfall equalization basin liner needs replacement after reaching the end of its useful life. The basin liner has become degraded by exposure to natural ultraviolet (UV) light and is at risk of leaking treated effluent to groundwater.

- **Ocean Outfall**
  The ocean outfall pipe is experiencing corrosion of anchor assemblies, is missing cathodic protection to prevent further corrosion, and needs significant repairs; however, the full extent of the repairs needed have not been determined at this time. MCCSD expects that major repairs to the ocean outfall pipe will be needed by the year 2025.

- **Sewer Mains**
  Sewer system repair projects were identified by the 2010 sewer system capacity analysis (SHN, 2010) and are listed in Table 10. An additional sewer main replacement project has been identified on Evergreen Street; however, a cost estimate for this repair project has not yet been developed.

Table 10
Sewer System Repair Projects[1]
Mendocino City Community Services District

Project #	Location	Description	Estimated Cost
Project #1	MH[2] 10 to MH 11	Upgrade line size from 15 inches to 24 inches	$98,337
Project #2	MH 16 to MH 19	Repair/Replacement for Sags	$212,850
Project #3	MH 4A to C/O[3] 4A	Manhole Additions	$29,700
Project #4	MH 81 to hr[4]0 and hr0 to hr1	Upgrade line size from 6 inches to 8 inches	$159,300
Project #5	MH H to MH I and MH I to MH J	Upgrade line materials from Plastic to PVC[5]	$132,894
Project #6	MH 47 to C/O 47 and C/O 47 to Capped Main Line	Manhole Additions	$23,625
Project #7	MH 73 to C/O 73 to C/O 73a to C/O at Parcel	Manhole Additions	$29,025
Project #8	Various Locations	Root Treatment	$12,000

1. Sewer system repair projects identified in the 2010 Sewer System Capacity Analysis (SHN, 2010)
2. MH: manhole
3. C/O: cleanout
4. hr: Hills Ranch
5. PVC: polyvinyl chloride

(iii) Needed Upgrades to Address Operational and Design Issues

- **Chlorination/Dechlorination Systems**
  The existing disinfection systems currently use liquid sodium hypochlorite for chlorination. Liquid sodium hypochlorite is shipped in 30-gallon barrels that weigh approximately 250 pounds (lbs). MCCSD typically keeps 10 barrels in stock, which provides approximately 1-month of supply. Shipping the heavy liquid barrels is costly due to the remote location of the town of Mendocino on the Northern California coast, and presents a hazard to workers who must handle the heavy barrels of corrosive liquid. The sodium hypochlorite systems should be replaced to reduce O&M costs and increase workplace safety.

  The existing disinfection systems are housed in a small out-building measuring approximately 4 feet by 8 feet, making operation and maintenance difficult. Due to the small space, sodium hypochlorite barrels are kept outdoors and the dechlorination system is kept in a separate building. A new, larger building should be constructed to house the chlorination and dechlorination systems together and provide enough space for chemical storage. Housing chlorination and dechlorination systems together, and providing chemical storage nearby, will simplify operation and provide sufficient room for operation and maintenance. Storing chemicals indoors will also increase safety and security by keeping corrosive chemicals in a locked building out of the elements.

- **Recycled Water System**

  The existing recycled water disinfection system injects sodium hypochlorite into the 2-inch PVC pipe that goes up to the high school storage tank. The chlorinated, recycled water is then held for longer than 24 hours, to ensure that disinfection requirements have been met before the water is used for irrigation. This batch treatment style restricts the amount of water that can be recycled due to the long wait-times. The high school operations manager has indicated that they could use more water for irrigation if it were available.

  Each batch of recycled water produced by MCCSD contains approximately 34,000 gallons, transferred at a rate of 52 gallons per minute (gpm), for a total transfer time of more than 10 hours. Transfers typically begin during the day (Day 1) and automatically shut off at night once the tank is full. The following day (Day 2), bacteriological samples are analyzed and the high school is notified that the water is safe for use. The high school begins irrigation the following morning (Day 3) between approximately 5 a.m. and 9 a.m. to minimize potential contact with anyone using the athletic fields. The entire process for producing one batch of recycled water can take approximately 36 hours. Due to the batch processing time required for pumping and testing, the recycled water system is limited to producing 3 batches (102,000 gallons) per week.

  The current peak recycled water production rate is 0.034 MGD, whereas the ADWF at the MCCSD WWTF is 0.070 MGD, such that there is an additional 0.036 MGD available on days when recycled water is being transferred to the high school, and 0.070 MGD available on days when recycled water is being held for testing.

  The current offsite batch treatment process is insufficient to supply additional recycled water. The batch treatment process should be replaced with a continuous flow onsite disinfection and storage system that is capable of recycling up to 100% of the summer flows, when recycled water demand is greatest due to irrigation and construction needs. To meet disinfection requirements continuously onsite, a new chlorine contact chamber is needed. The existing chlorine contact chamber disinfects water for the ocean discharge at a lower chlorine dose than is required for recycled water and cannot be used for both processes. Using the existing contact chamber for both purposes would result in increased chlorination and dechlorination of the ocean discharge stream, and increased cost for additional chemicals.

  Recycled water can also be used for fire suppression, which the town of Mendocino does not currently have. The aging 2-inch PVC line that delivers recycled water to the high school storage tank is insufficient to handle fire flows, and is not in an accessible location for fire suppression for the town. Replacing the 2-inch line with a 6-inch line, and re-locating the pipe along city streets would meet both the needs of the high school and fire suppression. During construction of the original system in 1997, fire suppression needs were considered; however, funds were not available from the Mendocino Fire Protection District to pay the increased cost to add fire suppression equipment.

Enabling fire suppression use will increase the demand on recycled water, requiring more storage. An additional 30,000-gallon redwood water storage tank exists at the high school approximately 180 feet northeast of the 55,000-gallon concrete storage tank currently used for irrigation of the athletic fields. Connecting the 30,000-gallon redwood tank to the system would increase storage capacity of the recycled water system that could be made available for new and existing uses of recycled water.

Producing recycled water onsite at the WWTF using a new chlorine contact chamber will make recycled water available at the WWTF continuously. A storage tank is needed to equalize diurnal fluctuations in WWTF inflow and recycled water production, and recycled water use. An onsite storage tank would increase the capacity of the recycled water system and could provide a redundant reservoir for fire suppression water.

- **Plant Water System**
  The original plant water (PW) system pumped treated effluent from the existing ocean discharge equalization basin throughout the WWTF, which was used as non-potable water for wash-down and process water purposes. The ocean discharge equalization basin has become populated with small shrimp that have been pumped into the PW system where they clog filters, strainers, and process equipment. Because of the continuing issues with shrimp plugging the system, the equalization basin PW system has been abandoned and PW is currently being pumped from the chlorine contact chamber using the recycled water supply pump.

  PW is removed from the chlorine contact chamber, and any excess runoff is returned to the headworks in an internal loop that effectively increases the flow rate through the treatment system. MCCSD staff has noted problems with poor settling in the clarifier, and sludge washing out of the clarifier into the tertiary filters when both the dryer and belt press are operated at the same time. Due to the high demands of the dryer and belt press, these two processes cannot be operated on the same day.

  The PW system supply pump needs to be removed from the main treatment train and placed in the recycled water system to prevent washout of solids in the aeration basin when the dryer and belt press are operated at the same time. The recycled water system can also act as a reservoir to supply the PW system, when necessary, without disrupting normal operation of the WWTF. This can be accomplished using the existing high school storage tank, or by installing additional recycled water storage onsite.

  The PW pump and pressure tank were installed in 2001 and should be replaced with updated equipment.

- **Pump Station Controls**
  Currently, the three pump stations in the MCCSD collection system are controlled at each pump station. This system is antiquated and should be updated to provide remote control from a centralized system located at the WWTF main office. The recycled water system at the high school athletic fields is currently manually controlled by turning the pumps on to start charging the system, and is shut off automatically by a signal from a float switch inside the storage tank at the high school. This is necessary due to the current batch treatment process; however, a continuous flow-through treatment system will allow the recycled water pumps to be automated.

(iv) Existing Operational Management Issues

The MCCSD WWTF is currently sufficiently staffed with qualified operators. A Grade 3 wastewater operator is required to run the MCCSD WWTF. The MCCSD WWTF is exempted from the Grade 4 certification for tertiary treatment facilities, because the design flow is less than 1.0 MGD. MCCSD employs 3 full-time licensed operators: 1 Grade 4 operator, 1 Grade 3 operator, and 1 Grade 2 operator. Additionally, MCCSD has 1 "retired" operator on staff part-time. Current staffing levels are sufficient to operate the facility.

c) Reasonable Growth

The town of Mendocino's population in 2010 was 894 people with an average population growth rate of 0.8% per year between 2000 and 2010 (US Census Bureau, 2010). For a 20-year design period starting in 2017 with an annual population growth rate of 0.8%, the projected population in 2037 would be 1,083 people. Based upon a projected population increase of 140 people between 2017 and 2037, at 1.86 people per household and 200 gpd per EDU, the projected increase in wastewater flow would be approximately 15,000 gpd. The treatment system average daily flow rate is currently 0.081 MGD with a design capacity of 1 MGD. An average influent flow rate increase of 0.015 MGD would put the average daily flow rate at 0.096 MGD, less than 10% of the design flow rate of the facility.

Part 4 Alternatives Considered

1) Disinfection System Upgrade

a) Description

MCCSD currently uses liquid sodium hypochlorite for disinfection, calcium thiosulfate for dechlorination of final effluent discharged through the ocean outfall, and a calcium hypochlorite tablet feeder is maintained as a backup disinfection system. Liquid sodium hypochlorite is also used for additional disinfection of recycled water pumped to the MUSD high school storage tank. Liquid sodium hypochlorite is expensive to ship due to its weight and the remote location of the MCCSD WWTF. Liquid sodium hypochlorite also poses a health and safety risk for workers due to its corrosive properties. Alternatives considered for replacement of the existing disinfection systems are included in Table 11.

Table 11
Onsite Disinfection System Alternatives Considered
Mendocino City Community Services District

Proposed Project Component	Alternatives Description
Disinfection System	1. Optimize current facilities (no construction): operate and maintain existing facilities; infeasible. 2. Upgrade current facilities: construct new onsite chlorine generation system, new chlorine contact chamber, new 50,000-gallon recycled water storage tank, and new equipment and storage building; feasible. 3. Interconnect with other existing facilities: there is no other existing wastewater disinfection system close enough to provide service to the MCCSD; infeasible. 4. Build new centralized facilities: the construction of a new regional facility is outside the scope of this report; infeasible. 5. Develop decentralized systems: distribution of undisinfected wastewater for offsite disinfection increases the danger to public health due to exposure to human pathogens and hazardous chemicals used for disinfection; infeasible.

Onsite generation of a chlorine-based disinfectant from sodium chloride salt is a common technology used for disinfection of wastewater. Sodium chloride salt is non-toxic, and less expensive to ship than liquid sodium hypochlorite, because the main ingredient is dry salt as opposed to a liquid solution. The sodium chloride salt is dissolved into a brine solution and passed through an electrolytic cell where chlorine-based disinfectants are generated. Onsite generation of a chlorine-based disinfectant will reduce operational costs to MCCSD, create a safer working environment, and reduce environmental impacts resulting from shipping of the heavy liquid sodium hypochlorite.

The ocean discharge and recycled water systems include chemical feed pumps, chlorine analyzers, and feedback control equipment. The ocean discharge also requires a dechlorination system. The existing instrument building is not sufficient to house the addition of an onsite generation and storage system; therefore the new disinfection systems will require a new building.

A new chlorine contact chamber is necessary to increase the production of recycled water. The existing chlorine contact chamber is needed to disinfect effluent discharged through the ocean outfall, and cannot be used for both disinfection streams without over-chlorinating the ocean discharge. The existing chlorine contact chamber will continue to be used to meet disinfection requirements for discharge to the ocean outfall; effluent from the existing contact chamber can be pumped to the new contact chamber to meet the additional disinfection requirements for recycled water.

Once recycled water has met disinfection requirements onsite, a storage tank will be necessary to hold water for plant water needs, will provide a redundant reservoir for fire suppression water supply, add capacity to the recycled water system, and provide a reservoir for a proposed onsite public filling station described below in the section on recycled water distribution system expansion. Water can also be drawn from the storage tank and pumped up to the high school for immediate use. This will provide recycled water system operators with operational flexibility, and will increase the capacity of the recycled water system.

(i) Optimize Current Facilities Operation (No Construction)

Infeasible. Optimizing the existing disinfection systems includes maintenance and operation of the existing facilities. This alternative provides sufficient disinfection for the ocean outfall through the existing chlorine contact chamber without any modifications, and generates approximately 102,000 gallons per week of recycled water for irrigation of the MUSD high school athletic fields. This alternative limits recycled water use due to batch processing that requires more than 24 hours to treat and test for use, does not provide fire protection water, and maintains the high shipping costs and workplace hazards associated with the use of liquid sodium hypochlorite.

(ii) Upgrade Existing Facilities

Feasible. Upgrading the current disinfection systems includes switching from liquid hypochlorite to onsite generation of an alternative disinfectant, replacing injection pumps and chlorine analyzers for the ocean discharge and recycled water system, replacing the dechlorination feed system for the ocean discharge, addition of a new chlorine contact chamber for the recycled water system, and construction of a new building to house disinfection materials, equipment, and instrumentation.

Onsite generation of an alternative disinfectant is intended to reduce operating costs by eliminating the need for costly shipping of heavy liquid sodium hypochlorite, and increase workplace safety by reducing storage and handling of dangerous chemicals. Alternative disinfectants considered for onsite generation include sodium hypochlorite and mixed oxidant solution (MOS). The electrolytic cells of onsite generation systems must be backwashed and cleaned periodically, and the backwash will be discharged into the wastewater stream upstream of the aeration chamber. The backwash from the electrolytic cells is expected to be very small in relation to the total wastewater stream and will contain sodium as a byproduct of the sodium chloride salt used to generate the chlorine-based disinfectant.

This alternative also includes increasing production of recycled water to meet the increased demand during the summer when groundwater resources are under increased pressure.

(iii) Interconnect With Other Existing Systems

Infeasible. There is no other existing wastewater disinfection system close enough to provide service to the MCCSD.

(iv) Build New Centralized Facilities For Regional/Joint Management

Infeasible. This alternative is infeasible as the construction of a new regional facility is outside the scope of this report.

(v) Develop Centrally Managed Decentralized Systems

Infeasible. Distribution of unprocessed wastewater for offsite disinfection increases the danger to public health due to exposure to human pathogens and hazardous chemicals used for disinfection.

b) Design Criteria

1. Existing liquid sodium hypochlorite disinfection system will be removed and replaced with a new onsite liquid chemical oxidant generation and disinfection system.
    a. The new system will meet, at a minimum, disinfection requirements for the ocean discharge and recycled water systems set forth by the RWQCB described below in "Disinfection Requirements."
        i. The ocean discharge disinfection system will include injection, monitoring, and control equipment necessary to maintain a minimum dose of 6.0 mg/L FAC during peak flows.
        ii. The recycled water disinfection system will include injection, monitoring, and control equipment necessary to maintain a minimum dose of 7.1 mg/L FAC during peak flows.
    b. The new disinfection system will include all equipment necessary for onsite generation, storage, injection, monitoring, and control of a liquid chemical oxidant for disinfection.
    c. The new system will be compatible with backup tablet calcium hypochlorite disinfection system for redundancy.
    d. The new system will produce a liquid chemical oxidant for disinfection capable of minimizing biofilm growth and accumulation, in contact chambers, distribution piping, and irrigation systems.
2. A new dechlorination system for the ocean discharge will be installed to replace the existing calcium thiosulfate feed system.
    a. The new dechlorination system will be capable of meeting dechlorination requirements set forth by the RWQCB described below in "Dechlorination Requirements."
    b. The new system will include new equipment necessary for storage, feed, injection, monitoring, and control of a chemical de-chlorinating agent.
3. A new recycled water disinfection contact chamber will be constructed onsite to replace the current offsite batch treatment process.

   a. The new contact chamber will, at a minimum, be capable of maintaining a modal contact time of 90 minutes at peak flows in accordance with RWQCB requirements for recycled water described below in "Recycled Water Contact Time Requirements."
      i. The new contact chamber will include longitudinal serpentine baffles to create channels with a wetted depth to width ratio of 1.0 and a minimum length to width ratio of 40.
   b. The new contact chamber will be covered by metal grating or equivalent for safety and access.
   c. The new contact chamber will discharge to a wet well over a weir structure to control the flow rate and water level in the contact chamber.
   d. The new contact chamber will discharge into a wet well that will be deeper than the invert of the storage tank to ensure that a submersible pump can drain the storage tank when necessary for maintenance and cleaning.
4. A new 50,000-gallon onsite recycled water storage tank will be constructed.
   a. The new onsite storage tank will include level controls connected to a PLC; the tank PLC will also be tied into level control of other offsite recycled water storage tanks.
   b. The new onsite storage tank will be constructed to allow construction of the equipment and storage building on top of the tank.
   c. Backflow prevention devices will be installed on any part of the recycled water system that has an alternative potable water connection in accordance with CCR §7601-7605.
   d. The new onsite storage tank will include a mixer to help prevent re-growth of bacteria.
5. A new building will be constructed to house disinfection system equipment, controls, electrical, raw materials storage, and a pickup truck.
   a. The new building must meet approval of the historical society.
   b. The new building will be wood framed with gable trusses.
   c. The look will match the existing buildings meaning a 9:12 slope (horizontal to vertical), with 10-12-foot high walls sheathed and sided in T1-11 siding and painted to match.
   d. The exterior personnel and roll-up doors will be painted wood with stainless handles and hinges.
   e. Any exterior lighting will match the existing fixtures.
   f. The roof will be a 30-year dark grey composition shingle roofing.

(i) Disinfection Requirements

Disinfection at the MCCSD WWTF must meet the dual criteria of the NPDES ocean discharge limits and the WDR for recycled water (Order Number R1-2015-0039, NPDES Number CA0022870, and WDID Number 1B83129OMEN). Disinfection requirements for the ocean discharge include a median monthly limit of 70 most probable number of coliform colonies per 100 milliliters (MPN/100 ml) or a maximum single value of 230 MPN/100 ml. The tertiary treated recycled water disinfection standards are lower than the ocean discharge values, requiring a 7-day median limit of 2.2 MPN/100 ml, a 30-day single sample maximum of 23 MPN/100 ml, and a single sample maximum of 240 MPN/100 ml.

(ii) Dechlorination Requirements

Total chlorine residual in the ocean discharge must be reduced to a maximum daily concentration of 0.81 mg/L, an instantaneous maximum of 6.06 mg/L, or a 6-month median of 0.20 mg/L in accordance with the current RWQCB WDR Order No. R1-2015-0039.

(iii) Recycled Water Contact Time Requirements

According to RWQCB Order R1-2015-0039, recycled water must meet a residual chlorine concentration and contact time (CT) requirement of 450 milligram-minutes per liter (mg-min/L) with a minimum modal contact time of 90 minutes. Modal contact time is defined as:

> *the amount of time elapsed between the time that a tracer, such as salt or dye, is injected into the influent at the entrance to a chamber and the time that the highest concentration of the tracer is observed in the effluent from the chamber* (CCR §60301.600).

c) Map

A site map showing location of the proposed contact chamber, storage tank, and control building is included as Figure 11. A process diagram showing the proposed disinfection systems is included as Figure 12.

d) Environmental Impacts

A new in-ground chlorine contact chamber and recycled water storage tank, and a new equipment storage building will be constructed within the property boundaries of the existing WWTF. The new contact chamber and storage tank is proposed to be constructed in-ground which will require excavation. Because proposed ground disturbing activities have some potential to impact biological and/or cultural resources, biological and cultural resource studies are being completed as part of the CEQA and NEPA documentation. These reports will recommend any necessary avoidance and/or mitigation measures which may be required. It is anticipated that no significant environmental impacts will result from construction of the new in-ground chlorine contact chamber and equipment building. Existing facilities at the WWTF are in-ground at a depth similar to the proposed chlorine contact chamber and have not been shown to impact groundwater.

Environmental impacts associated with materials shipping will decrease with respect to the reduced shipping weight of sodium chloride salt compared with liquid sodium hypochlorite. MCCSD currently uses approximately 41,000 lbs of sodium hypochlorite per year, while the projected use of sodium chloride salt for onsite chlorine generation is less than 5,000 lbs per year.

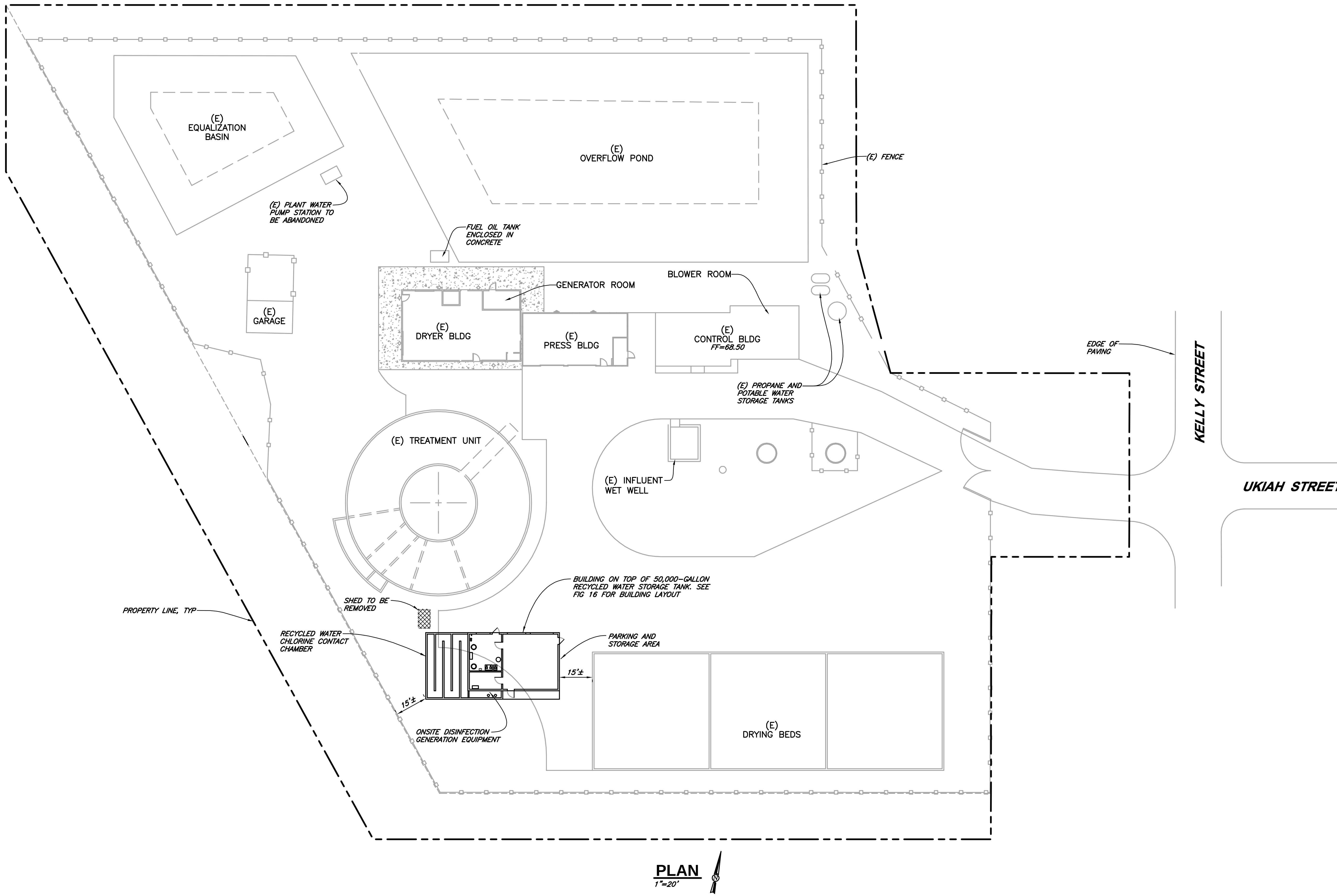
Onsite disinfectant generation will increase power consumption at the facility from the electrolytic cell that converts the salt brine to a chlorine-based disinfectant solution.

e) Land Requirements

All disinfection system additions will be located within the confines of the existing WWTF owned by MCCSD.

f) Potential Construction Problems

Soft sediments have been verified in the vicinity of the potential new chlorine contact chamber and storage tank that are approximately 15 feet deep, below which is hard rock, allowing sufficient



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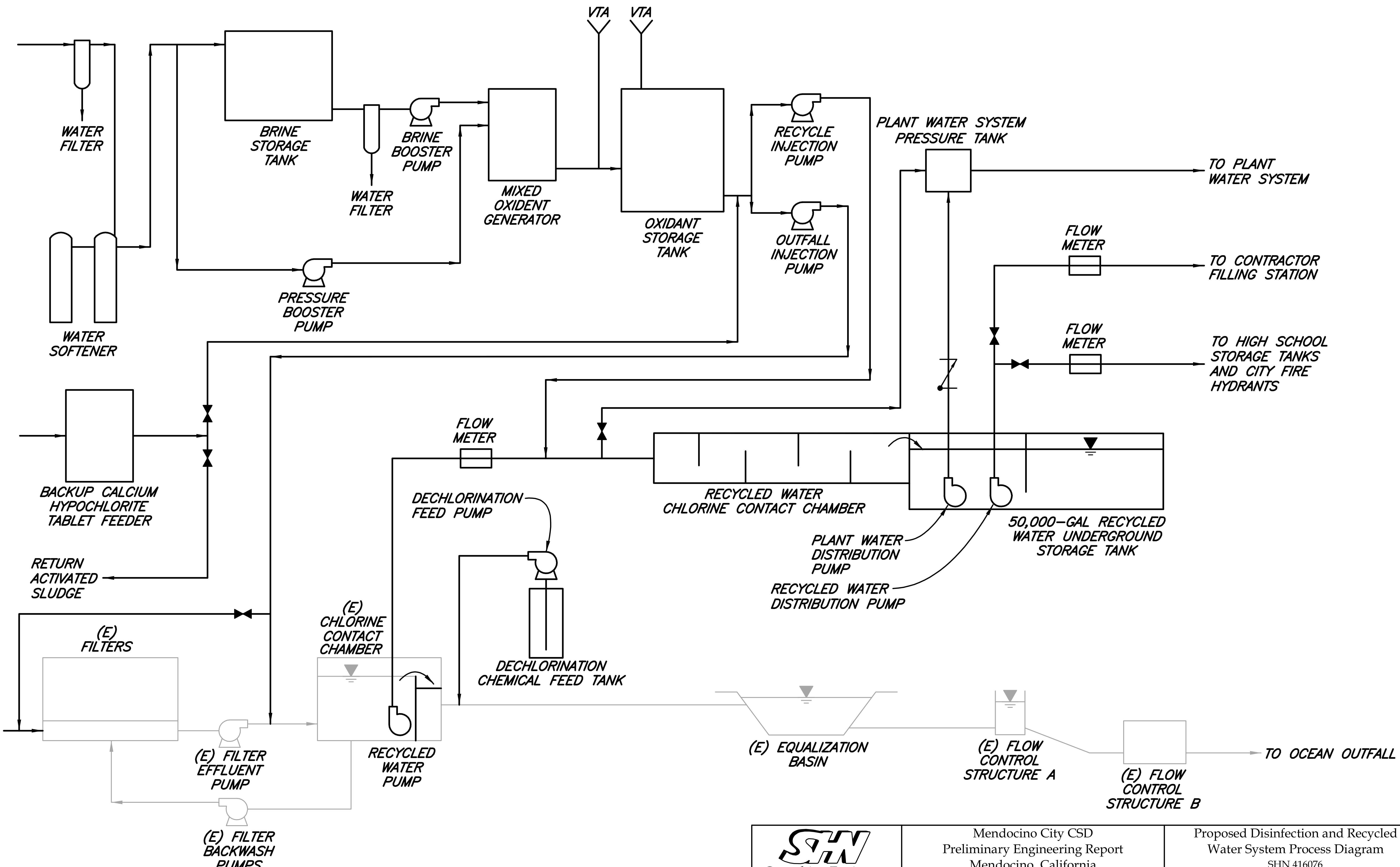
MENDOCINO CITY CSD
PRELIMINARY ENGINEERING REPORT
MENDOCINO, CALIFORNIA

PROPOSED DISINFECTION SYSTEM UPGRADE SITE PLAN

FIGURE 11

DATE 03/2017
PROJ. NO. 416076



SHN Consulting Engineers & Geologists, Inc.

Mendocino City CSD
Preliminary Engineering Report
Mendocino, California

Proposed Disinfection and Recycled Water System Process Diagram
SHN 416076

March 2017 | 416076-PROCESS | Figure 12

\\Eureka\Projects\CAD-FILES\Willits\2016\416076 , SAVED: 3/6/2017 1:56 PM NDOWNEY, PLOTTED: 3/6/2017 1:56 PM, NATHAN DOWNEY room for below-ground installation. Depending on the time of construction, groundwater entering the excavation area may require dewatering activities. Construction of the proposed chlorine contact chamber is proposed to occur during the summer to minimize potential impacts to and from groundwater during the wet season.

g) Sustainability Considerations

1) Water Efficiency

The addition of an onsite chlorine contact chamber for tertiary treated recycled water disinfection will increase the availability of recycled water to the community. Increasing the supply of recycled water to the community will decrease the demand placed on groundwater pumping.

2) Energy Efficiency

Not applicable; onsite generation of disinfectant will increase energy use.

3) Other

Environmental impacts associated with materials shipping will decrease with respect to the reduced shipping weight of sodium chloride salt compared with liquid sodium hypochlorite. MCCSD currently uses approximately 41,000 pounds of sodium hypochlorite per year; however, the projected use of sodium chloride salt for onsite chlorine generation is less than 5,000 lbs per year.

Use of a mixed oxidant chemical solution will reduce accumulation of biofilm in the high school irrigation system, and distribution lines, reducing maintenance costs and extending the useful life of equipment.

h) Cost Estimates

Construction costs for the onsite disinfection system and contact chamber are estimated to be approximately $1,283,700 (Table 12).

Table 12
Engineer's Opinion of Probable Cost for Disinfection System Upgrade
Mendocino City Community Services District

Description	Unit	Unit Cost	Quantity	Total Cost
Demolition	LS[(1)]	$ 1,000	1	$ 1,000
Recycled Water Chlorine Contact Chamber (23,000 gal[(2)])	LS	$ 130,000	1	$ 130,000
Recycled Water Storage Tank (50,000 gal)	LS	$ 358,000	1	$ 358,000
Chlorine Generation Building (1,000 sf[(3)] @ $300/sf)	LS	$ 300,000	1	$ 300,000
Chlorine Generation Packaged System ($60,000 + installation + taxes)	LS	$ 100,000	1	$ 100,000
Dechlorination System	LS	$ 3,000	1	$ 3,000
Chlorine Analyzer	EA[(4)]	$ 5,000	2	$ 10,000
Chemical Feed Pumps	EA	$ 3,000	6	$ 18,000
Transfer Pumps (to new contact basin)	EA	$ 7,000	2	$ 14,000
Variable Frequency Drive	EA	$ 3,000	1	$ 3,000
Site Work WWTF[(5)]	LS	$ 10,000	1	$ 10,000
Site Electrical	LS	$ 200,000	1	$ 200,000
Site Grading and Excavation	LS	$ 20,000	1	$ 20,000
Base Construction Subtotal				1,167,000
Mobilization/Demobilization (10%)				$ 116,700
Estimated Construction Subtotal				$ 1,283,700
Engineering Services (25% of Construction Subtotal)				$ 320,925
Project Subtotal				**$ 1,604,625**

1. LS: lump sum
2. gal: gallons
3. sf: square feet
4. EA: each
5. WWTF: wastewater treatment facility

Annual operating costs of the onsite chlorine generation system are estimated to be approximately $1,150 per year, including the cost of electricity to run the electrolytic cell and the cost of purchasing sodium chloride salt (Table 13). Table 14 summarizes annual short-lived asset reserves required for components of the disinfection system upgrades.

Table 13
Estimated Annual Operating Costs for Disinfection System Upgrade
Mendocino City Community Services District

Description	Cost
Annual Power Cost	$ 700
Annual Sodium Chloride Salt Cost	$ 450
Total Annual Operating Cost	**$ 1,150**

Table 14
Estimated Short-Lived Asset Reserve for Disinfection System Upgrade
Mendocino City Community Services District

Description	Replacement Cost	Quantity	Useful Life (years)	Annual Reserve
Submersible Pump Replacement Parts	$ 1,500	2	5	$ 600.00
Variable Frequency Drive	$ 3,000	1	5	$ 600.00
Chemical Feed Pump	$ 3,000	3	3	$ 3,000.00
Onsite Generation Equipment				
Valves and Fittings	$ 125	1	5	$ 25.00
Brine Proportional Pump	$ 1,000	1	5	$ 200.00
Switchgear/Controls Maintenance	$ 500	1	10	$ 50.00
Electrolytic Cell	$ 11,655	3	10	$ 1,165.50
Filters	$ 20	1	1	$ 20.00
Total Annual Replacement Reserve				**$ 5,660.50**

i) Technically Unfeasible Alternatives

(i) Optimize Current Facilities Operation (No Construction)

This alternative limits recycled water use due to batch processing that requires longer than 24 hours to treat and test for use, does not provide fire protection water, and maintains the high shipping costs and workplace hazards associated with the use of liquid sodium hypochlorite.

(ii) Upgrade Existing Facilities

Alternative disinfectants include ozone and UV; both options are considered infeasible due to the high power demand of these technologies compared with onsite chlorine-based disinfectant generation.

(iii) Interconnect With Other Existing Systems

There is no other existing wastewater disinfection system close enough to provide service to MCCSD.

(iv) Build New Centralized Facilities For Regional/Joint Management

The construction of a new regional facility is outside the scope of this report.

(v) Develop Centrally Managed Decentralized Systems

Distribution of unprocessed wastewater for offsite disinfection increases the danger to public health due to exposure to human pathogens and hazardous chemicals used for disinfection.

2) Recycled Water Distribution System Expansion

a) Description

The existing recycled water distribution system consists of a 2-inch PVC pipe that crosses the State Parks property to the north of the WWTF and runs behind a residential neighborhood to the high school. The pipe is approximately 40 years old, reportedly in poor condition, and should be replaced before it fails. The town also needs a fire suppression system, and could use the recycled water for fire suppression if the pipe diameter is increased and placed in city streets for easy access to hydrants by the Mendocino Fire Protection District. There is also an empty 30,000-gallon redwood water tank at the high school that the MUSD has agreed can be tied into the recycled water system for added capacity and gravity flow to the fire hydrants. Increasing the supply of recycled water includes adding onsite storage capacity at the WWTF and a public filling station. Alternatives considered for the recycled water distribution system are included in Table 15.

Table 15
Recycled Water Distribution System Expansion Alternatives Considered
Mendocino City Community Services District

Proposed Project Component	Alternatives Description
Recycled Water Distribution System	1. Optimize current facilities (no construction): the existing recycled water distribution system needs replacement; infeasible. 2. Upgrade current facilities: replace 2-inch recycled water distribution line on State Parks land with 6-inch line on city streets, add tees and flanges for fire suppression system connection, connect existing 30,000-gallon redwood tank at high school to recycled water system, add onsite public filling station, install new plant water pump and pressure tank system; feasible. 3. Interconnect with other existing facilities: no other facilities exist; infeasible. 4. Build new centralized facilities: there is no other community in close enough proximity; infeasible. 5. Develop decentralized systems: there is not enough distributed supply of recycled water to warrant construction of decentralized distribution systems; infeasible.

(i) Optimize Current Facilities Operation (No Construction)

Infeasible. The existing 2-inch PVC line is in need of replacement and cannot be optimized.

(ii) Upgrade Existing Facilities

Feasible. The existing 2-inch PVC line that supplies recycled water to the high school needs to be replaced and the city needs a fire suppression system. By combining the two needs, MCCSD will be able to reduce capital costs of constructing a fire suppression system, increase recycled water use, and reduce pumping of groundwater. The addition of an onsite hydrant for the recycled water system can serve as a fire hydrant, as well as a public filling station. Connecting the 30,000-gallon redwood tank at the high school will add recycled water storage capacity for irrigation and fire suppression needs. The WWTF also needs to replace the PW pressure system since the original pump and pressure tank were abandoned due to shrimp contamination from the ocean discharge equalization basin. Installing a new PW pressure system in the proposed 50,000-gallon onsite recycled water storage tank will add redundancy for the PW system and increase worker safety by ensuring any human contact with PW is following the recycled water disinfection process.

A preliminary water balance for the proposed recycled water system has been considered. MCCSD staff has indicated that the high school may use the equivalent to an additional 34,000-gallon batch of recycled water per week for a total proposed use of 136,000 gallons per week. Following irrigation, MUSD must let the athletic fields rest so that the recycled water can infiltrate before re-application, to prevent runoff. Assuming MUSD can irrigate every other day, this would result in the application of approximately 40,000 gallons every other day. PW uses are known and will not change (PW uses are described above in the section describing "Condition of Existing Facilities: Plant Water"). Table 16 includes the existing 7-day recycled water use schedule including the biosolids belt press and dryer that make up the PW demand, and the high school irrigation schedule. Table 17 includes a proposed 7-day recycled water use schedule maintaining the existing PW demand schedule, increasing the high school irrigation schedule as described above, and adding the fill station at a rate of 25,000 gpd. Based on the proposed schedule in Table 17 and at the ADWF of 70,000 gpd, a preliminary water balance indicates that there will be enough water in the system to keep the 50,000-gallon onsite tank, and the 30,000-gallon redwood tank at the high school full, with the 55,000-gallon high school tank fluctuating to meet the needs of the irrigation schedule (Appendix E). Keeping the 50,000-gallon and 30,000-gallon tanks full provides water for fire suppression, and allows operational flexibility for transferring water to the various uses in the system.

Table 16
Existing Daily Recycled Water Demand Schedule
Mendocino Community Services District

Day	Fenton Dryer gpd[1]	Belt Press gpd	High School gpd	Total gpd
Monday	0	0	34,000	34,000
Tuesday	39,000	0	0	39,000
Wednesday	0	19,200	34,000	53,200
Thursday	39,000	0	0	39,000
Friday	0	0	34,000	34,000
Saturday	0	0	0	0
Sunday	0	0	0	0

1. gpd: gallons per day

Table 17
Proposed Daily Recycled Water Demand Schedule
Mendocino Community Services District WWTF

Day	Fenton Dryer gpd	Belt Press gpd	High School gpd	Fill Station gpd	Total gpd
Monday	0	0	40,000	25,000	65,000
Tuesday	39,000	0	0	25,000	64,000
Wednesday	0	19,200	40,000	25,000	84,200
Thursday	39,000	0	0	25,000	64,000
Friday	0	0	40,000	25,000	65,000
Saturday	0	0	0	0	0
Sunday	0	0	40,000	0	40,000

1. gpd: gallons per day

(iii) Interconnect With Other Existing Systems

Infeasible. There is no other recycled water system or fire suppression system nearby to which the system could connect.

(iv) Build New Centralized Facilities for Regional/Joint Management

Infeasible. This alternative is infeasible as the construction of a new regional facility is outside the scope of this report.

(v) Develop Centrally Managed Decentralized Systems

Infeasible. There is not enough distributed supply of recycled water to warrant construction of decentralized distribution systems.

b) Design Criteria

(i) General Criteria

1. All components of the recycled water system will comply with MCCSD's Title 22 engineering report and backflow prevention program.
2. A new recycled water distribution pipe will be installed from the new recycled water disinfection and storage system at the WWTF to the storage tanks at the high school.
    a. The new distribution pipe will be capable of meeting minimum fire flow requirements for the State of California.
    b. The new distribution pipe will include tees and flanges for connection of fire hydrants to be purchased and installed by the Mendocino City Fire Protection District.
    c. The new distribution pipe will include isolation valves at each hydrant location.
    d. The new distribution pipe will continue from the recycled water disinfection and storage system at the WWTF, eastward along Ukiah Street, and turn northward on Kasten Street to the high school.

3. A new PLC will be installed in the main office of the WWTF capable of monitoring, displaying, and controlling water levels in all tanks.
   a. PLC programming will allow for operation of the recycled water system as described below in "Recycled Water Demand Priorities."
4. New level sensors will be installed in the new 50,000-gallon underground storage tank at the WWTF, and in the existing 30,000-gallon redwood tank and the existing 55,000-gallon concrete tank at the high school.
   a. Level sensors will be connected to a new PLC located at the main office of the WWTF and controls will be hard-wired using signal wires placed along the new recycled water pipe route.
5. A new recycled water filling station will be installed inside the WWTF yard.
   a. The filling station will include a hydrant for filling water tanks.
   b. The filling station hydrant will be plumbed into the main recycled water distribution line and capable of being controlled by either pump pressure using the main distribution pumps, or static pressure from water in the 30,000-gallon storage tank at the high school.
   c. The filling station hydrant and controls will include security locks for control by MCCSD staff.
6. Two new submersible distribution pumps will be installed to supply the filling station, fire hydrants and high school storage tanks.
   a. The two pumps will be installed in a wet well adjacent to the new chlorine contact chamber and recycled water storage tank.
   b. The two pumps will be capable of delivering 500 gpm individually, to the redwood storage tank located at the MUSD high school (to be run one pump at a time, with the second pump provided for redundancy).
7. A new PW submersible pump and pressure tank system will be installed.
   a. The new PW submersible pump and pressure tank will be capable of delivering 75 gpm at 60-80 pounds per square inch (psi) to the PW system.
   b. The new submersible pump will be installed in a wet well adjacent to the new chlorine contact chamber and recycled water storage tank.
   c. The new PW pressure tank will be located inside the new equipment building located on top of the new 50,000-gallon underground storage tank.
   d. The new PW pressure system will be plumbed into the new recycled water force main to provide redundant static water supply from the 30,000-gallon redwood storage tank at the high school.

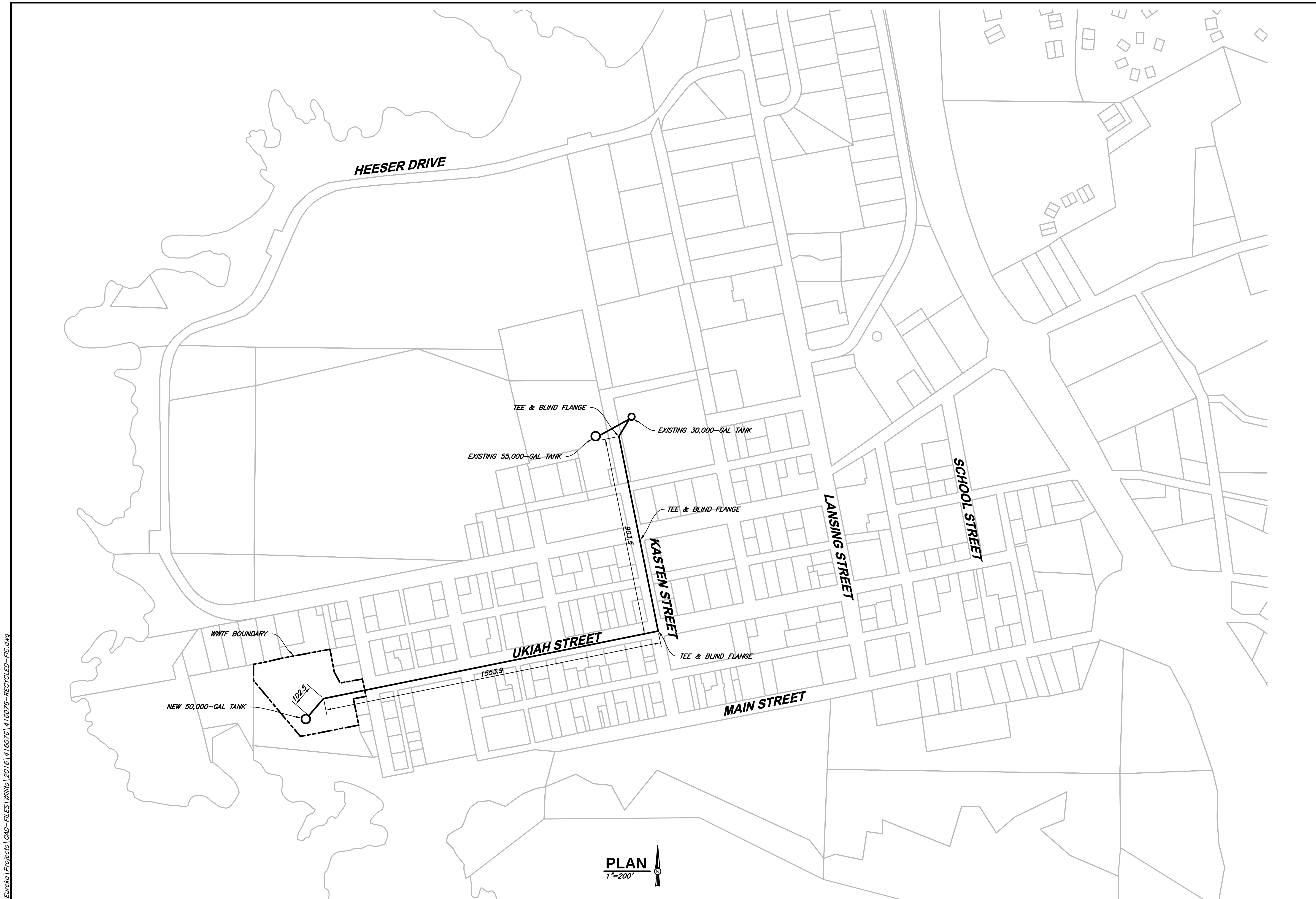
(ii) Recycled Water Demand Priorities

The recycled water system will have the following components listed in order of demand priority:

1. PW system at WWTF
2. Fire suppression water supply
3. High School athletic field irrigation
4. Public fill station at WWTF

c) Map

A map of the proposed recycled water distribution alignment is included as Figure 13.



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MENDOCINO CITY CSD
PRELIMINARY ENGINEERING REPORT
MENDOCINO, CALIFORNIA

PROPOSED RECYCLED WATER DISTRIBUTION SYSTEM

FIGURE 13

DATE 03/2017

PROJ. NO. 416076

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d) Environmental Impacts

Installation of a new recycled water distribution pipe network will occur entirely within existing city streets and MUSD high school property. No environmental impacts are expected to be associated with this part of the project. The existing 2-inch delivery line on State Park land will be abandoned in place.

Installation of a new recycled water distribution pipe network will occur primarily within areas covered by paved roadways. The existing 2-inch delivery line on State Park land will be abandoned in place. Because proposed ground disturbing activities have some potential to impact biological and/or cultural resources, biological and cultural resource studies are being completed as part of the CEQA and NEPA documentation. These reports will recommend any necessary avoidance and/or mitigation measures which may be required. It is anticipated that no significant environmental impacts will result from construction of the new recycled water distribution pipe network.

e) Land Requirements

No additional land acquisition or easement is expected.

f) Potential Construction Problems

All new construction will take place within existing city streets. Conflicts with existing utilities can be resolved with minor adjustments to the pipe alignment.

g) Sustainability Considerations

1) Water Efficiency

The purpose of the new recycled water distribution network is to provide increased access to recycled water for fire suppression and irrigation of athletic fields at the MUSD high school. Increasing recycled water use reduces the pressure placed on groundwater pumping within the MCCSD.

2) Energy Efficiency

Not applicable.

3) Other

Moving the pipe network alignment beneath city streets also removes the system from the sensitive habitats of the State Park lands to the north of the WWTF. The new pipe network will also supply the town with a fire suppression system that will increase public safety and protect property.

h) Cost Estimates

Capital costs for upgrading the recycled water system are included in Table 18 below. Operations and maintenance costs are expected to be minimal; some additional energy for pumping will be required if the diameter of the pipe is increased to the high school and additional water is supplied. The onsite fill station may require some additional personnel time for management and operation to ensure users are complying with safety regulations. Users of the fill station will require special training and certification, renewed annually, to comply with MCCSD's recycled water program (MCCSD's safety regulations can be found in their Title 22 engineering report in Appendix B). Table 19 includes a summary of short-lived asset annual reserves required for the recycled water distribution system expansion.

Table 18
Engineer's Opinion of Probable Cost for Recycled Water Distribution System Expansion
Mendocino City Community Services District

Description	Unit	Unit Cost	Quantity	Total Cost
Traffic Control	LS(1)	$ 12,000	1	$ 12,000
Six-inch C-900 Purple PVC Water Main	LF(2)	$ 90	2,560	$ 230,400
Six-inch Fire Hydrant Assembly	Each	$ 5,000	4	$ 20,000
Recycled Water Distribution Pumps	Each	$ 10,000	2	$ 20,000
Pump Controls	Each	$ 10,000	1	$ 10,000
Plant Water Pressure System	LS	$ 8,000	1	$ 8,000
Variable Frequency Drive	Each	$ 3,000	1	$ 3,000
Electric Water Valves	Each	$ 1,600	1	$ 1,600
Float Controls at Water Tanks	Each	$ 5,000	2	$ 10,000
Six-inch Water Main Valves	Each	$ 1,250	6	$ 7,500
Base Construction Subtotal				$ 322,500
Mobilization/Demobilization (10%)				$ 32,250
Estimated Construction Subtotal				$ 354,750
Engineering Services (25% of Construction Subtotal)				$ 88,688
Project Subtotal				**$ 443,438**

1. LS: lump sum 2. LF: lineal foot

Table 19
Estimated Short-Lived Asset Reserve for Recycled Water Distribution System Expansion
Mendocino City Community Services District

Description	Replacement Cost	Quantity	Useful Life (years)	Annual Reserve
Submersible Pump Replacement Parts	$ 1,500	4	5	$ 1,200
Variable Frequency Drive	$ 3,000	1	5	$ 600
Total Annual Replacement Reserve				**$ 1,800**

i) Technically Unfeasible Alternatives

(i) Optimize Current Facilities Operation (No Construction)

The existing 2-inch PVC line is in need of replacement and cannot be optimized.

(ii) Upgrade Existing Facilities

An expanded alternative to distribute recycled water to other parts of town including public restrooms, parks, a cemetery, and two additional offsite storage tanks was considered (Figure 14). This alternative created a significantly larger recycled water system (adding two public bathrooms and more than doubling the area for irrigation) which, upon further review was determined to exceed the potential recycled water supply from the MCCSD WWTF during the summer time. This alternative is therefore unfeasible.

(iii) Interconnect With Other Existing Systems

There is no other recycled water system or fire suppression system nearby to which the system could connect.

(iv) Build New Centralized Facilities for Regional/Joint Management

The construction of a new regional facility is outside the scope of this report.

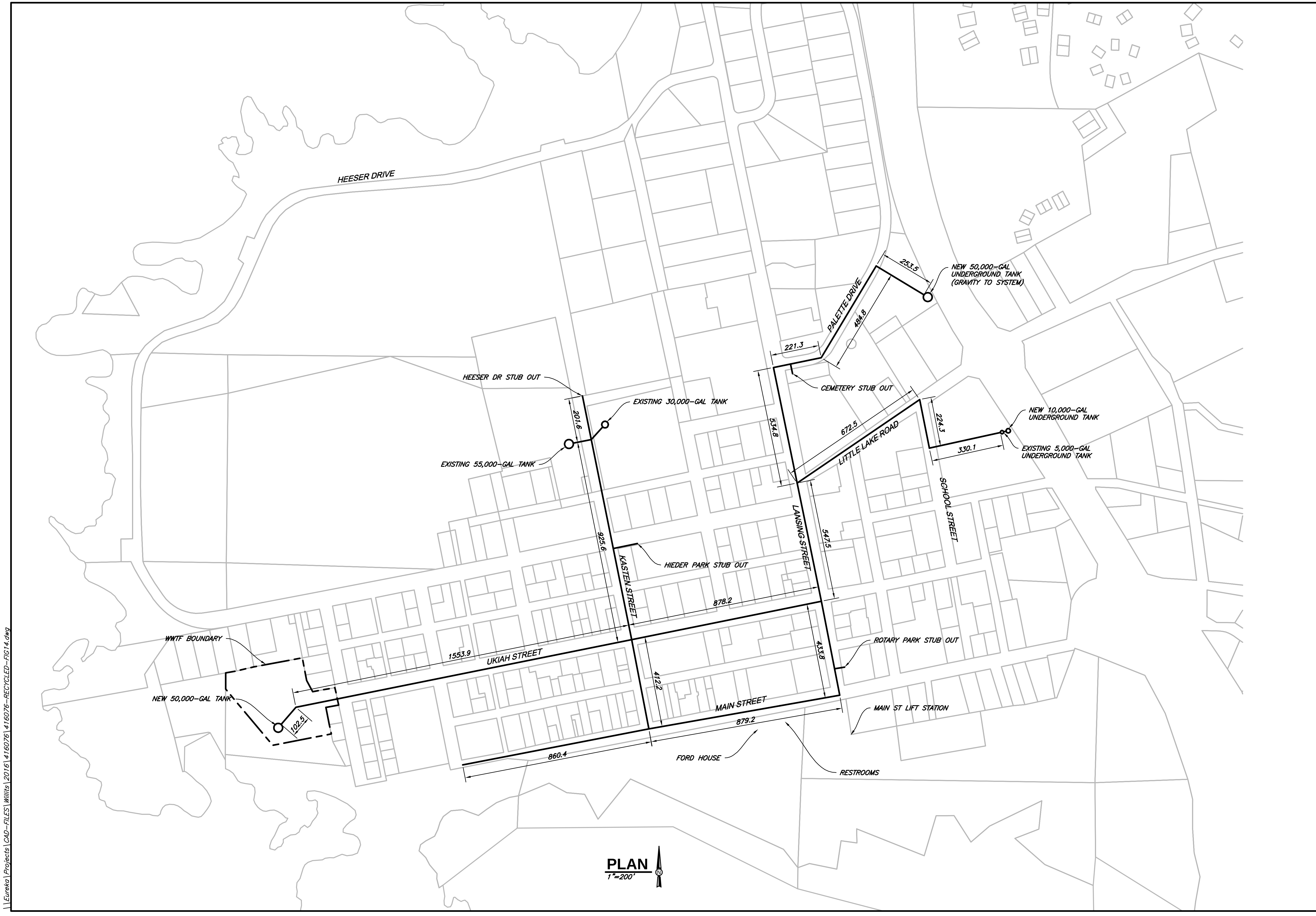
(v) Develop Centrally Managed Decentralized Systems

There is not enough distributed supply of recycled water to warrant construction of decentralized distribution systems.

3) Sludge Drying Bed Rehabilitation

a) Description

The existing sludge drying beds have surpassed their useful life expectancy and are in need of repair or replacement. The drying beds provide much needed redundancy to the current sludge/biosolids treatment process. The WWTF digester fills in 1-2 weeks, at which point biosolids are moved through the belt press and dryer unit. If either of the mechanical units were to fail there is currently no back up process to treat the overflow biosolids. The drying beds would provide a minimum of one additional month of treatment. During warmer months, the drying beds would be used as an energy efficient alternative to the current treatment process. Alternatives considered for rehabilitation of the sludge drying beds are included in Table 20.



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NO.	DATE	REVISION	BY

DSGN TAH
DR SRH
CHK JGI
APVD

MENDOCINO CITY CSD
PRELIMINARY ENGINEERING REPORT
MENDOCINO, CALIFORNIA

RECYCLED WATER DISTRIBUTION SYSTEM–ALTERNATIVE 1

FIGURE 14

DATE 03/2017
PROJ. NO. 416076

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Table 20 Sludge Drying Bed Rehabilitation Alternatives Considered Mendocino City Community Services District	
Proposed Project Component	**Alternatives Description**
Sludge Stream Processing	1. Optimize current facilities (no construction): perform deferred maintenance through repair of existing drying beds; feasible. 2. Upgrade current facilities: upgrade drying beds with improved plumbing, concrete lining, access ramps, and a central infiltration trench; feasible. 3. Interconnect with other existing facilities: no other facilities exist; infeasible. 4. Build new centralized facilities: construction of a new regional facility is outside the scope of this project; infeasible. 5. Develop decentralized systems: number and concentration of existing groundwater wells in the vicinity preclude construction of decentralized systems; infeasible.

(i) Optimize Current Facilities Operation (No Construction)

Feasible. The current system includes a sludge press that is active and three drying beds that are currently inactive. The no construction alternative would be to perform the deferred maintenance on the inactive drying beds and include them in the sludge stream process for redundancy.

(ii) Upgrade Existing Facilities

Feasible. The sludge press is adequate, provided that the drying beds are brought online to provide redundancy. An upgrade of the drying beds would use the footprint and concrete stem walls of the existing beds. A new sludge distribution system and central infiltration trench in each of the three beds would replace the existing deteriorated piping system. The upgrade would also include lining the beds with concrete, sloped to a central infiltration trench, and ramps into the beds to allow for sludge cake clean-out with a small bobcat.

(iii) Interconnect With Other Existing Systems

Infeasible. This alternative is infeasible, because no other systems exist.

(iv) Build New Centralized Facilities For Regional/Joint Management

Infeasible. This alternative is infeasible, because the construction of a new regional facility is outside the scope of this report.

(v) Develop Centrally Managed Decentralized Systems

Infeasible. This alternative is infeasible, because the number and proximity of domestic water wells in the service area preclude the construction of additional decentralized systems.

b) Design Criteria

(i) Optimize Current Facilities Operation (No Construction)

Optimization of the current facilities operation would not require design or interaction with any regulatory agencies.

(ii) Upgrade Existing Facilities

Upgrading the drying beds would require design by a licensed Civil Engineer, and be subject to compliance with local and state building codes, including the County of Mendocino and the 2013 CBC. The project would also require a coastal development permit issued by the California Coastal Commission.

c) Map

Figure 3 shows the location of the drying beds; the proposed project will take place on the existing footprint of the drying beds.

d) Environmental Impacts

(i) Optimize Current Facilities Operation (No Construction)

The environmental impact of the repair alternative would be the potential leaching of sludge runoff into groundwater below the drying beds, because they are currently unlined. Because the repair alternative would not disturb any additional ground, no significant environmental effect is anticipated.

(ii) Upgrade Existing Facilities

The environmental impacts associated with the upgrade of the drying beds would be minimal. The drying beds require no energy to function and would potentially reduce the quantity of energy used in the current sludge stream process that uses only the press. Lining the beds would ensure that there is no leaching and infiltration of runoff from the sludge into groundwater. Because the upgrade of the drying beds would use the footprint and concrete stem walls of the existing beds and would not disturb any additional ground, no significant environmental effect is anticipated.

e) Land Requirements

The alternatives considered make use of the footprint of the existing drying bed structures and would require no additional land requirements.

f) Potential Construction Problems

(i) Optimize Current Facilities Operation (No Construction)

The construction related issues associated with repairing the existing drying beds are the deteriorated state of the existing piping and valves. Due to the proximity of the facility to the ocean and associated salt-air corrosion, many of the valves, left unused over an extended period, are frozen in position. Much of the existing piping would have to be overhauled or replaced.

(ii) Upgrade Existing Facilities

The construction related issues associated with upgrading the existing drying beds are minimal. Most of the deteriorated piping and infrastructure would be replaced; there are no foreseen challenges anticipated with the proposed upgrade.

g) Sustainability Considerations

1) Water Efficiency

The sustainability considerations, in terms of water reuse and recycle practices, are positive for both feasible alternatives. Both repair and upgrade of the drying beds would result in the reuse and potential recycling of water leached from the sludge.

2) Energy Efficiency

The energy efficiency of both feasible alternatives is also an integral part of the drying beds system. Drying beds use gravity and the heat from the sun to reduce the sludge to cake. The system is extremely energy efficient.

3) Other

The operational simplicity of the two alternatives can also be considered very high, because the system has very few moving parts and is a time tested solution for removing liquid content from sludge. Non-monetary factors in the evaluation include environmental impact and facility sustainability. Alternative 1 would result in continuing to use un-lined sludge drying beds with an increased possibility of groundwater and ocean contamination. Facility sustainability is also an issue with Alternative 1, because the availability of staff to perform the additional labor associated with manually harvesting the sludge and maintaining the functionality of the under drains may be limiting for the District.

h) Cost Estimates

(i) Optimize Current Facilities Operation (No Construction)

Construction costs associated with repair of the existing drying beds would have an estimated range of $20,000-$50,000 (Table 21). These costs would include performing deferred maintenance and replacing frozen valves and damaged piping. The non-construction costs associated with this alternative would be more significant. There would be no design or permitting costs associated with repair. However, the O&M costs of the repaired drying beds would be substantial due the labor intensive process associated with removing the sludge cake, by hand, from the beds and keeping the infiltration piping network clear of clogs. Valves and piping exposed to the elements would also need regular anti-corrosion maintenance. The O&M costs associated with this alternative would have an estimated range of $5,000-$10,000 annually.

Table 21
Engineer's Opinion of Probable Cost for Sludge Drying Bed Repair
Mendocino City Community Services District

Description	Unit	Unit Cost	Quantity	Total Cost
Sludge Drying Bed Repair	LS(1)	$ 10,000	3	$ 30,000
Base Construction Subtotal				$ 30,000
Mobilization/Demobilization (10%)				$ 3,000
Estimated Construction Subtotal				$ 33,000
Engineering Services (25% of Construction Subtotal)				$ 8,250
Project Subtotal				**$ 41,250**

1. LS: lump sum

(ii) Upgrade Existing Facilities

The construction costs associated with upgrading the drying beds would have an estimated range of $250,000-$350,000 (Table 22). The non-construction costs would include engineering design and permitting with an estimated range of $30,000-$50,000. O&M costs would be similar to those discussed for the repair alternative with the exception that an upgrade to the drying beds would include ramps to allow for mechanical collection of the sludge cake with a skid steer, reducing labor costs. The O&M costs associated with this alternative would have an estimated range of $1,000-$2,000 annually.

Table 22
Engineer's Opinion of Probable Cost for Sludge Drying Bed Rehabilitation
Mendocino City Community Services District

Description	Unit	Unit Cost	Quantity	Total Cost
Sludge Drying Bed Rehabilitation	LS(1)	$ 90,000	3	$ 270,000
Base Construction Subtotal				$ 270,000
Mobilization/Demobilization (10%)				$ 27,000
Estimated Construction Subtotal				$ 297,000
Engineering Services (25% of Construction Subtotal)				$ 74,250
Project Subtotal				**$ 371,250**

1. LS: lump sum

i) Technically Unfeasible Alternatives

(i) Interconnect With Other Existing Systems

This alternative is infeasible, because no other system exists.

(ii) Build New Centralized Facilities For Regional/Joint Management

This alternative is infeasible, because the construction of a new regional facility is outside the scope of this report.

(iii) Develop Centrally Managed Decentralized Systems

This alternative is infeasible, because the number and proximity of domestic water wells in the service area preclude the construction of additional decentralized systems.

4) Equalization Basin Liner Replacement

a) Description

The ocean outfall equalization basin liner needs replacement after reaching the end of its useful life. The basin liner has become degraded by exposure to natural UV light and is at risk of leaking treated effluent to groundwater. Alternatives considered for replacement of the equalization basin liner are included in Table 23.

Table 23
Equalization Basin Liner Replacement Alternatives Considered
Mendocino City Community Services District

Proposed Project Component	Alternatives Description
Equalization Basin	1. Optimize current facilities operation (no construction): repair existing equalization basin liner; infeasible. 2. Upgrade existing facilities: replace equalization basin liner; feasible. 3. Interconnect with other existing systems: no other systems exist; infeasible. 4. Build new centralized facilities for regional/joint management: construction of a new regional facility is outside the scope of this report; infeasible. 5. Develop centrally managed decentralized systems: the number and proximity of domestic water wells in the service area preclude the construction of additional decentralized systems; infeasible.

(i) Optimize Current Facilities Operation (No Construction)

Infeasible. The current equalization basin liner has been degraded over time by UV such that repairs to the existing liner may not prevent leaks from occurring in other locations.

(ii) Upgrade Existing Facilities

Feasible. An upgrade of the equalization basin liner would be to remove the existing liner and baffle structure, grade the area around the basin, and install a new Enviro Liner 7060 geomembrane or equal consisting of a 60 mil thickness fortified with added UV protection. The liner material will be compatible with the associated wastewater conditions experienced in the equalization basin. The basin is used to provide mixing and contact time for treated wastewater effluent that has been chlorinated and subsequently dechlorinated for discharge into the equalization basin prior to being discharged to the existing ocean outfall. Prior to the installation of the new liner a non-woven geotextile fabric will be placed as a cushion between the liner and the soil of the excavated basin.

(iii) Interconnect With Other Existing Systems

Infeasible. This alternative is infeasible, because no other system exists.

(iv) Build New Centralized Facilities For Regional/Joint Management

Infeasible. This alternative in infeasible, because the construction of a new regional facility is outside the scope of this report.

(v) Develop Centrally Managed Decentralized Systems

Infeasible. This alternative is infeasible, because the number and proximity of domestic water wells in the service area preclude the construction of additional decentralized systems.

b) Design Criteria

The replacement of the equalization basin liner will provide compliance with current federal, state, and local regulatory requirements and will not require any new permitting to be installed. The installation of a new liner will provide relative maintenance free and a regulatory compliant method of mixing the de-chlorinated effluent prior to discharge to the ocean outfall.

c) Map

See Figure 3 for location of the ocean discharge equalization basin liner.

d) Environmental Impacts

The replacement of the existing basin liner is expected to reduce the environmental impact from the existing condition where the basin liner may be leaking. Because proposed ground disturbing activities have some potential to impact biological and/or cultural resources, biological and cultural resource studies are being completed as part of the CEQA and NEPA documentation. These reports will recommend any necessary avoidance and/or mitigation measures that may be required. It is anticipated that no significant environmental impact will result from replacement of the equalization basin liner.

e) Land Requirements

Figure 3 shows the location of the existing equalization basin. The new basin liner will be installed on the same footprint with the modification of the existing earth berm and fence on the north side of the basin which are to be graded and moved approximately 10 feet northward to align with the other northern fence line.

f) Potential Construction Problems

There is no anticipated construction problem with replacing the basin liner, because the existing basin footprint will continue to be used.

g) Sustainability Considerations

1) Water Efficiency

Not applicable; replacing the equalization basin liner will have no impact on water use.

2) Energy Efficiency

Not applicable; replacing the equalization basin liner will have no impact on energy use.

3) Other

The replacement of the existing basin liner with a material that will last more than 20 years is the most sustainable and efficient use of material, and resources and manual labor for maintenance.

h) Cost Estimates

The construction cost associated with the replacement of the equalization basin liner will have an estimated range of $45,000 to $55,000 to provide a new liner, perform field fabrication, and install the new liner with a geotextile place beneath the new liner as a protective cushion (Table 24). The construction will also include minor site grading around the existing basin footprint.

With a 20-year weathering warranty, a service life of 20 to 30 years can be expected for the new liner. The capital cost for design and installation of a new liner would be $60,000 to $65,000. The new liner with an estimated service life of 25 years (using straight-line depreciation) will have a salvage value of 20% of the capital cost equal to $5,000 after 20 years.

Table 24
Engineer's Opinion of Probable Cost for Equalization Basin Liner Replacement
Mendocino City Community Services District

Description	Unit	Unit Cost	Quantity	Total Cost
Equalization Basin Liner Replacement	LS(1)	$ 45,000	1	$ 45,000
Base Construction Subtotal				$ 45,000
Mobilization/Demobilization (10%)				$ 4,500
Estimated Construction Subtotal				$ 49,500
Engineering Services (25% of Construction Subtotal)				$ 12,375
Project Subtotal				**$ 61,875**
1. LS: lump sum				

i) Technically Unfeasible Alternatives

(i) Optimize Current Facilities Operation (No Construction)

Repair of the existing basin liner may present future maintenance problems as the remaining material from the original liner continues to breakdown and cause pond effluent leakage. Repair of the existing liner could also present minor environment issues if the treated effluent were to begin leak through the old areas of the liner causing saturation of the soil around the basin. The effluent currently meets tertiary treatment and chlorination rules and regulations to meet Title 22 compliance for recycled water use for irrigation of athletic fields, thus the potential for environmental contamination is low if it a small leak develops in the pond liner.

(ii) Interconnect With Other Existing Systems

Because of the unique and remote location of the town of Mendocino it is infeasible to connect the waste water treatment system to another system.

(iii) Build New Centralized Facilities For Regional/Joint Management

To build a new centralized regional facility is beyond the scope of this project.

(iv) Develop Centrally Managed Decentralized Systems

To develop centrally managed decentralized treatment systems would be to convert to private wastewater treatment/disposal systems, which is not feasible, because nearly all of the residential and commercial units within the town are on individual wells for domestic water.

5) Filter Backwash Control Panel Replacement

a) Description

The existing backwash control panel was installed in 1975 during the original plant construction. Although the backwash control system has performed well over the years, the control panel has out lived its expected life. The existing control panel is based on timer and relay technology which has become obsolete. Spare parts required for routine maintenance are no longer available when components wear out or break. In order to ensure the continued performance of the filter backwash system, the existing backwash control panel requires replacement with a state of the art PLC. Alternatives considered for replacement of the filter backwash control panel are included in Table 25.

Table 25
Filter Backwash Control Panel Replacement Alternatives Considered
Mendocino City Community Services District

Proposed Project Component	Alternatives Description
PLC Controller	1. Optimize current facilities operation (no construction): repair existing filter backwash control panel; infeasible. 2. Upgrade existing facilities: replace filter backwash control panel; feasible. 3. Interconnect with other existing systems: there are not any existing PLCs(1) at the WWTF(2) that would accept the additional programming requirements; infeasible. 4. Build new centralized facilities for regional/joint management: control panel replacement does not require a new centralized facility; infeasible. 5. Develop centrally managed decentralized systems: existing control panel is located at existing filters and cannot be easily fed from the main control room of the WWTF; infeasible.

1. PLCs: programmable logic controllers 2. WWTF: wastewater treatment facility

(i) Optimize Current Facilities Operation (No Construction)

Infeasible. The existing filter backwash control panel was built using technology that has since been rendered obsolete. Replacement parts are no longer manufactured and acquiring parts required to repair the panel is difficult if not impossible.

(ii) Upgrade Current Facilities Alternative

Feasible. Upgrading the existing backwash control panel with a state of the art PLC includes the reverse engineering of the existing panel and developing a replacement PLC that will allow the operator to control the filter backwash process. The new processor will provide a reliable controller using current technologies.

(iii) Interconnect with Other Existing Systems Alternative

Infeasible. there is no existing PLC at the WWTF that would accept the additional programming requirements.

(iv) Build New Centralized Facilities for Regional/Joint Management Use Alternative

Infeasible. Control panel replacement does not require a new centralized facility.

(v) Develop Centrally Managed Decentralized Systems Alternative

Infeasible. Existing control panel is located at existing filters and cannot be easily fed from the main control room of the WWTF.

b) Design Criteria

1. Existing process control panel will be removed and replaced with new PLC control system. It is imperative treatment system remain operational during upgrade.
    a. Proposer will submit for approval plan of action prior to proceeding with equipment replacement.
    b. All costs associated with temporary control system will be the responsibility of successful proposer and included as part of bid.
2. Minimum material requirements are specified below.
3. Programming will allow for similar operation of existing system as described by system "Description of Operation."
4. Complete manual controls will be integrated into design allowing for operation during time of potential PLC, operator interface terminal (OIT) or network malfunctions. Manual operation will provide District operations personnel the ability to manual open/close vales, start pumps etc.

(i) System Description of Operation

New PLC control system will be configured to replicate existing system operation and as functionality described herein.

(ii) Filter Backwash Process (Semi-Automatic) Description

Provision was made in the original WWTF design and plant construction for automatically backwashing the four dual media filters; however, automatic backwashing has been determined to be non-beneficial in the plant operation. The intent is to remove the capability for automatic backwashing as part of the plant update project. The programmed 24-step, 20-switch (P1 – P20) semi-automatic backwash process has proved very effective in the operation of the plant. The criterion for the need to backwash is a visual inspection of the water level above each of the four filters; the filter to be backwashed is then manually selected. The semi-automatic backwash mode is then initiated and the backwash cycle for the selected filter is automatically sequenced (24 steps). The pumps are alternated between backwashes. The backwash process is generally run every other day, and requires approximately 15 minutes process time per filter. Only one filter may be backwashed at a time. Controls should be included with the SCADA implementation so that only one filter at a time may be in a backwash cycle. The capability to manually backwash a single filter or multiple filters simultaneously will remain intact when the SCADA system is implemented. Manual operation of the SCADA step programmer will be provided in the "AUTO" mode as currently exists. It would also be highly desirable during the SCADA implementation to add two sensors to each of the filters (that is, a sensor that, when the head of water above the filter reaches the sensor, an alarm sounds, indicating that the filter should be backwashed). A second sensor would be positioned to detect a flooded condition in a filter and provide an alarm that the filter was flooded to the backwash trough and flowing into the backwash wet well.

c) Map

See Figure 3 for location of the filter backwash control room.

d) Environmental Impacts

No environmental impact is anticipated with filter backwash control panel replacement, because the new PLC will be housed in the existing filter control room with no exterior components.

e) Land Requirements

There are no additional land requirements, because the new PLC will be housed in the existing filter control room.

f) Potential Construction Problems

There are no known construction related issues, because the new PLC will be connected to the treatment system through existing conduits and will require less space than the existing panel.

g) Sustainability Considerations

1) Water Efficiency

Not applicable; replacing the filter backwash control panel will not affect water use.

2) Energy Efficiency

Current technology incorporated into the new PLC will have a reduced electrical demand to provide the filter backwash control.

3) Other

Operational simplicity will be provided to the operator with the ability to modify the programming of the PLC with current programming software versus setting manual timers located within the existing system. PLC will provide the operator with real time information of the process.

h) Cost Estimates

The estimated construction cost associated with replacement of the filter backwash control panel is $133,100, with an estimated design and installation cost of $166,375 (Table 26). There are no significant O&M costs associated with the replacement of the control panel. Electrical costs are to remain consistent with the current panel. There will be an undetermined costs savings based on reducing the maintenance hours required to maintain the out-dated equipment.

Table 26 Engineer's Opinion of Probable Cost for Filter Backwash Control Panel Replacement Mendocino City Community Services District				
Description	**Unit**	**Unit Cost**	**Quantity**	**Total Cost**
Demolition	LS(1)	$ 1,000	1	$ 1,000
Programmable Logic Controller	LS	$ 100,000	1	$ 100,000
Installation and start-up	LS	$ 20,000	1	$ 20,000
Base Construction Subtotal				$ 121,000
Mobilization/Demobilization (10%)				$ 12,100
Estimated Construction Subtotal				$ 133,100
Engineering Services (25% of Construction Subtotal)				$ 33,275
Project Subtotal				**$ 166,375**
1. LS: lump sum				

i) Technically Unfeasible Alternatives

(i) Optimize Current Facilities Operation (No Construction)

The existing filter backwash control panel was built using technology that has since been rendered obsolete. Replacement parts are no longer manufactured and acquiring parts required to repair the panel is difficult if not impossible.

(ii) Interconnect with Other Existing Systems Alternative

There is no existing PLC at the WWTF that would accept the additional programming requirements.

(iii) Build New Centralized Facilities for Regional/Joint Management Use Alternative

Control panel replacement does not require a new centralized facility.

(iv) Develop Centrally Managed Decentralized Systems Alternative

Existing control panel is located at existing filters and cannot be easily fed from the main control room of the WWTF.

Part 5 Selection of an Alternative

1) Disinfection System Upgrade

a) Life Cycle Cost Analysis

Upgrading the disinfection system was the only feasible alternative identified during the alternatives analysis; therefore no life cycle cost was considered.

b) Non-Monetary Factors

Upgrading the disinfection system was the only feasible alternative identified during the alternatives analysis; therefore no non-monetary factors were considered.

2) Recycled Water Distribution System Expansion

a) Life Cycle Cost Analysis

Upgrading and expanding the recycled water distribution system was the only feasible alternative identified during the alternatives analysis; therefore no life cycle cost was considered.

b) Non-Monetary Factors

Upgrading and expanding the recycled water distribution system was the only feasible alternative identified during the alternatives analysis; therefore no non-monetary factors were considered.

3) Sludge Drying Bed Rehabilitation

a) Life Cycle Cost Analysis

A life cycled cost comparison for repairing the existing sludge drying beds (Alternative 1) and upgrading the sludge drying beds (Alternative 2) is included in Table 27. The net present worth of the upgrade alternative ($330,232), using a 20-year project life expectancy, is $103,359 greater than the repair alternative ($226,873).

Table 27
Life Cycle Cost Analysis for Sludge Drying Bed Rehabilitation Alternatives
Mendocino City Community Services District

Project Component Alternatives	A Capital Cost(1)	B Annual O&M(2)	C P.W.(3) O&M P/A(4), 1.2%(5), 20 yrs (PW Factor = 17.6873)	D Salvage Value(6)	E P.W. Salvage P/F(7), 2.9%, 20 yrs (PW Factor = 0.7878)	A+C-E Net Present Worth
Alternative 1	$ 50,000	$ 10,000	$ 176,873	$ 0	$ 0	$ 226,873
Alternative 2	$ 350,000	$ 2,000	$ 35,375	$ 70,000	$ 55,143	$ 330,232

1. Capital cost includes total construction and non-construction costs to complete the project but excludes contingency.
2. O&M: operations and maintenance
3. P.W.: present worth
4. P/A: present worth factor given uniform annual payments
5. Current real discount rate for cost-effectiveness analysis of federal programs for 20 year term; Federal Register, February 2016: https://www.gpo.gov/fdsys/pkg/FR-2016-02-02/pdf/2016-01604.pdf
6. Salvage value estimate based on assumed 20-year life of the project using straight line depreciation.
7. P/F: Present worth factor given single future value

b) Non-Monetary Factors

Non-monetary factors in the evaluation include environmental impact and facility sustainability. Alternative 1 would result in continuing to use un-lined sludge drying beds with an increased possibility of groundwater and ocean contamination. Facility sustainability is also an issue with Alternative 1, because the availability of staff to perform the additional labor associated with hand harvesting the sludge and maintaining the functionality of the under drains may be limiting for the District. Alternative 2 addresses both of these non-monetary factors by providing a sludge stream processing solution that is up to date with current needs.

4) Equalization Basin Liner Replacement

was the only feasible alternative identified during the alternatives analysis; therefore no life cycle cost or non-monetary factors were considered.

a) Life Cycle Cost Analysis

Replacing the equalization basin liner was the only feasible alternative identified during the alternatives analysis; therefore no life cycle cost was considered.

b) Non-Monetary Factors

Replacing the equalization basin liner was the only feasible alternative identified during the alternatives analysis; therefore no non-monetary factors were considered.

5) Filter Backwash Control Panel Replacement

a) Life Cycle Cost Analysis

Replacing the filter backwash control panel with a new PLC was the only feasible alternative identified during the alternatives analysis; therefore no life cycle cost was considered.

b) Non-Monetary Factors

Replacing the filter backwash control panel with a new PLC was the only feasible alternative identified during the alternatives analysis; therefore no non-monetary factors were considered.

Part 6 Proposed Project

a) Project Description

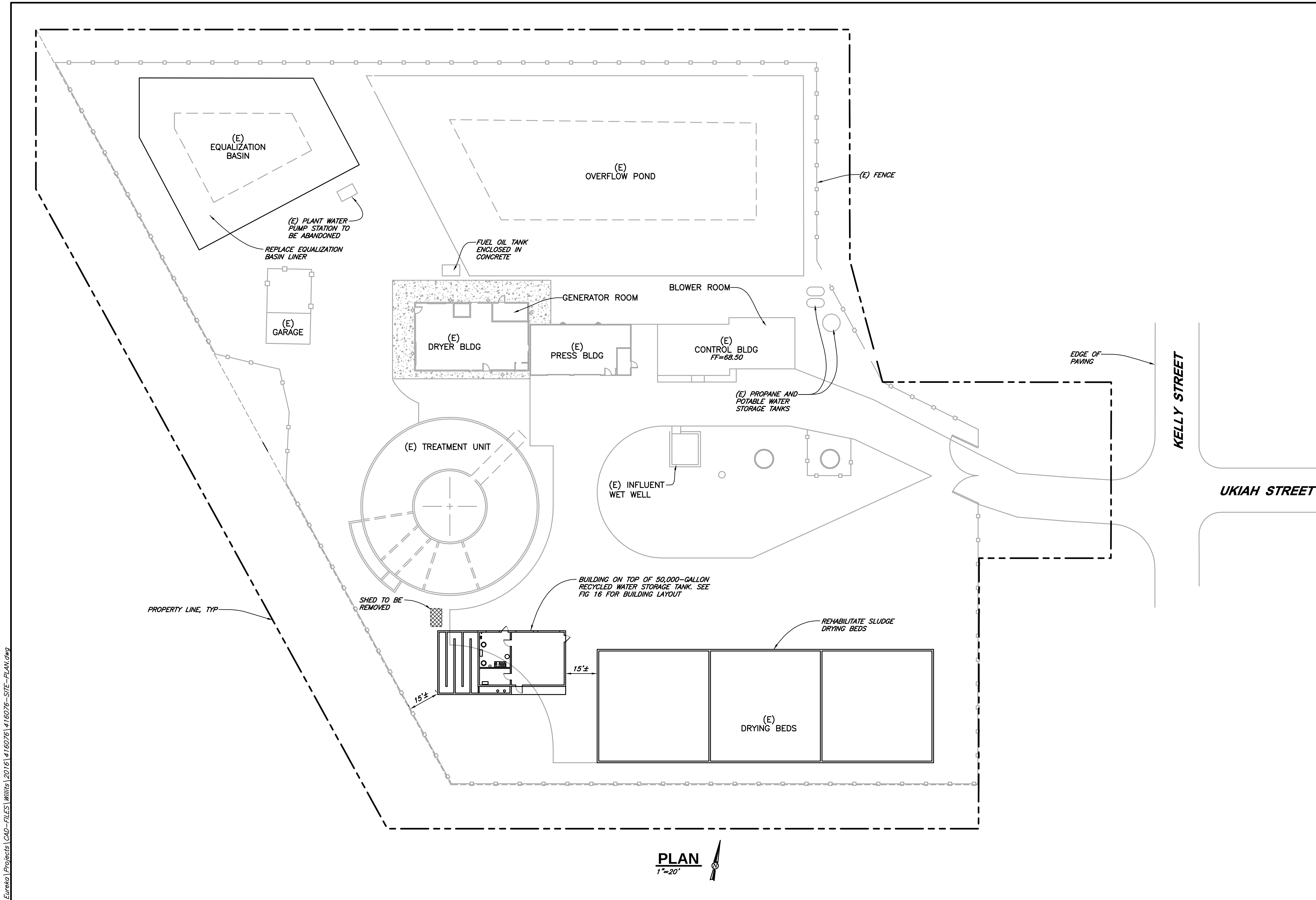
The proposed project will repair and replace aging facilities to ensure permit compliance and environmental protection. The five components of the project include disinfection system upgrades, recycled water distribution system expansion, sludge drying bed rehabilitation, ocean discharge equalization basin liner replacement, and filter backwash control panel replacement. A brief summary of each project alternative is included below in Table 28 with a more detailed description of each project component in the following sections. Figure 15 includes a site plan for the projects taking place at the WWTF.

Table 28
Proposed Project Description
Mendocino City Community Services District

Proposed Project Component	Proposed Alternative Description
Disinfection System Upgrade	Upgrade to onsite generation of a chlorine-based disinfectant for ocean discharge and recycled water systems; construct new equipment/storage building for disinfection systems; construct new recycled water chlorine contact chamber and 50,000-gallon underground recycled water storage tank.
Recycled Water Distribution System Expansion	Install new 6-inch force main from WWTF to high school with access points for fire hydrants; install new onsite public filling station; install two new pumps to supply recycled water system; connect 6-inch force main to existing 30,000-gallon redwood tank at high school; connect redwood tank to existing 55,000-gallon concrete tank at high school; install new plant water pump and pressure system.
Sludge Drying Bed Rehabilitation	Install a new sludge distribution system; line beds with concrete and install new central infiltration trench; and construct new ramps into the beds to allow for sludge cake clean-out with a small bobcat.
Equalization Basin Liner Replacement	Replace ocean discharge equalization basin liner.
Filter Backwash Control Panel Replacement	Install a new state of the art programmable logic controller.

1) Disinfection System Upgrade

Replacing the existing liquid sodium hypochlorite disinfection system with an onsite chlorine-based disinfectant generation system will reduce operating costs for MCCSD by reducing the shipping costs associated with heavy drums of liquid sodium hypochlorite. Onsite generation also uses sodium chloride salt as an input, which will reduce the workplace hazard of handling corrosive liquids. Onsite generation does generate a corrosive liquid solution for disinfection, but at a lower concentration than liquid sodium hypochlorite and the liquid is stored in a tank that does



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MENDOCINO CITY CSD
PRELIMINARY ENGINEERING REPORT
MENDOCINO, CALIFORNIA

PROPOSED SITE PLAN

FIGURE 15

DATE 03/2017

PROJ. NO. 416076

not have to be moved or handled by operators. Some chlorine-based disinfectants have the additional benefits of reducing biological growth in distribution and irrigation systems that reduces O&M costs and extends the life of equipment in the system.

The proposed project includes the construction of a new chlorine contact chamber and 50,000-gallon underground storage tank for the recycled water system. A new chlorine contact chamber will ensure the recycled water disinfection system meets Title 22 regulations. The new 50,000-gallon storage tank will provide an onsite reservoir for recycled water to supply the PW system, the public filling station, and fire suppression water in town.

A layout of the proposed onsite generation system equipment room, electrical room, storage room, chlorine contact chamber, and 50,000-gallon storage tank is included as Figure 16. Note that the new chlorine contact chamber and 50,000-gallon storage tank will be mostly underground with approximately 6-inches above grade and visible. The 50,000-gallon storage tank will be beneath the equipment and storage rooms and will be approximately 10 feet deep. Due to the historic setting of the town of Mendocino, an architect has been consulted to work with the historical review board to ensure that the design of the disinfection equipment and storage building meets approved standards. An architect's depiction of the east and north elevations of the building is included in Figure 17; the east elevation is the most likely view from the public side of the property, and the north elevation is the side of the building with the large roll-up doors for vehicle access.

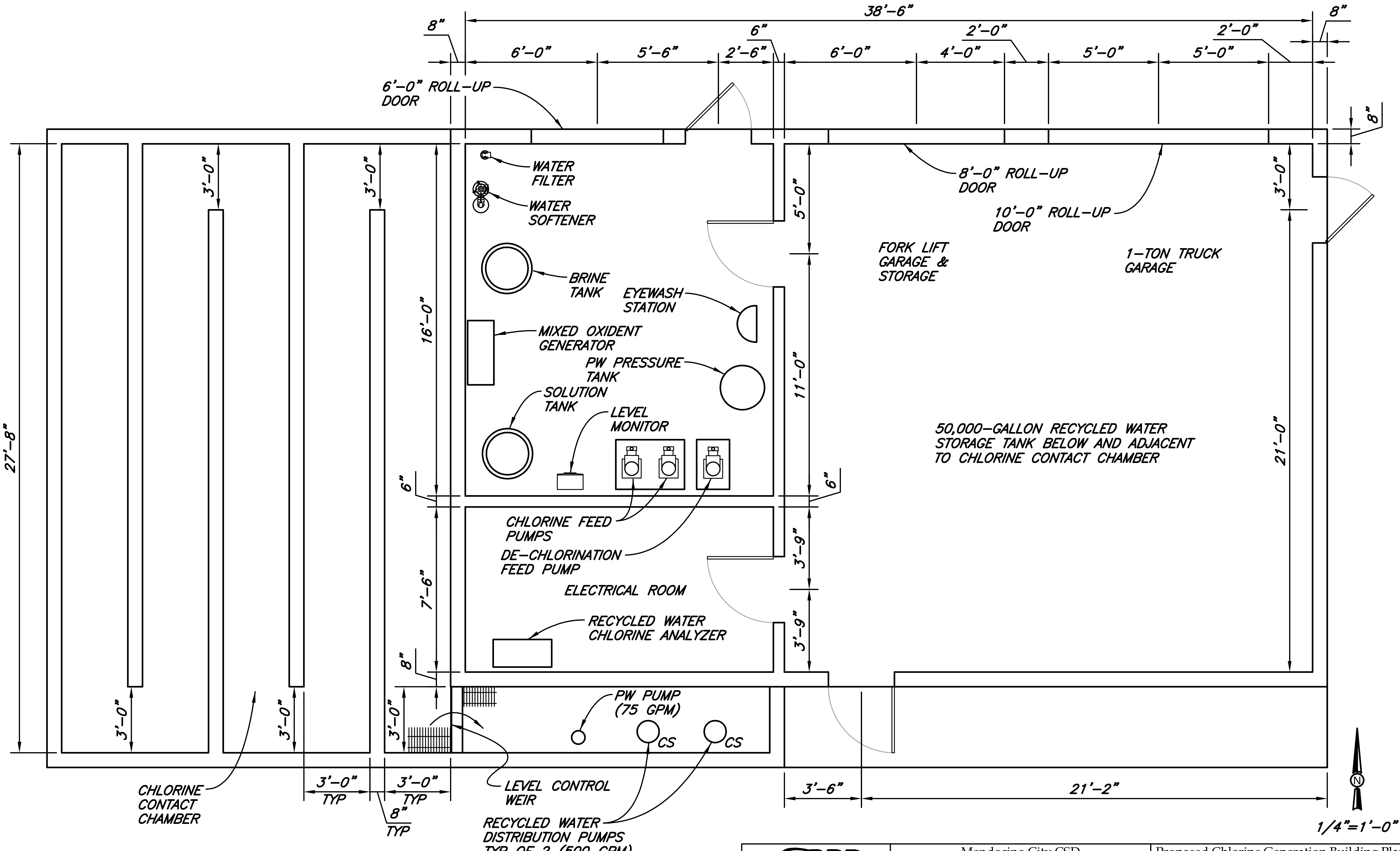
The upgraded disinfection systems will include new feed pumps, chlorine analyzers, and ancillary equipment to replace aging equipment and to ensure that the equipment will last the duration of the term of this project.

2) Recycled Water System Expansion

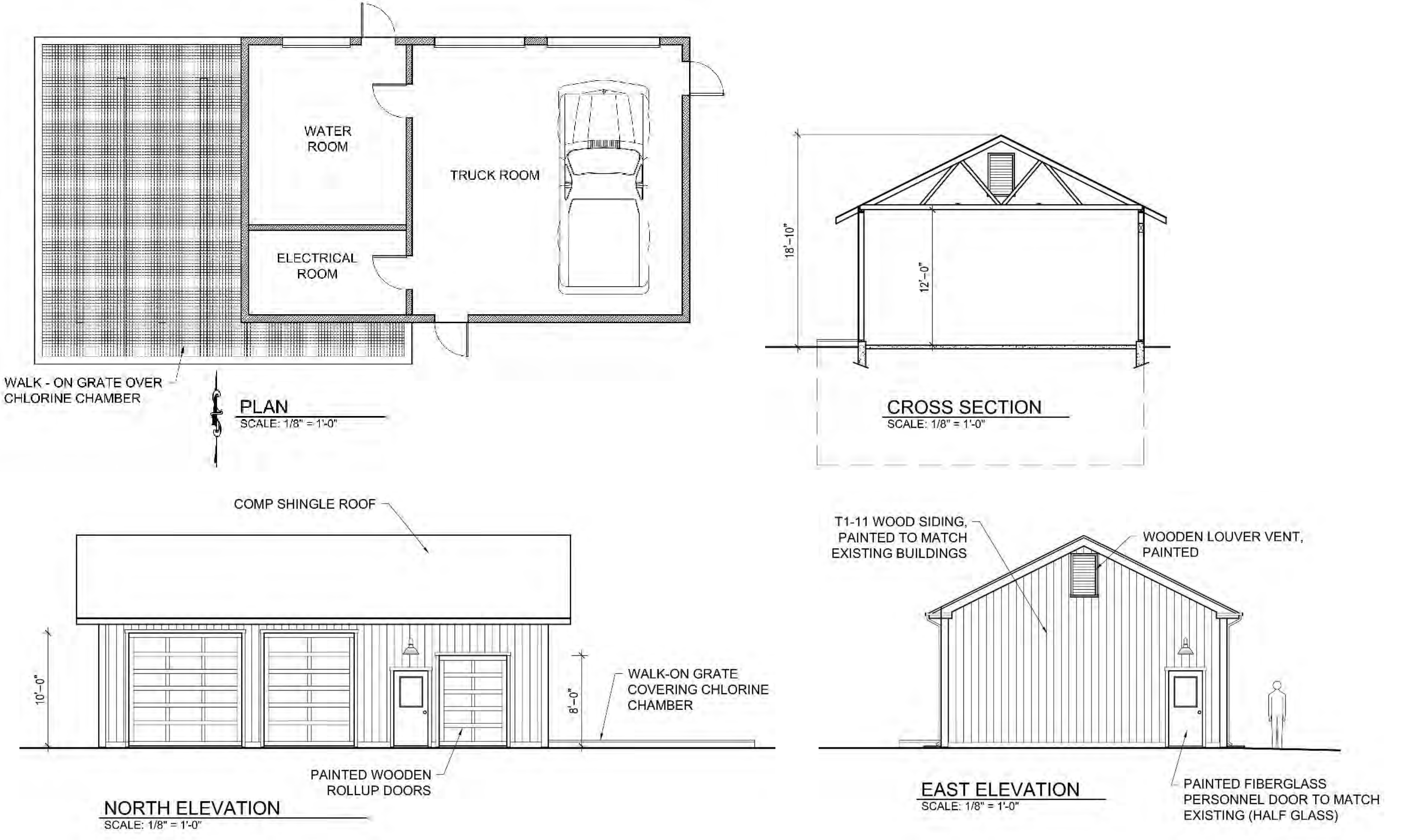
The addition of a new 6-inch recycled water line up Ukiah and Kasten Streets to the high school will add much-needed fire suppression capabilities for part of the town and increase the supply of recycled water to the high school for irrigation of the athletic fields (Figure 18). The 6-inch pipe will be fitted with tees and flanges for connection to fire hydrants that will be supplied by the Mendocino Fire Protection District; the fire hydrants are not included as a part of this project. The existing 2-inch pipe to the high school requires approximately 10 hours to transfer one batch of recycled water to the high school. The batch process also requires 24 hours to verify that the recycled water meets disinfection standards prior to use for irrigation, limiting the amount of recycled water available for irrigation use.

The proposed project includes connecting an existing 30,000-gallon redwood tank at the high school to the recycled water system bringing the total recycled water storage capacity up to 135,000 gallons with the 55,000-gallon storage tank at the high school, and the proposed new 50,000-gallon underground storage tank at the WWTF. The increased recycled water storage capacity will reduce the demand placed on groundwater pumping allowing additional uses, including the public filling station and fire suppression water.

The proposed project includes the installation of a new public filling station for landscape irrigation. The filling station will be located within the WWTF fence to ensure safe control and operation by WWTF operators. Filling station use will comply with all appropriate Title 22



SHN Consulting Engineers & Geologists, Inc.	Mendocino City CSD Preliminary Engineering Report Mendocino, California	Proposed Chlorine Generation Building Plan SHN 416076
	March 2017 — 416076-CHLOR-GEN-BLDG	Figure 16



SOURCE: KELLY B. GRIMES, ARCHITECT

SHN Consulting Engineers & Geologists, Inc.	Mendocino City CSD Preliminary Engineering Report Mendocino, California	Proposed Chlorine Generation Building Architect's Drawings SHN 416076
March 2017	416076-CHLOR-BLDG-ARCH	Figure 17

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Consulting Engineers & Geologists, Inc.

Mendocino City CSD
Preliminary Engineering Report
Mendocino, California

Recycled Water
Distribution System
SHN 416076

FEBRUARY 2017 | MCCSD-RECYCLED-ALTERNATIVE4 | Figure 18

Path: \\Willitssvr\Projects\2016\416076-MCCSD-PER\300-Recycled-Sys\GIS\Figures\MCCSD-RECYCLED-ALTERNATIVE4.mxd recycled water safety requirements including additional training for WWTF personnel and members of the public who will use the system, as well as record-keeping and documentation of participants in the program with quantities and locations of recycled water use.

A new PW pressure system is also needed so that normal WWTF operations are not affected by the offsite recycled water needs. The proposed PW pump and pressure tank will be located in the new equipment building on top of the 50,000-gallon underground storage tank, and the PW pump will draw from the 50,000-gallon recycled water storage tank. Using recycled water for the PW system will increase worker safety with respect to potential human contact with PW during cleaning and washing procedures.

3) Sludge Drying Beds Rehabilitation

Rehabilitation of the sludge drying beds will add redundancy and capacity to sludge processing. The proposed project includes installation of a new sludge distribution system, concrete liners, and under drains in each bed, and access ramps for cleanout by a small bobcat tractor.

4) Filter Backwash Control Panel Replacement

The existing filter backwash control panel is outdated and replacement parts are difficult to find. The proposed project will replace the outdated system with a state of the art PLC that will increase reliability and operational flexibility of the system.

5) Equalization Basin Liner Replacement

The existing ocean discharge equalization basin liner has been degraded over time by UV exposure and is fragile. The existing liner is also perforated by posts that support an internal baffle to increase hydraulic performance of the basin. The proposed project will replace the aging liner, reduce the potential for leakage and groundwater contamination, and eliminate the perforation by installing a directional inlet for enhanced hydraulic performance.

b) Project Schedule

The proposed project will initiate immediately following authorization by the funding agency to expend funds. Engineering designs and specifications are expected to be completed within 8 months of the authorization to expend funds (Table 29). Once completed, engineering designs and specifications will be submitted to USDA for review; the initial USDA design review is expected to take one or two months. USDA comments will then be incorporated into the final designs and specifications for construction; finalization of designs and specifications is expected to take one month. Following completion of final engineering designs and specifications, the project will be put out to bid; the bidding process is expected to take one month. Once bids are received, the bid review process is expected to take approximately two months. Following bid review and approval, bid contract awards are expected to take another one or two months. With construction beginning in April 2019 and finishing in December 2019, it is expected to take approximately eight months.

Table 29
Proposed Project Schedule
Mendocino City Community Services District

Project Component	Tentative Start Date(1)	Tentative Completion Date
Authorization to Expend Funds	NA(2)	November , 2017
Engineering Designs and Specifications	November, 2017	July , 2018
USDA Review of Designs and Specifications	July, 2018	August, 2018
Finalize Plans and Specifications	August, 2018	September, 2018
USDA Review of Final Plans and Specifications	September, 2018	October, 2018
Bidding Process	November, 2018	December , 2018
Bid Review	December, 2018	January, 2019
Contract Award	February, 2019	March, 2019
Construction	April, 2019	December, 2019

1. All project schedule dates are preliminary and based on authorization of funding agency to expend funds. Delays in funding authorization will result in equal delays in subsequent project stages.
2. NA: not applicable

c) Permit Requirements

The project is located entirely within the Coastal Zone and will require coastal development permit(s) (CDP) from the State and/or the County of Mendocino. If both CDPs are required, the CDP process would be consolidated to the State. Grading and building permit(s) will be required from the County of Mendocino. The project will likely include more than 1 acre of ground-disturbing activity, which would require coverage under the General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit; NPDES Permit No. CAS000002, Order No. 2009-0009-DWQ as amended by Order No. 2010-0014-DWQ and 2012-0006-DWQ), administered by the State Water Resources Control Board (SWRCB).

Because the project will not affect any wetlands or other jurisdictional waters, no permit will be required from the Army Corps of Engineers, RWQCB, or California Department of Fish & Wildlife. Because the project will not alter the ocean outfall or the composition of the treated wastewater effluent, no change to the facility's NPDES permit is required.

d) Sustainability Considerations

1) Water Efficiency

Increasing recycled water supply and use will significantly reduce the demand placed on ground water pumping in the MCCSD service area.

2) Energy Efficiency

High efficiency pumps will be used for all applications of recycled water pumping, plant water pumping, and transfer pumping to maximize energy efficiency. Onsite generation of a chlorine based disinfectant will reduce the energy footprint of shipping heavy liquid sodium hypochlorite for disinfection.

3) Other

Optimizing the disinfection process for recycled water including a new chlorine contact basin, will reduce the overall amount of disinfectant required for recycled water.

e) Total Project Cost Estimate

An estimated total project cost breakdown is included in Table 30, a breakdown of estimated construction costs for the total project is included in Table 31, and a summary of the estimated construction cost subtotals for each project component are included in Table 32.

Table 30
Total Project Cost Estimate
Mendocino City Community Services District

Item	**Subtotal**	**Total**
Property Purchase / Lease Agreements		$ 0.00
Easement Acquisition / Right-of-Way / Water Rights		$ 0.00
Bond Counsel		$ 63,541.50
Legal Counsel		$ 42,361.00
Interest/Refinancing Expense		$ 0.00
Other (identify)		$ 0.00
CEQA[1] Environmental Report	$ 2,500.00	
NEPA[2] Environmental Report	$ 5,000.00	
Environmental Mitigation Contract Services	$ 5,000.00	
Total Environmental Services:		**$ 118,402.50**
Engineering Services		
Basic Services:		
Preliminary Engineering Report (PER)	$ 107,000.00	
Preliminary and Final Design Phase Services	$ 160,444.00	
Bidding/Contract Award Phase Services	$ 21,172.00	
Construction and Post-Construction Phase Services (s/inspection)	$ 69,819.00	
Resident Project Representative Services (Resident Inspector)	$ 126,092.00	
Additional Services:		
Permitting	$ 31,757.00	
Regulatory Compliance Reports	$ 34,559.00	
Environmental Mitigation Services (Construction Phase)	$ 27,086.50	
Easement Acquisition/ROW's[3] Services (Construction Phase)	$ 0.00	
Surveying Services (Construction Phase)	$ 15,911.00	
Operation & Maintenance Manual(s)	$ 5,000.00	
Geotechnical Services	$ 4,000.00	
Hydrogeologist Services	$ 0.00	
Materials Testing Services (Construction Phase)	$ 21,172.00	
Total Engineering Services:		**$ 624,012.50**
Equipment/Materials (Direct purchase using approved methods, separate from construction bid/cost)		$ 0.00
Construction Cost Estimate (breakdown included in Table 30a and Table 30b)		$ 2,118,050.00
Contingency (10%)		$ 211,805.00
TOTAL PROJECT COST ESTIMATE:		**$ 3,072,270.00**

1. CEQA: California Environmental Quality Act
2. NEPA: National Environmental Policy Act
3. ROWs: rights-of-way

Table 31
Construction Cost Estimate Breakdown
Mendocino City Community Services District

Item	Unit	Unit Price	Quantity	Total
1) Disinfection System Upgrades				
Mobilization/Demobilization (10% of construction subtotal)	LS[1]	$ 116,700	1	$ 116,700
Demolition	LS	$ 1,000	1	$ 1,000
Recycled Water Chlorine contact chamber	LS	$ 130,000	1	$ 130,000
Recycled Water Storage Tank (50,000-gallon)	LS	$ 358,000	1	$ 358,000
Chlorine Generation Building (1,000 sf[2] @ $300/sf)	LS	$ 300,000	1	$ 300,000
Chlorine Generation Package System ($60,000 + taxes + installation)	LS	$ 100,000	1	$ 100,000
Dechlorination System	LS	$ 3,000	1	$ 3,000
Chlorine Analyzer	EA[3]	$ 5,000	2	$ 10,000
Chemical Feed Pumps	EA	$ 3,000	6	$ 18,000
Transfer Pumps	EA	$ 7,000	2	$ 14,000
Variable Frequency Drive	EA	$ 3,000	1	$ 3,000
Site Work WWTF[4]	LS	$ 10,000	1	$ 10,000
Site Electrical	LS	$ 200,000	1	$ 200,000
Site Grading and Excavation	LS	$ 20,000	1	$ 20,000
Disinfection System Upgrades – Construction Subtotal				**$ 1,283,700**
2) Recycled Water Distribution System Expansion				
Mobilization/Demobilization (10% of construction subtotal)	LS	$ 32,250	1	$ 32,250
Traffic Control	LS	$ 12,000	1	$ 12,000
6-inch C-900 Purple PVC[5] Water Main	LF[6]	$ 90	2,560	$ 230,400
6-inch Fire Hydrant Assembly	EA	$ 5,000	4	$ 20,000
Recycled Distribution Pumps at WWTF	EA	$ 10,000	2	$ 20,000
Pump Controls	EA	$ 10,000	1	$ 10,000
Plant Pressure Pump System	LS	$ 8,000	1	$ 8,000
Variable Frequency Drive	EA	$ 3,000	1	$ 3,000
Electric Water Valves	EA	$ 1,600	1	$ 1,600
Float Controls at Water Tanks	EA	$ 5,000	2	$ 10,000
6-inch Water Main Valves	EA	$ 1,250	6	$ 7,500
3) Recycled Water Distribution System Expansion – Construction Subtotal				**$ 354,750**
4) Sludge Drying Bed Rehabilitation				
Mobilization/Demobilization (10% of construction subtotal)	LS[1]	$ 27,000	1	$ 27,000
Sludge Drying Beds Rehabilitation	LS	$ 90,000	3	$ 270,000
Sludge Drying Bed Rehabilitation – Construction Subtotal				**$ 297,000**
5) Equalization Basin Liner Replacement				
Mobilization/Demobilization (10% of construction subtotal)	LS	$ 4,500	1	$ 4,500

Table 31 Construction Cost Estimate Breakdown Mendocino City Community Services District				
Item	**Unit**	**Unit Price**	**Quantity**	**Total**
Equalization Basin Liner	LS	$ 45,000	1	$ 45,000
Equalization Basin Liner Replacement – Construction Subtotal				**$ 49,500**
6) Backwash Programmable Logic Control Replacement				
Mobilization/Demobilization (10% of construction subtotal)	LS	$ 12,100	1	$ 12,100
Demolition	LS	$ 1,000	1	$ 1,000
Programmable Logic Controller (PLC)	LS	$ 100,000	1	$ 100,000
Installation and Start-up	LS	$ 20,000	1	$ 20,000
Backwash Programmable Logic Control Replacement – Construction Subtotal				**$ 133,100**
Total Opinion of Construction Costs				**$ 2,118,050**

1. LS: Lump Sum
2. sf: square feet
3. EA: each
4. WWTF: wastewater treatment facility
5. PVC: polyvinyl chloride
6. LF: lineal foot

Table 32 Construction Cost Estimate Summary Mendocino City Community Services District	
Item	**Cost**
1) Disinfection System Upgrades	$ 1,283,700
2) Recycled Water Distribution System Expansion	$ 354,750
3) Sludge Drying Bed Rehabilitation	$ 297,000
4) Equalization Basin Liner Replacement	$ 49,500
5) Backwash Programmable Logic Control Replacement	$ 133,100
Total Opinion of Construction Costs	**$ 2,118,050**

f) Annual Operating Budget

1) Income

Based on the MCCSD current operating income, there is no rate schedule increase being proposed to finance the proposed improvement project. Currently, MCCSD collects $614,274 from user fees annually–approximately $50.60 per month for an average of 404 connections. Income from sewer connections with the State Park and Mendocino Unified School District total $53,300; the fee charged for groundwater management is $68,506, and other income in the amount of $16,268 is from a private development connection fee.

A capacity charge rate study completed by SHN in 2016 recommended a “buy-in” capital improvement fee for new sewer hookups. The capital improvement fee for 2016-17 is $2,858 as calculated by the charge rate study. As the existing facilities are depreciated annually in the future, and anticipated capital improvement projects are constructed ,the capacity fee will diminish according.

2) Annual Operations and Maintenance Costs

Total project O&M costs are included in Table 33. The only anticipated changes in net operating cost after the completion of the proposed project will be the reduction in cost of disinfection chemicals due to the installation of an onsite chemical generation process that will use dry sodium chloride salt and electricity to run an electrolytic cell to produce a chlorine-based disinfectant. The onsite disinfectant generation will eliminate the shipping and handling of liquid sodium hypochlorite, reducing cost and improving safety of the WWTF employees. The net cost savings for the new disinfection chemical generation will be $11,099.

Table 33
Total Project O&M[1] Cost Estimate
Mendocino City Community Services District

Expense	Amount
Salaries	$ 178,116
Benefits	$ 54,252
Taxes	$ 27,633
Professional Service Fees	$ 15,500
Utilities	$ 64,744
Biosolids Dryer Fuel	$ 16,500
Insurance	$ 12,607
Annual Repairs and Maintenance	$ 35,000
Supplies, Tools & Services	$ 22,631
Lab Supplies and Testing	$ 17,000
Process Chemicals	$ 450
Miscellaneous Operating Expenses	$ 10,346
Solids Handling	$ 3,000
Training and Education	$ 868
Total Expenses	**$ 458,647**

1. O&M: operations and maintenance

3) Debt Repayments

Biosolids dryer equipment installed in 2005 was purchased, in part, with a loan from the California Infrastructure and Economic Development Bank (CIEDB) in the amount of $650,000. Annual payments on the remainder of this debt in 2017 are in the amount of $35,252.54. Currently, MCCSD has no general bond obligations. The proposed WWTF improvements and recycled water system expansion will be funded by 100 percent USDA RD financing in the estimated amount of $3,072,270, with an annual loan payment of $109,864.

If MCCSD is found to be eligible for grant assistance, the annual loan debt and annual payment would be less than the above calculated estimate based on the equivalent grant percent.

4) Reserves

- **Debt Service Reserve**

  In 2016-17, MCCSD has operating income available for debt service reserve– $211,730 for capital improvement fund and equipment replacement fund in addition to the existing the existing load payment. After the loan payment of $109,864 there will be $51,730 left to place in the capital improvement fund and $40,136 in the equipment replacement fund. The existing reserve fund is $612,607; the total estimated annual debt payment will be $145,244; and the funds available to save in the reserve funds each year will be $91,866. The ratio of reserve funds to projected annual debt, $91,866:$145,244, is 0.63:1.0.

- **Short-Lived Asset Reserve**

  Annual short-lived asset reserves necessary for the proposed project amount to $7,460.50 per year (Table 34). After the annual short-lived asset reserve is accounted for, $32,653.50 will remain in the annual equipment replacement fund reserve.

Table 34
Annual Project Reserve Estimate
Mendocino City Community Services District

Description	Replacement Cost	Quantity	Useful Life (years)	Annual Reserve
Submersible Pump Replacement Parts	$ 1,500	6	5	$ 1,800.00
Variable Frequency Drive	$ 3,000	2	5	$ 1,200.00
Chemical Feed Pump	$ 3,000	3	3	$ 3,000.00
Onsite Generation Equipment				
Valves and Fittings	$ 125	1	5	$ 25.00
Brine Proportional Pump	$ 1,000	1	5	$ 200.00
Switchgear/Controls Maintenance	$ 500	1	10	$ 50.00
Electrolytic Cell	$ 11,655	3	10	$ 1,165.50
Filters	$ 20	1	1	$ 20.00
Total Annual Replacement Reserve				**$ 7,460.50**

Part 7 Conclusions and Recommendations

The town of Mendocino is a small rural community in a highly scenic and environmentally sensitive area. Investing in the infrastructure of this community will ensure that these resources are protected and that residents are able to use the potential to recycle water efficiently and effectively, and reduce their dependence on groundwater. Groundwater resources in the MCCSD service area have shown signs of stress during drought periods, which, combined with the State of California emergency drought conservation measures, contribute to the need to increase recycling capacity.

The proposed project described herein maximizes the use of available recycled water resources to reduce groundwater pumping and addresses multiple aging infrastructure issues at the WWTF. Replacing aging infrastructure will ensure that the MCCSD WWTF is able to remain in compliance with discharge permits and recycled water regulations while protecting public and environmental health. Upgrading facilities will reduce O&M efforts and costs while increasing operational flexibility over the 20 year expected lifetime of the project.

Annual revenues and equipment replacement reserves are sufficient to service debt obligations for this project according to the engineer's best opinion of cost. Grant funding will offset loan repayment obligations and increase the economic viability of this project for the town of Mendocino. If funding is awarded for this project, construction is expected to be completed by the end of 2019.

Part 8 References

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A

WDR Order No. R1-2015-0039

Incorporated by Reference Only:

http://www.swrcb.ca.gov/northcoast/board_decisions/adopted_orders/pdf/2015/150813_0039_MendocinoCityCSD_WWTP.pdf

B

Title 22 Engineering Report for Recycled Water System

Title 22 Engineering Report for the Mendocino City Wastewater Treatment Facility-2017 Update

WDR Order No. R1-2015-0039
NPDES Permit No. CA0022870
WDID No. 1B83129OMEN

Prepared for:

Mendocino City Community Services District

Engineers & Geologists

335 South Main St.
Willits, CA 95490-3977
707-459-4518

March 2017

415065

SHN CONSULTING ENGINEERS & GEOLOGISTS, INC.
335 S. Main St., Willits, CA 95490-3977• 707-459-4518 • FAX: 707-459-1884 • willitsinfo@shn-engr.com

Reference: 415065

March 7, 2017

Ms. Cathleen Goodwin
North Coast Regional Water Quality Control Board
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403

Subject: Title 22 Engineering Report-2017 Update, Mendocino City Wastewater Treatment Facility, WDR Order No. R1-2015-0039; NPDES Permit No. CA0022870; WDID No. 1B83129OMEN

Dear Ms. Goodwin:

SHN Engineers & Geologists is submitting this 2017 update to the Title 22 engineering report for the Mendocino City wastewater treatment facility (WWTF) on behalf of the Mendocino City Community Services District (MCCSD). This report provides an evaluation of the wastewater reuse system for the WWTF, as required for compliance with the Division of Drinking Water (DDW) water recycling criteria.

The enclosed report is being submitted at the request of the North Coast Regional Water Quality Control Board (RWQCB) in accordance with the provisions outlined in Waste Discharge Requirements (WDR) Order No. R1-2015-0039, Section IV.C.2. Water Recycling Requirements. An initial draft of the Title 22 report was submitted on March 31, 2016, for DDW and RWQCB review and comment. This 2017 update of the Title 22 report addresses the comments received from the DDW on the initial draft of the Title 22 report and includes updates on the recycled water expansion project proposed to be undertaken by MCCSD in 2018.

Sincerely,

SHN Engineers & Geologists

Lisa K. Stromme, PE
Water Resources Engineer

LKS:lms

Enclosure: Title 22 Engineering Report-2017 Update
c. w/Encl: Michael Kelley, MCCSD

Reference: 415065

Title 22 Engineering Report for the Mendocino City Wastewater Treatment Facility 2017 Update

WDR Order No. R1-2015-0039
NPDES Permit No. CA0022870
Facility ID. No. 1B83129OMEN

Prepared for:

Mendocino City Community Services District
10500 Kelly Street
Mendocino, CA 95460

REGISTERED PROFESSIONAL ENGINEER
LISA K. ST...
No. C 63154
Exp. 9/30/2018
CIVIL
STATE OF CALIFORNIA
3/7/17

Prepared by:

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Willits, CA 95490-3977
707-459-4518

March 2017

QA/QC: LKS

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Appendices

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Abbreviations and Acronyms

ft	feet
ft^2	square feet
gpd	gallons per day
gpm	gallons per minute
gpm/ft^2	gallons per minute per square foot
lbs	pounds
MG	million gallons
mg/L	milligrams per liter
mg-min/L	milligram-minutes per liter
MGD	million gallons per day
NTU	nephelometric turbidity units

ADWF	average dry weather flow
AG	air gap separator
AWWA	American Water Works Association
AWWF	average wet weather flow
BOD	biochemical oxygen demand
CalOES	California Governor's Office of Emergency Services Warning Center
CDPH	California Department of Public Health
CHHS	California Health and Human Services
CT	concentration and time
DC	double check valve
DDW	Division of Drinking Water
EPA	Environmental Protection Agency
F/M	food to mass ratio
FOG	fats, oil, and grease
MCCSD	Mendocino City Community Services District
MHS	Mendocino High School
MLVSS	mixed liquor volatile suspended solids
MRP	monitoring and reporting program
MUSD	Mendocino Unified School District
NPDES	National Pollutant Discharge Elimination System
NR	no reference
O&M	operations and maintenance
RP	reduced pressure principle backflow prevention device
RWQCB	North Coast Regional Water Quality Control Board
SHN	SHN Engineers & Geologists
SWRCB	State Water Resources Control Board
TSS	total suspended solids
USGS	United States Geological Survey
WDR	waste discharge requirements
WWTF	wastewater treatment facility

1.0 Introduction

SHN Engineers & Geologists has prepared this 2017 update to the Title 22 engineering report on behalf of the Mendocino City Community Services District (MCCSD) for the Mendocino City wastewater treatment facility (WWTF) located in the City of Mendocino, California (Figure 1). This report provides an evaluation of the wastewater reuse system for the WWTF as required for compliance with the State Board Division of Drinking Water (DDW), water recycling criteria (CDPH, 2009). This report has been prepared in accordance with the "Guidelines for the Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water" (CHHS, 2001).

Throughout this report, we have cited excerpts from the water recycling criteria in *italics* with a description in plain text of how the Mendocino City wastewater reuse system complies/addresses the relevant requirement(s).

1.1 Purpose

The purpose of this Title 22 engineering report is to describe how the MCCSD will comply with the water recycling criteria as contained in Sections 60301 through 60355, inclusive, of the California Code of Regulations, Title 22. The water recycling criteria prescribe:

- recycled water quality and wastewater treatment requirements for the various types of allowed uses,
- use area requirements pertaining to the actual location of use of the recycled water (including dual plumbed facilities), and
- reliability features required in the treatment facilities to ensure safe performance.

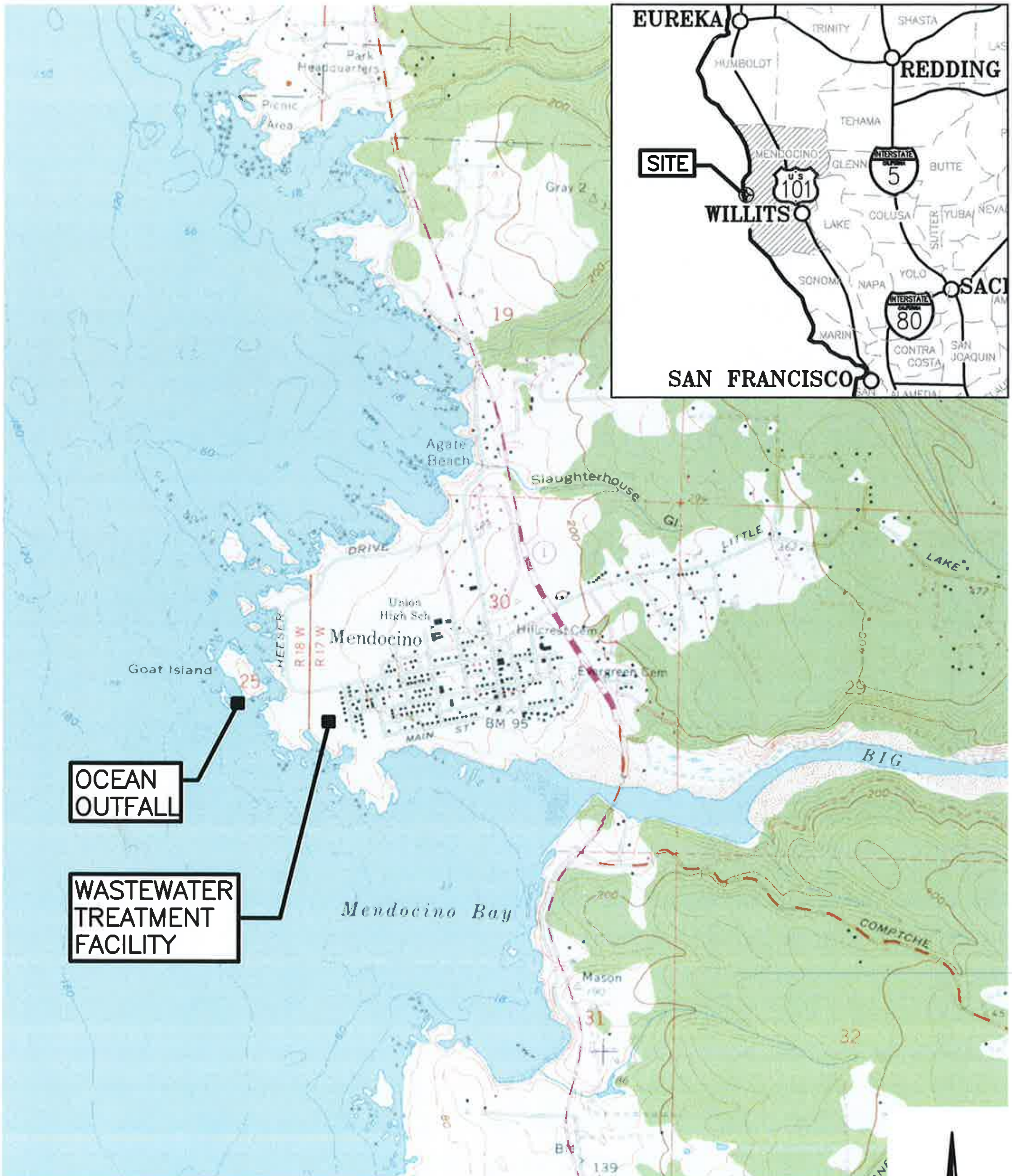
1.2 Approval Process

This Title 22 report is being submitted at the request of the North Coast Regional Water Quality Control Board (RWQCB) in accordance with the provisions outlined for the facility in National Pollutant Discharge Elimination System (NPDES) Permit No. CA0022870, Waste Discharge Requirements (WDR) Order No. R1-2015-0039, Section IV.C.2. (RWQCB, 2015).

Section IV.C.2. of the WDR requires MCCSD to submit proof of DDW approval of a Title 22 engineering report prior to adding any new recycled water users.

An initial draft of the Title 22 report was submitted to the RWQCB on March 31, 2016, for DDW and RWQCB review and comment. Comments on the Title 22 report were received from DDW on August 5, 2016. A number of the comments received from DDW requested additional information related to the proposed uses of recycled water at new irrigation sites, public restrooms, and the proposed fill station. Many of the proposed additional recycled water uses presented in the initial Title 22 report are no longer being proposed as part of the recycled water expansion project, and these proposed uses have been removed from this 2017 update to the Title 22 report.

This 2017 update of the Title 22 report addresses the additional comments received from the DDW on the existing recycled water system; it also includes updates on the recycled water expansion project proposed to be undertaken by MCCSD in 2018.



SOURCE: MENDOCINO
USGS 7.5 MINUTE QUADRANGLE

1"=2000'±

SHN Consulting Engineers & Geologists, Inc.	Mendocino City CSD Wastewater Treatment Facility Mendocino, California	Site Location Map SHN 415065
December 2015	415065-LOCATION	Figure 1

2.0 Recycled Water Project

This section of the report identifies all agencies and entities that are involved in the treatment, distribution, and operation and maintenance of the recycled water facilities, and includes a description of the legal arrangements outlining authorities and responsibilities between the producer, distributor, and user.

MCCSD currently disposes of treated wastewater effluent from the Mendocino City WWTF by land application to the Mendocino High School (MHS) athletic fields. Under Title 22 Section 60304(a), the recycled wastewater used for the irrigation of parks, playgrounds, or school yards must be disinfected tertiary-recycled water.

2.1 General

The Mendocino City WWTF is a publicly owned treatment works owned and operated by MCCSD, which services a population of approximately 4,000, including 1,000 full-time residents and many visitors and tourists to Mendocino City, Russian Gulch State Park, and Headlands State Park. The WWTF collects, treats, and reuses wastewater from residential and commercial developments only; no industrial user discharges wastewater to the WWTF.

The WWTF collection system consists of gravity sewer mains, laterals, manholes, and three lift stations: "A," "B," and Hills Ranch. The primary function of the lift stations is to pump wastewater from low points in the system to higher areas for gravity flow to the WWTF.

Domestic wastewater is treated at the WWTF using an extended aeration activated sludge system, followed by secondary clarification, filtration, and chlorination, prior to pumping to a 55,000-gallon storage tank at MHS for land application to the school's athletic fields.

2.2 Rules and Regulations

MCCSD is regulated under NPDES Permit No. CA0022870, WDR Order No. R1-2015-0039, for the Mendocino City WWTF (Waste Discharge ID No. 1B83129OMEN). The WDR authorizes MCCSD to reuse treated municipal wastewater that complies with water recycling specifications and requirements contained in Section IV.C of the WDR for uses that have been addressed in an approved Title 22 engineering report.

The current established rules and regulations for recycled water use from MCCSD WWTF include joint resolution 97-1 and a 1997 memorandum of understanding between MCCSD and the Mendocino Unified School District (MUSD). Both agreements are summarized in the following sections and a copy of each agreement is included in Appendix A.

In 1997, MCCSD and the MUSD developed joint resolution 97-1 concerning the use of recycled water for irrigation of the MHS athletic fields. The resolution directed MCCSD and MUSD to enter into a memorandum of understanding to provide a detailed discussion of the relationship between the two districts with regard to the recycled water use project.

In 1997, MCCSD and MUSD agreed to a memorandum of understanding between the two districts that gives MCCSD the ability to supply recycled water to the MUSD for irrigating the MHS athletic fields. As part of the understanding, MCCSD agreed to provide tertiary-treated disinfected recycled water for irrigation during the summer and fall months of the year. It was estimated that approximately 50,000 gallons per week of recycled water from the WWTF would be used for irrigation. MUSD is responsible for the operation and maintenance of the irrigation and recycled water storage facilities located on MHS grounds.

The memorandum also set forth an understanding that MCCSD would make necessary modifications to the WWTF to accommodate the need for recycled water and to meet additional water quality standards and record keeping requirements of the California Department of Health Services (now DDW).

2.3 Producer-Distributor-User

MCCSD is the producer and distributor of the recycled water. Currently, all recycled water is applied to athletic fields operated by MUSD, located at MHS. Therefore, MUSD is the user of all currently supplied recycled water.

2.4 Raw Wastewater

All wastewater treated at the WWTF is from residential and commercial sources. The district operates a source-control program intended to prevent the introduction into the MCCSD sewer system of pollutants that would interfere with the operation of its treatment facility; pass through into the receiving waters; inhibit the MCCSD's ability to recycle, reclaim, and/or reuse wastewater treatment byproducts; and/or jeopardize the safety and well-being of treatment plant and collection system personnel. In addition, the program ensures that MCCSD stays in compliance with State of California regulations and Environmental Protection Agency (EPA)-mandated national pretreatment standards and regulations (Montgomery, 2005).

In 2009, MCCSD revised its source-control program and adopted a fats, oils, and grease (FOG) Ordinance, 09-3, FOG Program, and a Sanitary Sewer Use Ordinance, 09-2. The Sanitary Sewer Use Ordinance included requirements for Special Use Discharge Permits for waste haulers and pretreatment standards and requirements for discharges by non-residential users. The FOG Ordinance and FOG Program were developed to prevent sanitary sewer overflows from grease blockages in the collection system (Montgomery, 2005). Table 1 summarizes the raw wastewater influent characteristics for the year 2015.

Table 1 2015 Wastewater Influent Characteristics Mendocino City Wastewater Treatment Facility			
Month	**Average Flow (MGD)[1]**	**Average BOD[2] (mg/L)[3]**	**Average TSS[4] (mg/L)**
January	0.067	324	212
February	0.100	357	278
March	0.073	410	421
April	0.054	494	470
May	0.048	530	535
June	0.040	588	534
July	0.061	492	377
August	0.063	538	506
September	0.065	384	364
October	0.063	525	417
November	0.039	420	345
December	0.080	320	289
Range[5]	**0.024-0.281**	**140-640**	**154-643**
Median[5]	**0.060**	**440**	**391**
95th Percentile[5]	**0.103**	**609**	**591**

1. MGD: million gallons per day
2. BOD: biochemical oxygen demand
3. mg/L: milligrams per liter
4. TSS: total suspended solids
5. Range, median, and 95th percentile presented are for all recorded values

2.5 Treatment Processes

2.5.1 Process Description

The process for the facility is described in the current WDR for the WWTF (Order No. R1-2015-0039) as follows:

> *The Facility treats domestic and commercial wastewater and has an average dry weather design treatment capacity of 0.3 mgd and a peak daily wet weather treatment capacity of 1.0 mgd. The Facility consists of comminution, extended aeration activated sludge, secondary clarification, and tertiary filtration. Effluent is chlorinated, dechlorinated, and flows by gravity to a flow equalization pond. Influent flows in excess of the design flow can be routed to a 300,000 gallon overflow pond for storage until flows diminish, when the excess flow is routed back to the headworks for treatment. Effluent from the equalization pond is controlled at flow control structure A by sliding stop gates, from which flow continues to flow to control structure B, which has two pressure control valves to prevent backflow conditions in the outfall. From flow control structure B, effluent is discharged through a diffuser at Discharge Point 001 to the Pacific Ocean. The outfall structure is an 8-inch diameter pipe, 996 feet in length, which provides a minimum initial dilution of 100:1. Onsite storm water runoff is diverted to the plant headworks for treatment.*

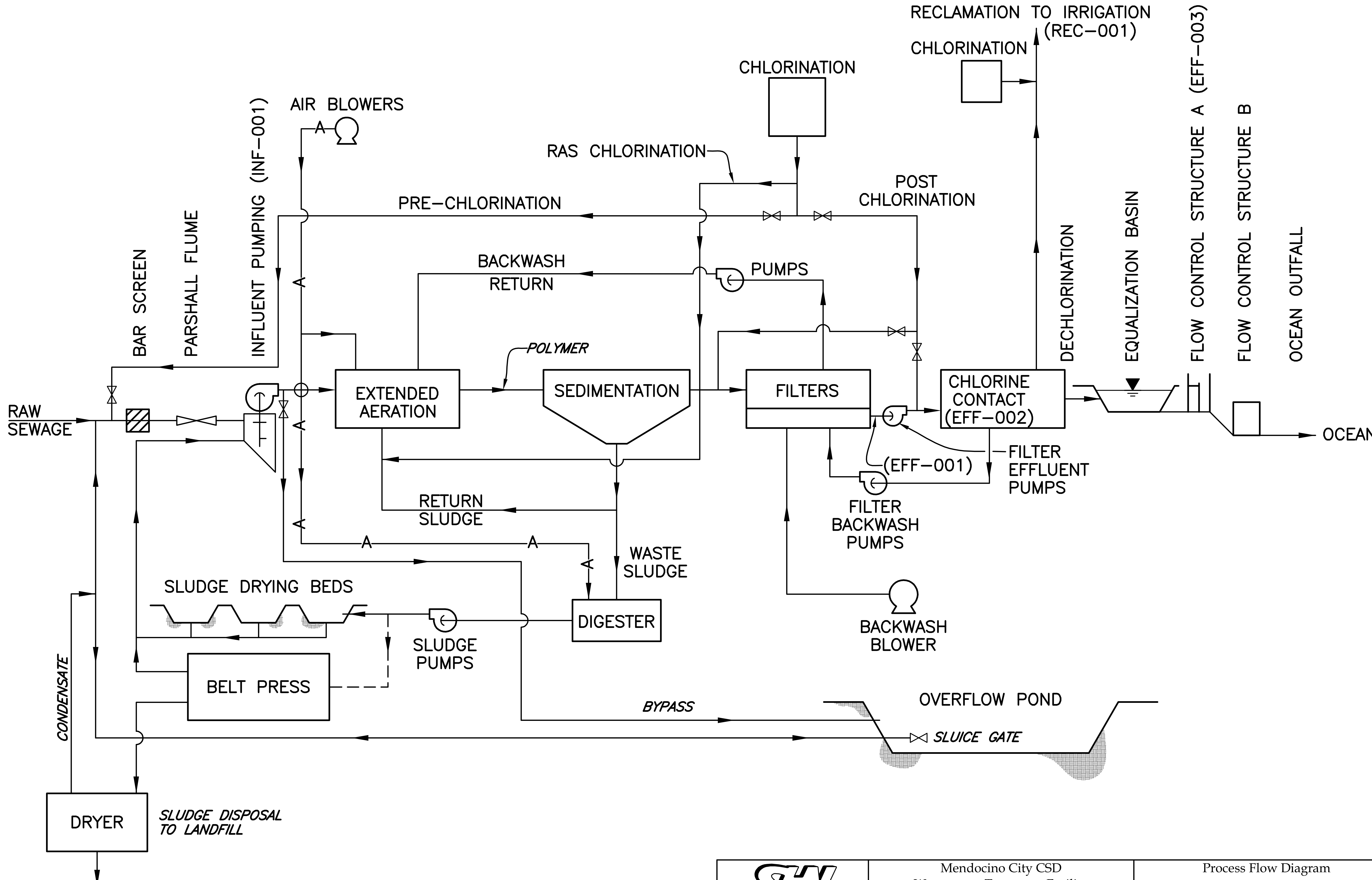
During the dry weather season (generally May through October) and other periods, as needed, tertiary-treated effluent is distributed to a water recycling system at Discharge Point 002, which consists of a 55,000-gallon storage tank, accompanying appurtenances, and a pop-up sprinkler system located on the Mendocino High School athletic fields. Disinfected tertiary recycled water is pumped to the high school storage tank in a "batch" fashion, and each tank of recycled water transferred to the storage tank must be used for field irrigation before the tank is refilled from the treatment plant (RWQCB, 2015).

In 2011 the pre-treatment process was modified and the comminutor was replaced with an automated bar screen. Table 2 summarizes the design criteria for the WWTF processes. A process flow diagram for the facility is included as Figure 2.

Table 2
Design Criteria
Mendocino City Wastewater Treatment Facility

Equipment	Design Criteria	
Aeration tank	Detention time	24 hours (average flow)
	Volume	300,000 gallons
	Loading (BOD)[1]	18.1 lbs[(2)] /1,000 ft^2[(3)]
	MLVSS[4]	2,000 mg/L[(5)]-5,000 lbs
	F/M[6]	0.16 lbs BOD/lb MLVSS
Secondary Clarifier	Overflow rate	373 gpd[(7)]/ft^2 (average flow) 1,244 gpd/ft^2 (peak flow)
	Area	804 ft^2
	Diameter	32 ft[(8)]
	Volume	90,000 gallons
	Detention time	7.2 hours (average flow) 2.2 hours (peak flow)
Filter	Number of Units	4
	Surface rate (with 3 filters)	1.9 gpm[(9)]/ft^2 (average flow) 6.4 gpm/ft^2 (peak flow)
	Area per filter	35.8 ft^2
	Media Depth	anthracite: 4 inches sand: 4 ft gravel: 1.5 ft
	Backwash rate	10 gpm/ft^2
	Volume of backwash per filter	5,370 gallons per backwash
	Backwash storage	14,600 gallons
Chlorine Contact	Volume	16,900 gallons
	Detention	1.35 hours (average flow) 0.4 hours (peak flow)

1. BOD: biochemical oxygen demand
2. lbs: pounds
3. ft^2: square feet
4. MLVSS: mixed liquor volatile suspended solids
5. mg/L: milligrams per liter
6. F/M: food to mass ratio
7. gpd: gallons per day
8. ft: feet
9. gpm: gallons per minute



SHN Consulting Engineers & Geologists, Inc.

Mendocino City CSD
Wastewater Treatment Facility
Mendocino, California

Process Flow Diagram

SHN 415065

March 2016 | 415065-PID | Figure 2

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2.5.2 Filtration Design Criteria

Tertiary filtration at the WWTF is provided by four dual-media filters. The filters consist of a 4-inch layer of anthracite and a 4-foot layer of mono media sand supported by 1.5 feet of gravel. The filters are designed to filter out 50 to 70% of suspended matter from the sedimentation tank. Design criteria for the filters are included in Table 2. The peak flow filtration rate of 6.4 gallons per minute per square foot (gpm/ft^2) exceeds the maximum 5 gpm/ft^2 required for tertiary filtration of recycled water; however, recycled water is not used during the high flow season when peak flows occur. Given the maximum filtration rate, the highest flow that can be put through the filters for recycled water is 0.77 MGD (534 gallons per minute [gpm]).

2.5.3 Chemical Usage

The WWTF uses sodium hypochlorite chlorination, and calcium hypochlorite chlorination. The sodium hypochlorite system is used for chlorination of return activated sludge and disinfection of the final effluent, and the calcium hypochlorite system is used as a backup system to the sodium hypochlorite system. MCCSD can manually switch from one chlorination system to another.

Sodium hypochlorite is pumped to the discharge side of the effluent pumps as a 12.5% solution. The calcium hypochlorite chlorination system is an "erosion feeder" and uses a 3-inch calcium hypochlorite tablet chlorinator. A flow of water is directed over a constant tablet surface area resulting in chlorine delivery to the chlorine contact tank. The chlorine contact tank supplies the required contact time for disinfection. Chlorine residuals at the chlorine contact tank range from 0.5 to 1.5 milligrams per liter (mg/L).

A second sodium hypochlorite feeder system is used to chlorinate the recycled water a second time when batch pumping to the high school recycled water tank. The residual from the second chlorination system is raised to 5 mg/L for the batch loads of recycled water pumped to the high school tank.

Sodium hypochlorite, and calcium hypochlorite are stored in the "chlorine room," which is equipped with an exhaust fan. Regular inspections for leaks, as well as emergency procedures, are outlined in the operations and maintenance (O&M) manual. The O&M manual instructs personnel to store calcium hypochlorite in a cool, dry, dark area.

2.5.4 Operation and Maintenance Manuals

The *Operations and Maintenance Manual for Mendocino City Wastewater Collection, Treatment and Disposal Facilities* (Montgomery, 1975 and 2005) was originally published in 1975, and was updated in 2005. The O&M manual includes, at a minimum, the following information:

1. A description of the facility's organizational structure
2. A detailed description of safe and effective operation and maintenance of treatment processes, process control instrumentation, and equipment
3. A description of laboratory and quality assurance procedures
4. Process and equipment inspection and maintenance instructions

5. A description of safeguards to ensure that, if there were a reduction, loss, or failure of electric power, the discharger would be able to comply with the current discharge requirements
6. A description of preventative (fail-safe) and contingency (response and clean-up) plans for controlling accidental discharges, and for minimizing the effect of such events

The information contained in the O&M manual provided the basis for this Title 22 report, along with the current WDR and supplemental information provided by MCCSD staff.

2.6 Plant Reliability Features

This section of the Title 22 report describes the plant reliability features used to comply with Sections 60333 through 60355 of the water recycling criteria. The discussion of each reliability feature states the conditions under which it will be actuated. This section notes where the alarm(s) will be received, how the location is staffed, and who will be notified. This section also notes the hours that the plant will be staffed.

2.6.1 General Requirements of Design

Flexibility of design (§60333).
The design of process piping, equipment arrangement, and unit structures in the reclamation plant must allow for efficiency and convenience in operation and maintenance and provide flexibility of operation to permit the highest possible degree of treatment to be obtained under varying circumstances.

The WWTF, as designed, provides flexibility for operation, as needed, to obtain the highest possible degree of treatment. The O&M manual for the WWTF includes guidelines for remedial actions for the failure of each element, including procedures for replacing inoperative units and/or altering the facility operations, so that the best possible treatment can be achieved during an element failure. The facility is equipped with an overflow basin capable of storing 24 hours of design flow to allow time for emergency repairs. In the case of a pump failure, all critical systems have parallel pump units that will enable the facility to operate satisfactorily until repairs are made. In the case of a controller failure, all pumps can be operated manually. The treatment plant and Hills Ranch lift stations have emergency generators in case of power outages. Lift stations "A" and "B" serve a limited number of residents and are designed with wet wells with 12 hours storage capacity. During extended outages, the lift stations are monitored and pumped by a septage pump truck as necessary.

Alarms (§60335a).
Alarm devices for various unit processes shall be installed to provide warning of the following:

1. *Loss of power from the normal power supply*
2. *Failure of a biological treatment process*
3. *Failure of a disinfection process*
4. *Failure of a coagulation process*
5. *Failure of a filtration process*
6. *Other specific process failure alarms*

The treatment system includes emergency and warning alarms addressing §60335a (1) through (6) as follows:

1. Power failure alarm
2. Blower failure alarm
3. High- and low-chlorine residual alarms
4. Not applicable-coagulation is not used
5. High turbidity and high filter level alarms
6. Sludge collector overload clutch failure, clear well low level, backwash sump high level, influent or effluent pump failure, dryer alarm, high sound level, and generator failure

There are also alarms for high- and low-wet well levels at the influent pump station and the Hills Ranch Lift Station.

Alarms (§60335b).
All required alarm devices shall be independent of the normal power supply of the reclamation plant.

All required alarm devices are supplied with power independent of the normal power supply.

Alarms (§60335c).
The person to be warned shall be the plant operator, superintendant, or any other responsible person designated by the management of the reclamation plant and capable of taking prompt corrective action.

The on-call plant operator is automatically notified of any alarm at the WWTF.

Alarms (§60335d).
Individual alarm devices may be connected to a master alarm to sound at a location where it can be conveniently observed by the attendant. In case the reclamation plant is not attended full time, the alarm(s) shall be connected to sound at police station, fire station, or other full time service unit with which arrangements have been made to alert the person in charge at times that the reclamation plant is unattended.

All alarm devices are connected to a single display location that is easily observed by the plant operator. During periods when the plant is unattended, the on-call operator is automatically notified of any condition triggering an alarm.

Power Supply (§60337).
The power supply shall be provided with one of the following reliability features:

a) *Alarm and standby power source.*
b) *Alarm and automatically actuated short-term retention or disposal provisions as specified in Section 60341.*
c) *Automatically actuated long-term storage or disposal provisions as specified in Section 60341.*

The WWTF is supplied with an alarm and a standby power source.

The WWTF is equipped with a Cummins Model DQDAA 250 kilowatt generator capable of powering all processes at the treatment facility. The generator at the treatment facility must be manually started, and an alarm notifies WWTF operators that a power outage has occurred. Until the generator is started, incoming flow is automatically diverted to the overflow pond. The overflow pond is capable of holding 24 hours of design average flow (0.3 million gallons [MG]).

2.6.2 Reliability Requirements for Primary Effluent

Primary Treatment (§60339). (Not Applicable)

This provision is specific to facilities reusing primary effluent as reclaimed water. The Mendocino City WWTF treats effluent to a tertiary level; therefore this section does not apply.

2.6.3 Reliability Requirements for Full Treatment

Emergency Storage (§60341a).
Where short-term retention or disposal provisions are used as a reliability feature, these shall consist of facilities reserved for the purpose of storing or disposing of untreated or partially treated wastewater for at least a 24-hour period. The facilities shall include all the necessary diversion devices, provisions for odor control, conduits, and pumping and pump-back equipment. All of the equipment other than the pump-back equipment shall be either independent of the normal power supply or provided with a standby power source.

Short-term emergency storage is provided by an overflow holding basin capable of storing 24 hours of design average flow (0.3 million gallons per day [MGD]). Influent flow is automatically diverted to the holding basin in the event of a power outage or other plant failure. Influent flows from the collection system flow through Manhole No. 9 to the WWTF. A 15-inch overflow located in Manhole No. 9 diverts flows to the holding basin. The stored wastewater will flow by gravity back to Manhole No. 9 as the influent level is pumped down by the influent pumps.

The current WDR for the WWTF prohibits an average dry weather flow (ADWF) greater than 0.3 MGD and peak wet weather flows greater than 1.0 MGD.

During the 36 years of plant operation from 1979 through 2015, the ADWF was 0.079 MGD and the average wet weather flow (AWWF) was 0.102 MGD. The maximum daily flow during 2015 was 0.281 MGD. Therefore, the overflow basin can provide a minimum of 24-hours storage during maximum flows.

Emergency Storage (§60341b). (Not Applicable)
Where long-term storage or disposal provisions are used as a reliability feature, these shall consist of ponds, reservoirs, percolation areas, downstream sewers leading to other treatment or disposal facilities, or any other facilities reserved for the purpose of emergency storage or disposal of untreated or partially treated wastewater. These facilities shall be of sufficient capacity to provide disposal or storage of wastewater for at least 20 days, and shall include all the necessary diversion works, provisions for odor and nuisance control, conduits, and pumping and pump back equipment. All of the equipment other than the pump-back equipment shall be either independent of the normal power supply or provided with a standby power source.

The MCCSD WWTF does not use long-term storage as a reliability feature.

Emergency Storage (§60341c). (Not Applicable)
Diversion to a less demanding reuse is an acceptable alternative to emergency disposal of partially treated wastewater, provided that the quality of the partially treated wastewater is suitable for the less demanding reuse.

Diversion to a less demanding reuse is not used as a reliability feature. Recycled water is delivered in batches. In the event that effluent does not meet turbidity requirements for disinfected tertiary-recycled water, no water is transferred to the reuse site. In the event that water is transferred to the storage tank and it is determined that it did not meet turbidity standards, the water can be pumped back into a nearby sewer manhole and returned to the treatment facility. In the event that effluent does not meet disinfection requirements for disinfected tertiary-recycled water during transfer to the MHS tank, the tanks are manually dosed with sodium hypochlorite solution, left to sit another 24 hours, and re-tested to ensure the disinfection requirements have been met prior to discharge onto the athletic fields.

Emergency Storage (§60341d). (Not Applicable)
Subject to prior approval by the regulatory agency, diversion to a discharge point, which requires lesser quality of wastewater, is an acceptable alternative to emergency disposal of partially treated wastewater.

The WWTF does not include any mechanism that would allow for diversion of partially treated wastewater to a discharge point that requires lesser quality of wastewater.

Emergency Storage (§60341e).
Automatically actuated short-term retention or disposal provisions and automatically actuated long-term storage or disposal provisions shall include, in addition to provisions of (a), (b), (c), or (d) of this section, all the necessary sensors, instruments, valves, and other devices to enable fully automatic diversion of untreated or partially treated wastewater to approved emergency storage or disposal in the event of failure of a treatment process and a manual reset to prevent automatic restart until the failure is corrected.

The overflow basin is capable of holding 24 hours of flow (0.3 MG) and may be used for storage in the event of a malfunction that results in or necessitates securing the influent pumping station or any portion of the treatment unit. Storage can be used by simply securing the influent pumping station, which will automatically divert wastewater to the overflow basin allowing the operator 24 hours to correct the malfunction. Although the influent pump station must be secured manually, no recycled water is delivered to use areas until meeting all requirements for disinfected tertiary-recycled water.

Primary treatment (§60343).
All primary treatment unit processes shall be provided with one of the following reliability features:

- *(a) multiple primary treatment units capable of producing primary effluent with one unit not in operation,*
- *(b) standby primary treatment unit process, or*
- *(c) long-term storage or disposal provisions.*

The facility does not have primary treatment. Pretreatment facilities include an automated bar screen. A Muffin Monster grinder is kept on stand-by for use if the automated bar screen is taken off-line. Pretreatment is followed by secondary and tertiary treatment. This fulfills §60343 (a).

Biological treatment (§60345).

All biological treatment unit processes shall be provided with one of the following reliability features:

(a) alarm and multiple biological treatment units capable of producing oxidized wastewater with one unit not in operation;
(b) alarm, short-term retention or disposal provisions, and standby replacement equipment;
(c) alarm and long-term storage or disposal provisions; or
(d) automatically actuated long-term storage or disposal provisions.

The facility provides secondary treatment using extended aeration. A new aeration blower was installed in March 2016. The two older blowers were left in place to be used in case of failure of the primary blower. Additionally, the overflow basin can be used for short-term storage. This fulfills §60345 (b).

Secondary Sedimentation (§60347).

All secondary sedimentation unit processes shall be provided with one of the following reliability features:

(a) Multiple sedimentation units capable of treating the entire flow with one unit not in operation.
(b) Standby sedimentation unit process.
(c) Long-term storage or disposal provisions.

The Mendocino City WWTF does not have a redundant system for secondary sedimentation. In the event that the secondary sedimentation unit process fails, no recycled water will be produced and all effluent will be directed to the ocean outfall for disposal.

Coagulation (§60349). (Not Applicable)

(a) All coagulation unit processes shall be provided with the following mandatory features for uninterrupted coagulant feed:
(1) Standby feeders,
(2) Adequate chemical stowage and conveyance facilities,
(3) Adequate reserve chemical supply, and
(4) Automatic dosage control

(b) All coagulation unit processes shall be provided with one of the following reliability features:
(1) Alarm and multiple coagulation units capable of treating the entire flow with one unit not in operation;
(2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;
(3) Alarm and long-term storage or disposal provisions;
(4) Automatically actuated long-term storage or disposal provisions, or
(5) Alarm and standby coagulation process.

The Mendocino City WWTF does not use coagulation processes and is, therefore, exempt from this section.

Filtration (§60351).

All filtration unit processes shall be provided with one of the following reliability features:

(a) Alarm and multiple filter units capable of treating the entire flow with one unit not in operation.
(b) Alarm, short-term retention or disposal provisions and standby replacement equipment.
(c) Alarm and long-term storage or disposal provisions.
(d) Automatically actuated long-term storage or disposal provisions.
(e) Alarm and standby filtration unit process.

The Mendocino City WWTF is equipped with four dual-media filters. The entire design flow can be filtered with one unit not in operation. Alarms for high turbidity and high filter water level alert the operator to potential filter failure. This fulfills §60351(a).

Disinfection (§60353).

All disinfection unit processes where chlorine is used as the disinfectant shall be provided with the following features for uninterrupted chlorine feed:

(1) *standby chlorine supply,*
(2) *manifold systems to connect chlorine cylinders,*
(3) *chlorine scales, and*
(4) *automatic devices for switching to full chlorine cylinders. Automatic residual control of chlorine dosage, automatic measuring and recording of chlorine residual, and hydraulic performance studies may also be required.*

All disinfection unit processes where chlorine is used as the disinfectant shall be provided with one of the following reliability features:

(1) *alarm and standby chlorinator;*
(2) *alarm, short-term retention or disposal provisions, and standby replacement equipment;*
(3) *alarm and long-term storage or disposal provisions;*
(4) *automatically actuated long-term storage or disposal provisions; or*
(5) *alarm and multiple point chlorination, each with independent power source, separate chlorinator, and separate chlorine supply.*

The WWTF uses sodium hypochlorite chlorination, and calcium hypochlorite chlorination. The sodium hypochlorite system is used for chlorination of return activated sludge and disinfection of the final effluent, and the calcium hypochlorite system is used as a backup system to the sodium hypochlorite system. MCCSD can manually switch from one chlorination system to another.

Sodium hypochlorite is pumped to the discharge side of the effluent pumps as a 12.5% solution. The calcium hypochlorite chlorination system is an "erosion feeder" and uses a 3-inch calcium hypochlorite tablet chlorinator. A flow of water is directed over a constant tablet surface area resulting in chlorine delivery to the chlorine contact tank. The chlorine contact tank supplies the required contact time for disinfection. Chlorine residuals at the chlorine contact tank range from 0.5 to 1.5 mg/L.

The disinfection system includes a room for storage and handling, diffuser-injector, and distribution system. A minimum supply of 90 gallons of 12.5% sodium hypochlorite is kept on hand.

A second sodium hypochlorite feeder system is used to chlorinate the recycled water a second time when batch pumping to the high school recycled water tank. The residual from the second chlorination system is raised to 5 mg/L for the batch loads of recycled water pumped to the MHS tank. Chlorine residual is monitored continuously during the transfer to the recycled water tank (REC-001). A minimum concentration and time (CT) value (the chlorine residual in mg/L multiplied by the contact time in minutes) of 450 milligram-minutes per liter (mg-min/L) is required prior to irrigation of the athletic fields.

Typical recycled water batch transfers of 32,000 gallons are pumped to the high school storage tank at approximately 52 gpm according to MCCSD staff. Transfers typically last approximately 10 hours, beginning in the afternoon and ending sometime in the early morning. Typically, irrigation occurs at MHS between 5 and 9 a.m., so that from the time the transfer stops to the time irrigation begins, the water has a minimum contact time of 24 hours. In order to verify that the minimum CT value is being met at the recycled water tank, MCCSD will monitor chlorine residual in the tank at the end of each 24-hour hold period and verify that a minimum chlorine residual has been maintained in the tank. A minimum chlorine residual of 0.3125 mg/L is required to meet the CT of 450 mg-min/L.

Chlorine can be supplied to the chlorine contact basin through the primary sodium hypochlorite system or the backup calcium hypochlorite system. The WWTF has alarms for both high- and low-chlorine residual, and the on-call operator is notified of any condition triggering an alarm. Therefore, the WWTF meets the requirement to have alarms and multiple points of chlorination, each with their own power source, separate chlorinator, and separate chlorine supply. This fulfills §60353 (5).

Other Alternatives to Reliability Requirements (§60355).
Other alternatives to reliability requirements set forth in Articles 8 to 10 may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the proposed alternative will assure an equal degree of reliability.

MCCSD transfers all recycled water in a batches. In the event that effluent does not meet turbidity requirements for disinfected tertiary-recycled water, no water is transferred to the reuse site. In the event that water is transferred to the reuse storage tank and is determined not to have met turbidity standards, water in the tank can be pumped into a nearby manhole and returned to the treatment facility. In the event that effluent does not meet disinfection requirements for disinfected tertiary-recycled water during transfer to the MHS tank, the tanks can be manually dosed with sodium hypochlorite solution, left to sit another 24 hours, and re-tested to ensure the disinfection requirements have been met prior to discharge onto the athletic fields.

2.7 Supplemental Water Supply

This section of the report describes all supplemental water supplies, including the purpose, source, quality, quantity available, and cross-connection control and backflow prevention measures.

The memorandum of understating between MCCSD and MUSD states that MCCSD will supply approximately 50,000 gallons of tertiary disinfected recycled water per week to irrigate athletic fields at MHS. The ADWF at the WWTF is approximately 0.079 MGD, which provides the necessary supply. Therefore, no supplemental water is required for use at the MHS athletic fields unless the requirements for disinfected tertiary-recycled water are not met at the WWTF and the transfer of recycled water does not occur. In the event the recycled water transfer does not occur, potable water can be used to fill the recycled water tank for irrigation water supply.

Water for the treatment plant is provided in two systems classified as the No. 1 water system and the No. 2 water system. Neither of these systems is potable quality and, therefore, must not be used for drinking purposes. Potable water is supplied by a well on Heeser Drive. The source for the No. 1 water system is an existing well located on the State Park property. The No. 1 water system supplies water to the operations building plumbing. The source for No. 2 water system is at the southeast corner of the equalization pond and provides water for all the 1-inch hose bibs and all the

1½-inch fire hydrants throughout the treatment plant site, and injection water for the chlorination system. The hose bibs are provided for wash-down of the treatment units and plant structures (Montgomery, 2005).

2.8 Monitoring and Reporting

This section of the Title 22 report describes the planned monitoring and reporting, including all monitoring required by the water recycling criteria, and includes the frequency and location of sampling. Where continuous analysis and recording equipment is used, the method and frequency of calibration is stated. This section also states whether or not all analyses are performed by a laboratory approved by the State Department of Health Services.

The State Water Resources Control Board's (SWRCB) recycled water regulations under Section 60321(c) require the producer or supplier of the recycled water to conduct sampling as required in Section 60321 (a) and (b). Section 60321(a) requires all disinfected secondary-23, disinfected secondary-2.2, and disinfected tertiary-recycled water to be sampled at least once daily for total coliform bacteria. The samples must be taken from the disinfected effluent and must be analyzed by an approved laboratory. Section 60321(b) requires that disinfected tertiary-recycled water be continuously sampled for turbidity using a continuous turbidity meter and recorder following filtration. Compliance with the daily average operating filter effluent turbidity must be determined by averaging the levels of recorded turbidity taken at 4-hour intervals over a 24-hour period. Compliance with turbidity pursuant to section 60301.320 (a)(2)(B) and (b)(1) must be determined using the levels of recorded turbidity taken at intervals of no more than 1.2-hours over a 24-hour period. The results of the daily average turbidity determinations must be reported quarterly to the regulatory agency.

Section 60301.320(a)(2) requires that turbidity of filtered wastewater not exceed 5 nephelometric turbidity units (NTU) more than 5% of the time within a 24-hour period. Section 60301.320(b)(1) applies to wastewater filtered using microfiltration, ultrafiltration, nanofiltration, or reverse osmosis, and is, therefore, not applicable to the Mendocino City WWTF.

The MCCSD performs monitoring and reporting for the Mendocino City WWTF discharges in accordance with Monitoring and Reporting Program (MRP) established by WDR Order No. R1-2015-0039 (RWQCB, 2015). The MRP sets forth requirements for influent flow monitoring, effluent monitoring, and recycled water monitoring. The effluent monitoring program includes a requirement to sample for total coliform organisms each day that recycled water is transferred from the WWTF to the recycled water system. All total coliform samples are analyzed in the WWTF laboratory, and once per week a duplicate sample is submitted for analysis to Alpha Analytical Laboratories, an SWRCB-approved laboratory in Ukiah, California. The daily sampling results are reported monthly.

As required by MRP Order No. R1-2015-0039, turbidity is monitored and recorded continuously at the WWTF following filtration during periods of water recycling. In the event of a failure of the meter or recorder, grab sampling is conducted at a minimum frequency of 1.2 hours for up to 24 hours while repairs are implemented. The daily average, daily maximum and 95th percentile turbidity results are reported in the quarterly monitoring reports, and all data is kept on file for at least 3 years.

A monthly summary of operating records including analyses, records of operational problems, plant and equipment breakdowns, and diversions to emergency storage or disposal, and all corrective or preventive actions taken shall be filed monthly with the RWQCB as required by Title 22 Section 60329.

2.9 Contingency Plan

Section 60323 (c) of the water recycling criteria requires that the engineering report contain a contingency plan signed to prevent inadequately treated wastewater from being delivered to the user. The contingency plan should include:

- *a list of conditions that would require an immediate diversion to take place;*
- *a description of the diversion procedures;*
- *a description of the diversion area, including capacity, holding time, and return capabilities;*
- *a description of plans for activation of supplemental supplies (if applicable);*
- *a plan for the disposal or treatment of any inadequately treated effluent;*
- *a description of failsafe features in the event of a power failure, and*
- *a plan (including methods) for notifying the recycled water user(s), the regional board, the state and local health departments, and other agencies as appropriate, of any treatment failures that could result in the delivery of inadequately treated recycled water to the use area.*

The Mendocino City WWTF transfers disinfected tertiary-recycled water to a 55,000-gallon recycled water tank located at MHS in a "batch" fashion. Therefore if there are any problems with the recycled water system, it can be shut down and all effluent will continue through the normal treatment train to the ocean outfall with no interruption in normal treatment. This includes the event that there is a failure or malfunction of any pumping, piping, or storage equipment, including the 55,000-gallon tank. In the event of a power failure at the WWTF facility, a backup generator will supply power to the treatment facility for treatment and transfer of recycled water.

In the event that effluent does not meet turbidity requirements for disinfected tertiary-recycled water, no water is transferred to the reuse site. This includes the event that turbidity exceeds 10 NTU at any one time, or 5 NTU for more than 30 minutes during a single 24-hour transfer period. In the event that water is transferred to the storage tank and it is determined that it did not meet turbidity standards, the water can be pumped back into a nearby sewer manhole and returned to the treatment facility.

In the event that effluent does not meet disinfection requirements for disinfected tertiary-recycled water, the tank can be manually dosed with a 12.5% sodium hypochlorite solution, left in storage tank for another 24 hours to achieve an adequate contact time, and re-tested to ensure the disinfection requirements have been met prior to use. Routine monitoring is performed at sampling locations EFF-001 and EFF-002 prior to the transfer of recycled water to the recycled water tank. Additional monitoring, including continuous chorine residual monitoring, is performed at REC-001 during transfers to the recycled water tank.

In the case that inadequately treated recycled water is delivered to the high school storage tank, Mr. Otto Rice the MUSD Maintenance Supervisor responsible for operation of the recycled water system will be contacted by cell phone at (707) 937-5670, by work phone at (707) 937-1603, or in person at his office at 44100 Little Lake Road, and notified by email at maint@mcn.org.

In accordance with monitoring and reporting requirements listed in WDR Order R1-2015-0039, any inadequately treated recycled water used for irrigation would be considered a spill and proper spill notification procedures will be followed. If the spill is greater than 10,000 gallons, the RWQCB will be notified immediately or as soon as possible by calling (707) 576-2220 during normal business hours of 8 a.m. to 5 p.m., Monday through Friday. If the spill occurs outside of this time, the spill will be reported to the California Governor's Office of Emergency Services Warning Center (CalOES) at (800) 852-7550. Randy Barnard, DDW recycled water unit chief will be notified by email at Randy.Barnard@waterboards.ca.gov.

The WWTF superintendent Mr. Mike Kelley can be reached during normal business hours at the treatment facility at (707) 937-5751, the community services district office at (707) 937-5790, by mail at PO Box 1029, Mendocino, CA 95460, or by email at mccsd@mcn.org. In the case of an emergency during non-business hours, an on-call operator can be reached at a dedicated cell phone at (707) 813-9296.

The MHS storage tank is also plumbed to receive potable water that can act as a supplemental supply in the event that recycled water is not available.

3.0 Transmission and Distribution Systems

This section of the report provides reference to maps and/or plans that show the location of the transmission facilities and the distribution system layout for the recycled water system. The plans should include the ownership and location of all potable water lines, recycled water lines, and sewer lines within the recycled water service area and use area(s).

The general layout of the recycled water transmission lines is shown on the "Mendocino City Community Services District Wastewater Treatment Plant Location Map," included in Appendix B, as are the sewer lines within the recycled water service area. MCCSD does not have a municipal water system, so no potable water lines are shown.

4.0 Use Areas

This section of the Title 22 report provides a general description of the recycled water use area, as well as additional information as required to address current irrigation practices in the use areas.

4.1 Irrigation

4.1.1 Type of Land Use

This section of the Title 22 report includes a description of the types of land use present in the reuse areas.

Recycled water use locations are shown on Figure 3. MCCSD currently recycles approximately one and a half million gallons of tertiary-treated effluent per year to MHS, to irrigate the school's athletic fields. Recycled water is stored in a 55,000-gallon water storage tank that is located in southeast corner of the soccer field; the athletic fields are irrigated using an automatic pop-up sprinkler system as shown on Figure 4. Both athletic fields at MHS are generally level and are

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MCCSD
Title 22 Engineering Report
Mendocino, California

Recycled Water Use Locations

SHN 415065

February 2017 | Figure3_ExistingProposed | Figure 3

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SHN Consulting Engineers & Geologists, Inc.	MCCSD Title 22 Engineering Report Mendocino, California		MHS Recycled Water Storage and Sprinkler Systems Layout SHN 415065
	March 2016	Figure4_StorageAndSprinklerSystem	Figure 4

located at a lower elevation than the MHS main campus. The soccer field is bordered by a running track and is surrounded by California State Park lands to the north and west. The football/baseball field is bordered by heavy vegetation on three sides.

4.1.2 Type of Reuse Proposed

This section of the Title 22 report includes a description of what will be irrigated, the method of irrigation, measures to be taken to minimize ponding, and the proposed irrigation schedule.

Tertiary-treated recycled water from the WWTF is currently used to irrigate the athletic fields at MHS. Irrigation is conducted during the dry months of the year, typically from April through October. The fields are irrigated using a pop-up sprinkler system during a watering window in the early morning from approximately 5 a.m. to 9 a.m. The irrigation system is manually controlled with timed zones for each field; each zone is watered for approximately 24 minutes. The sprinklers assigned to each zone are shown on Figure 4.

Measures are implemented to minimize ponding including managing irrigation so that recycled water infiltrates within 48 hours, regularly inspecting the system for leaks or malfunctions, and not irrigating during precipitation events. According to the Site Supervisor, recycled water does not pond at either site and no runoff from either field occurs during the recycled water irrigation season.

The proposed 2018 recycled water expansion project will include installation of a new chlorine contact chamber; installation of one new recycled water storage tank; repurposing of another existing water tank for recycled water storage; installation of a new recycled water conveyance pipeline and associated appurtenances; and installation of a fill station at the WWTF site for public use. Additional information related to the proposed additional recycled water uses has not been included in this report. This Title 22 report will be updated with the expansion project information following approval of the preliminary engineering report for the expansion project. An updated Title 22 report will be submitted for review and approval prior to adding any new recycled water users.

4.1.3 Party Responsible for Distribution and Use of Recycled Water

This section includes a description of the procedures, restrictions, and other requirements that are imposed by the distributor and/or user for the use area.

In accordance with the memorandum of understanding between MCCSD and MUSD, MUSD is responsible for the ongoing maintenance and operation of the distribution system. MUSD is also responsible for performing chlorine residual and total coliform monitoring prior to irrigation of the school's athletic fields; however, the required monitoring is completed by MCCSD on behalf of MUSD. MCCSD is responsible for maintenance and operations of WWTF equipment.

Recycled water use at the MHS athletics fields is currently managed by Mr. Otto Rice, the MUSD Maintenance Supervisor who can be reached by cell phone at (707) 937-5670, by work phone at (707) 937-1603, in person at his office at 44100 Little Lake Road, or by email at maint@mcn.org. As the designated Recycled Water Site Supervisor, Mr. Rice is responsible for operation and maintenance of the site's recycled water use system.

Any irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat (including ponding or flooding). Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas (picnic tables or benches), or food handling facilities. Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.

4.1.4 Regulatory Jurisdiction

This section includes identification of other governmental agencies that may have jurisdiction over the reuse site.

MUSD has jurisdiction over the existing irrigation sites.

4.1.5 Use Area Containment Measures

This section includes a description of the use area containment measure, including a description of the site containment measures, the direction of flow, and the area to which discharge will flow.

Both athletic fields at MHS are generally level and are located at a lower elevation than the MHS main campus. The soccer field is bordered by a running track and is surrounded by California State Park lands to the north and west. The football/baseball field is bordered by heavy vegetation on three sides. Irrigation of the MHS athletic fields with recycled water typically is conducted during the dry months of the year, from April through October. According to the Site Supervisor, recycled water does not pond at either site and no runoff from either field occurs during the recycled water irrigation season.

4.1.6 Map of Land Use Area

This section of the report includes references to maps and/or plans of the reuse areas that show all piping networks within the use area including recycled, potable, sewage and other piping networks. This section also includes a description of any water supply facilities in or adjacent to the LAAs, a description of the setback distances required, and the location and wording of public signs.

All existing use areas are shown on Figure 3. A map showing the location of the existing recycled water line to MHS and all sewer lines in the area is included in Appendix B. MCCSD does not have a community water system and water is supplied through individual wells, so no water lines are present.

The WDR for the WWTF requires that all areas where treated effluent is used for irrigation that are accessible to the public be posted with signs that are visible to the public, in a size no less than 4 inches high by 8 inches wide, that include the following wording: "RECYCLED WATER—DO NOT DRINK." Proposed sign locations for MHS are shown on Figure 5.

The WDR for the WWTF (Order No. R1-2015-0039) also requires that disinfected tertiary-recycled water not be used for irrigation within 50 feet of any domestic water supply well or domestic water supply surface intake. Existing domestic water supply wells are shown on Figure 6. All domestic wells are located at least 50 feet from the existing irrigation areas.

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EXPLANATION

SIGN POSTING LOCATIONS

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SHN Consulting Engineers & Geologists, Inc.	MCCSD Title 22 Engineering Report Mendocino, California	Recommended Recycled Water Sign Posting Locations SHN 415065
	March 2016 | Figure5_SignPostingLocations	Figure 5

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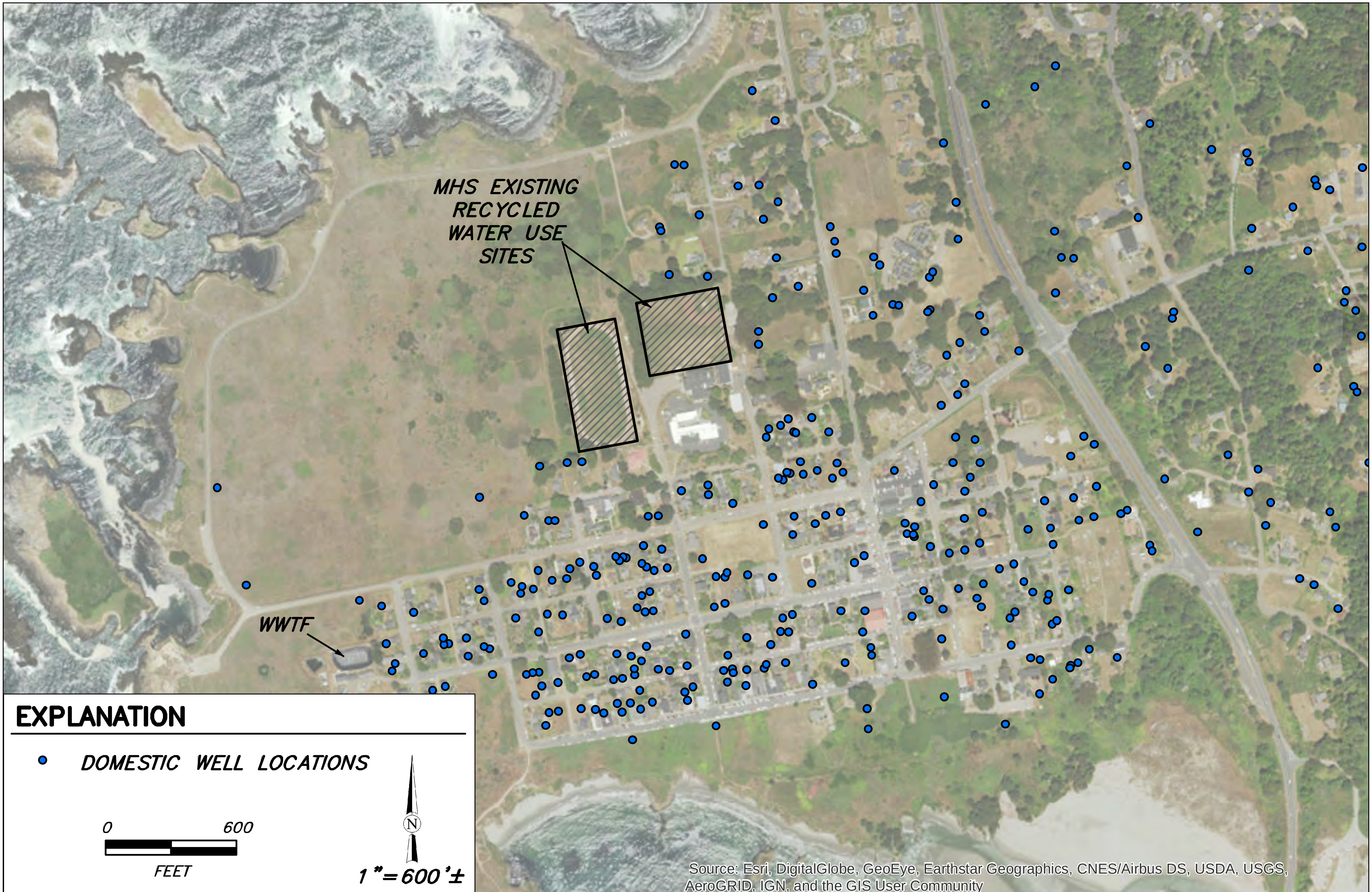

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MCCSD
Title 22 Engineering Report
Mendocino, California

Domestic Well Locations

SHN 415065

March 2016 | Figure6_DomesticWellLocations | Figure 6

4.1.7 Access Potential

This section of the report describes applicable protection measures for drinking water fountains and designated outdoor areas and measures taken to exclude or minimize public contact with reclaimed water.

The MHS athletic fields are irrigated with tertiary-disinfected recycled water as required for the irrigation of parks and playgrounds. Measures to minimize public contact with recycled water include an early morning watering window, measures to minimize ponding as described in Section 4.1.2, and cross-connection controls as described in Section 4.2. All recycled water appurtenances at the MHS athletic fields are clearly marked with purple paint and labeled as non-potable water.

4.2 Cross-Connection Control Program

This section describes the cross-connection control procedures required for use areas where both potable and recycled water lines exist.

Title 17 Section 7584 states that *the water supplier shall protect the public water supply from contamination by implementation of a cross-connection control program. The program, or any portion thereof, may be implemented directly by the water supplier or by means of a contract with the local health agency, or with another agency approved by the health agency. The water supplier's cross-connection control program shall for the purpose of addressing the requirements of Sections 7585 through 7605 include, but not be limited to, the following elements:*
(a) The adoption of operating rules or ordinances to implement the cross-connection program,
(b) The conducting of surveys to identify water user premises where cross-connections are likely to occur,
(c) The provisions of backflow protection by the water user at the user's connection or within the user's premises or both,
(d) The provision of at least one person trained in cross-connection control to carry out the cross-connection program,
(e) The establishment of a procedure or system for testing backflow preventers, and
(f) The maintenance of records of locations, tests, and repairs of backflow preventers.

The MCCSD/MUSD recycled water system consists of a single potential cross-connection at the high school storage tank. The potential cross-connection is protected by an air gap separation that is maintained by a float valve that shuts off the delivery of recycled water to the high school storage tank when the water level is approximately 1-foot below the potable water pipe. The float valve and air gap separation are inspected once annually by a certified cross-connection control specialist. Records of inspections and repairs are kept by MUSD Maintenance and Operations Supervisor Mr. Otto Rice, who is also the user supervisor for the recycled water system.

4.2.1 Evaluation of Hazard (§7585)

The water supplier shall evaluate the degree of potential health hazard to the public water supply which may be created as a result of conditions existing on a user's premises. The water supplier, however, shall not be responsible for abatement of cross-connections which may exist within a user's premises. As a minimum, the evaluation should consider: the existence of cross-connections, the nature of materials handled on the property, the probability of a backflow occurring, the degree of piping system complexity and the potential for piping system modification. Special consideration shall be given to the premises of the following types of water users:

(a) Premises where substances harmful to health are handled under pressure in a manner which could permit their entry into the public water system. This includes chemical or biological process waters and water from public water supplies which have deteriorated in sanitary quality.
(b) Premises having an auxiliary water supply, unless the auxiliary supply is accepted as an additional source by the water supplier and is approved by the health agency.
(c) Premises that have internal cross-connections that are not abated to the satisfaction of the water supplier or the health agency.
(d) Premises where cross-connections are likely to occur and entry is restricted so that cross-connection inspections cannot be made with sufficient frequency or at sufficiently short notice to assure that cross-connections do not exist.
(e) Premises having a repeated history of cross-connections being established or re-established.

A cross-connection is any physical connection between any part of a water system used or intended to supply potable water for drinking purposes, and any source or system containing water or another substance that is not, or cannot, be approved for human consumption. A cross-connection includes direct piping between the two systems, regardless of whether there are valves, backflow prevention devices, or other appurtenances.

There is a potable water supply line as well as a recycled water supply line that can be used to fill the recycled water tank at the MHS fields as needed. The MHS water tank is the only potential cross-connection hazard.

4.2.2 User Supervisor (§7586)

The health agency and water supplier may, at their discretion, require an industrial water user to designate a user supervisor when the water user's premises has a multipiping system that convey various types of fluids, some of which may be hazardous and where changes in the piping system are frequently made. The user supervisor shall be responsible for the avoidance of cross-connections during the installation, operation and maintenance of the water user's pipelines and equipment.

Recycled water use at the MHS athletics fields is currently managed by Mr. Otto Rice, the MUSD Maintenance and Operations Supervisor. Mr. Rice can be contacted by cell phone at (707) 937-5670, by work phone at (707) 937-1603, in person at his office at 44100 Little Lake Road, or by email at maint@mcn.org. As the designated Recycled Water Site Supervisor, Mr. Rice is responsible for operation and maintenance of the site's recycled water use system.

The Site Supervisor will notify MCCSD of any suspected cross-connection between the recycled water and potable water systems at MHS. If a cross-connection is suspected or occurs, the following procedure will be implemented:

1. MUSD will notify MCCSD by telephone immediately. The telephone notification will be followed by a written notice within 24 hours. The written notice will include an explanation of the nature of the cross-connection, date and time discovered, and the contact information of the person reporting the cross-connection.
2. MCCSD will notify the Mendocino County Public Health Department (County Public Health) and DDW of the reported cross-connection.
3. MUSD will immediately shut-down the recycled water supply to the irrigation system.
4. MUSD will keep the potable water system pressurized, and will post-"Do Not Drink" signs at all potable water fixtures and outlets.

5. MUSD will provide bottled water until the potable water system is deemed safe to drink.
6. MUSD will follow the procedures outlined by County Public Health, DDW, and MCCSD.

After final approval has been obtained from County Public Health and DDW, MCCSD will bring the recycled water system back into service, and inform MUSD to remove the "Do Not Drink" signs from all potable water fixtures and outlets.

4.2.3 Approval of Backflow Preventers (§7601)

Backflow preventers required by this Chapter shall have passed laboratory and field evaluation tests performed by a recognized testing organization which has demonstrated their competency to perform such tests to the State Water Resources Control Board.

The air gap separation backflow preventer in the MHS water tank is inspected and tested annually by a certified cross-connection control specialist. Currently, this specialist is Mr. Rio Russell of Elk, California, certification number 2330.

4.2.4 Construction of Backflow Preventers (§7602)

(a) Air-gap Separation. An Air-gap separation (AG) shall be at least double the diameter of the supply pipe, measured vertically from the flood rim of the receiving vessel to the supply pipe; however, in no case shall this separation be less than one inch.
(b) Double Check Valve Assembly. A required double check valve assembly (DC) shall, as a minimum, conform to the AWWA Standard C506-78 (R83) adopted on January 28, 1978 for Double Check Valve Type Backflow Preventive Devices which is herein incorporated by reference.
(c) Reduced Pressure Principle Backflow Prevention Device. A required reduced pressure principle backflow prevention device (RP) shall, as a minimum, conform to the AWWA Standard C506-78 (R83) adopted on January 28, 1978 for Reduced Pressure Principle Type Backflow Prevention Devices which is herein incorporated by reference.

The existing recycled water tank is equipped with an air-gap separation to prevent cross connection. The air gap separation is maintained by a float valve that shuts off the delivery of recycled water to the high school storage tank when the water level is approximately 1 foot below the potable water pipe. The recycled water delivery pipe is a 2-inch pipe, such that the minimum air gap separation required is 4 inches; therefore the 12-inch air gap is sufficient to comply with safety standards for air gap separation.

4.2.5 Location of Backflow Preventers (§7603)

(a) Air-gap Separation. An air-gap separation shall be located as close as practical to the user's connection and all piping between the user's connection and the receiving tank shall be entirely visible unless otherwise approved in writing by the water supplier and the health agency.
(b) Double Check Valve Assembly. A double check valve assembly shall be located as close as practical to the user's connection and shall be installed above grade, if possible, and in a manner where it is readily accessible for testing and maintenance.
(c) Reduced Pressure Principle Backflow Prevention Device. A reduced pressure principle backflow prevention device shall be located as close as practical to the user's connection and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance.

A brass float valve inside the 55,000-gallon high school storage tank shuts off flow to the tank once it has reached approximately 1 foot below the potable water delivery pipe. The float valve and air gap are visible inside the tank from an access port on the top of the tank cover.

4.2.6 Type of Protection Required (§7604)

The type of protection that shall be provided to prevent backflow into the public water supply shall be commensurate with the degree of hazard that exists on the consumer's premises. The type of protective device that may be required (listed in an increasing level of protection) includes: Double check Valve Assembly-(DC), Reduced Pressure Principle Backflow Prevention Device-(RP) and an Air gap Separation-(AG). The water user may choose a higher level of protection than required by the water supplier. The minimum types of backflow protection required to protect the public water supply, at the water user's connection to premises with various degrees of hazard, are given in Table 1. Situations not covered in Table 1 shall be evaluated on a case-by-case basis and the appropriate backflow protection shall be determined by the water supplier or health agency.

According to Title 17 Section 7604, Table 1, Item C: Recycled Water, Subsection 1: Premises where the public water system is used to supplement the recycled water supply, an air gap backflow preventer is the minimum required protection for this type of hazard. The Mendocino City WWTF has an air gap separator backflow preventer in place.

4.2.7 Testing and Maintenance of Backflow Preventers (§7605)

(a) The water supplier shall assure that adequate maintenance and periodic testing are provided by the water user to ensure their proper operation.
(b) Backflow preventers shall be tested by persons who have demonstrated their competency in testing of these devices to the water supplier or health agency.
(c) Backflow preventers shall be tested at least annually or more frequently if determined to be necessary by the health agency or water supplier. When devices are found to be defective, they shall be repaired or replaced in accordance with the provisions of this Chapter.
(d) Backflow preventers shall be tested immediately after they are installed, relocated or repaired and not placed in service unless they are functioning as required.
(e) The water supplier shall notify the water user when testing of backflow preventers is needed. The notice shall contain the date when the test must be completed.
(f) Reports of testing and maintenance shall be maintained by the water supplier for a minimum of three years.

The air gap separation backflow preventer in the MHS water tank is inspected and tested annually by a certified cross-connection control specialist. Currently, this specialist is Mr. Rio Russell of Elk, California, certification number 2330.

4.3 Impoundments (Not Applicable)

4.4 Cooling (Not Applicable)

4.5 Groundwater Recharge (Not Applicable)

4.6 Dual Plumbed Use Areas (Not Applicable)

4.7 Other Industrial Uses (Not Applicable)

4.8 Use-Area Design

This section of the report discusses how domestic water distribution systems shall be protected from the recycled water in accordance with the regulations related to cross-connections and the California waterworks standards, and how the facilities will be designed to minimize the chance of recycled water leaving the designated use area.

Potable water lines with hose bibs and fire hydrants are located throughout the MHS athletic fields. There is also a recycled water fire hydrant that is clearly marked as a purple pipe water reuse supply. Design information regarding the installation of the existing potable water supply lines at the MHS athletic fields was not available. All recycled water appurtenances at the MHS athletic fields are clearly marked with purple paint and labeled as non-potable water.

As discussed in Section 4.1.5, both athletic fields at MHS are generally level and are located at a lower elevation than the MHS main campus. The soccer field is bordered by a running track and is surrounded by California State Park lands to the north and west. The football/baseball field is bordered by heavy vegetation on three sides. According to the Site Supervisor, recycled water does not pond at either site and no runoff from either field occurs during the recycled water irrigation season.

4.9 Use-Area Inspections and Monitoring

This section of the report describes the use area inspection program and identifies the locations at the use area where problems are most likely to occur, (ponding, runoff, overspray, cross-connections, etc.) and the personnel responsible for monitoring and reporting use-area problems.

The Site Supervisor performs regular preventative maintenance to ensure that the irrigation system using recycled water remains in compliance with the governing regulations. As part of the maintenance program, the Site Supervisor conducts the following tasks:

1. Perform regular inspections of the entire recycled water system, including sprinkler heads, spray patterns, piping and valves, pumps, storage facilities, controllers, and potential cross-connections. Immediately repair all broken sprinkler heads, faulty spray patterns, leaking pipes and/or valves, and other noted conditions that may violate recycled water use requirements.
2. Check all recycled water identification signs, tags, stickers, and above-grade piping markings for their proper placement and legibility. Replace damaged, unreadable, or missing signs, tags, stickers, and/or pipe markings as necessary.
3. Check irrigation spray patterns to eliminate ponding, runoff, and wind-blown spray conditions. If evidence of runoff or ponding is noted, adjust the sprinkler heads in the affected area to prevent further ponding or runoff.

4.10 Employee Training

This section of the report describes the training that use-area employees receive to ensure compliance with the recycled water criteria and identifies the entity that will provide the training and its frequency. This section also identifies the written manuals of practice made available to employees.

Training related to recycled water use will be provided following final approval and acceptance of the Title 22 report. All recycled water use employees and associated agency staff will receive a copy of the approved Title 22 report, will receive training on the use and handling of recycled water, and operation of recycled water facilities. Employees will also receive an annual refresher training course following their initial training.

5.0 References

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California Health and Human Services, Division of Drinking Water and Environmental Management. (2001). *Guidelines for the Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water*. NR:CHHS.

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James M. Montgomery, Consulting Engineers, Inc. (1975, revised 2005). *Operation and Maintenance Manual for Mendocino City Wastewater Collection, Treatment, and Disposal Facilities.* Walnut Creek, CA:Montgomery.

North Coast Regional Water Quality Control Board. (2015). “WDR Order No. R1-2015-0039, Mendocino City Community Services District, Mendocino City Wastewater Treatment Facility, Mendocino County.” Santa Rosa, CA:RWQCB.

United States Geological Survey. (NR). Mendocino 7.5-Minute Quadrangle. NR:USGS.

A

Joint Resolution and Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING
MENDOCINO CITY COMMUNITY SERVICES DISTRICT
AND
MENDOCINO UNIFIED SCHOOL DISTRICT

WHEREAS, the efficient use of local water resources is an appropriate concern of local Districts; and

WHEREAS, the Mendocino City Community Services District (hereinafter referred to as MCCSD) desires to make efficient use of its waste water resources; and

WHEREAS, the Mendocino Unified School District (hereinafter referred to as MUSD) has a continuing need for irrigation water for its school athletic fields; and

WHEREAS, the MCCSD has the desire and ability to supply recycled water to the MUSD for the purpose of irrigating its athletic fields.

IT IS HEREBY AGREED between MCCSD and MUSD as follows:

1. MCCSD agrees to provide tertiary disinfected recycled water to irrigate Mendocino High School athletic fields. It is presently estimated that approximately 50,000 gallons of recycled water from the waste water treatment plant per week will be utilized by the Mendocino High School to irrigate the athletic fields during the summer and fall months of the year.

2. MCCSD agrees to make necessary modifications to its waste water treatment plant process to accommodate MUSD's need for recycled water and to meet additional water quality standards and record keeping requirements of the California Department of Health Services. These required necessary modifications and other requirements are described in detail in a letter dated November 25, 1996, from District Engineer Bruce H. Burton, PE of the Department of Health Services. A copy of this letter is attached to this Agreement as Exhibit A and hereby incorporated by reference as though fully set forth herein. MCCSD estimates the initial costs of these modifications to be $30,000.00 in addition to ongoing costs of approximately $500.00 per month. These additional costs will be incurred primarily during the approximate 4 month period during which recycled water will be provided to MUSD. MCCSD agrees to undertake ongoing maintenance and operation of the improvements constructed pursuant to this Agreement. All such improvements are located within the MCCSD plant site.

3. MUSD agrees to construct certain improvements including storage facilities and irrigation facilities, as well as repair an existing water transfer line. The estimated initial cost of these improvements is $42,000.00. Furthermore, MUSD will incur costs of approximately $100.00 per month (in addition to staff time) during the approximate 4 month period during which recycled water will be used by MUSD. MUSD agrees to be responsible for ongoing maintenance and operation of the improvements constructed pursuant to this Agreement.

4. MCCSD and MUSD mutually agree to construct the improvements necessary to provide MCCSD recycled water to MUSD. The Districts presently intend to complete construction of these improvements by Fall 1997. MCCSD and MUSD further agree that they shall maintain these improvements, including necessary monthly costs, until such time as it is otherwise agreed by the respective Districts.

5. In order to comply with the requirements in the attached Exhibit A, it will be necessary for MUSD to maintain certain records and provide these records to MCCSD. Specifically, MUSD must perform chlorine testing in accordance with the criteria set forth in the attached Exhibit A. Such testing must be done at the storage tank prior to irrigation. Furthermore, MUSD must conduct a total coliform test in accordance with the criteria set forth in the attached Exhibit A. MUSD agrees to conduct the necessary sampling and testing, obtain and log test results, and provide the test results to MCCSD on a monthly basis. In the event of any failure to meet the required chlorine residual and storage detention time or total coliform MPN as set forth in Exhibit A, MUSD agrees to immediately notify MCCSD. MUSD further agrees not to use the recycled water for irrigation purposes until such time as the water passes the required chlorine and total coliform tests.

Dated: February 24, 1997

MENDOCINO UNIFIED SCHOOL DISTRICT

By Kenneth Matheson

Title: Superintendent

Dated: February 24, 1997

MENDOCINO CITY COMMUNITY SERVICES DISTRICT

By E. O'Brien

EDWARD O'BRIEN, Chairman

MENDOCINO CITY COMMUNITY SERVICES DISTRICT
MENDOCINO UNIFIED SCHOOL DISTRICT

JOINT RESOLUTION NO. 97-1

A resolution of the Mendocino City Community Services District and Mendocino Unified School District concerning the use of recycled water for irrigation of school athletic fields.

WHEREAS, the efficient use of local water resources is an appropriate concern of local districts; and

WHEREAS, the Mendocino City Community Services District desires to make efficient use of its waste water resources; and

WHEREAS, the Mendocino Unified School District has a continuing need for irrigation water for its school athletic fields; and

WHEREAS, the Mendocino City Community Services District has the desire and ability to supply recycled water to the Mendocino Unified School District for the purpose of irrigating its athletic fields.

IT IS HEREBY JOINTLY RESOLVED, by the Mendocino City Community Services District (MCCSD) and the Mendocino Unified School District (MUSD) that these two Districts will enter into a memorandum of understanding whereby recycled water from the MCCSD Waste Water Treatment Plant could be used for the irrigation of MUSD school athletic fields. The estimated initial cost to the MCCSD will be $30,000.00. The estimated initial cost to the MUSD will be $42,000.00. A detailed discussion of the relationship between the two Districts with respect to this project will be set forth in a memorandum of understanding between these two Districts.

Dated: February 24, 1997

EDWARD O'BRIEN
Board President
Mendocino City Community Services District

Dated: February 13, 1997

KEN MATHESON
District Superintendent
Mendocino Unified School District

ATTEST:

Jodi Mitchell
District Secretary

Mendocino City Community Services District

Post Office Box 1029
Mendocino, California 95460

Business Phone (707) 937-5790 Treatment Plant (707) 937-5751 Fax (707) 937-3837

February 25, 1997

Mr. Ken Matheson
MUSD Superintendent
P. O. Box 1154
Mendocino, Ca. 95460

RE: **Water Recycling Project**

Dear Mr. Matheson:

At our regular Board meeting of the Mendocino City Community Services District held last night, our Board of Directors approved and executed both the Joint Resolution No. 97-1 and the Memorandum of Understanding between the Mendocino City Community Services District and Mendocino Unified School District.

I am enclosing executed copies of the Joint Resolution and the MOU. I will keep the original documents on file in the MCCSD office.

We look forward to working the MUSD on this project. Thank you very much.

Sincerely,
Jodi Mitchell
Jodi Mitchell
District Secretary

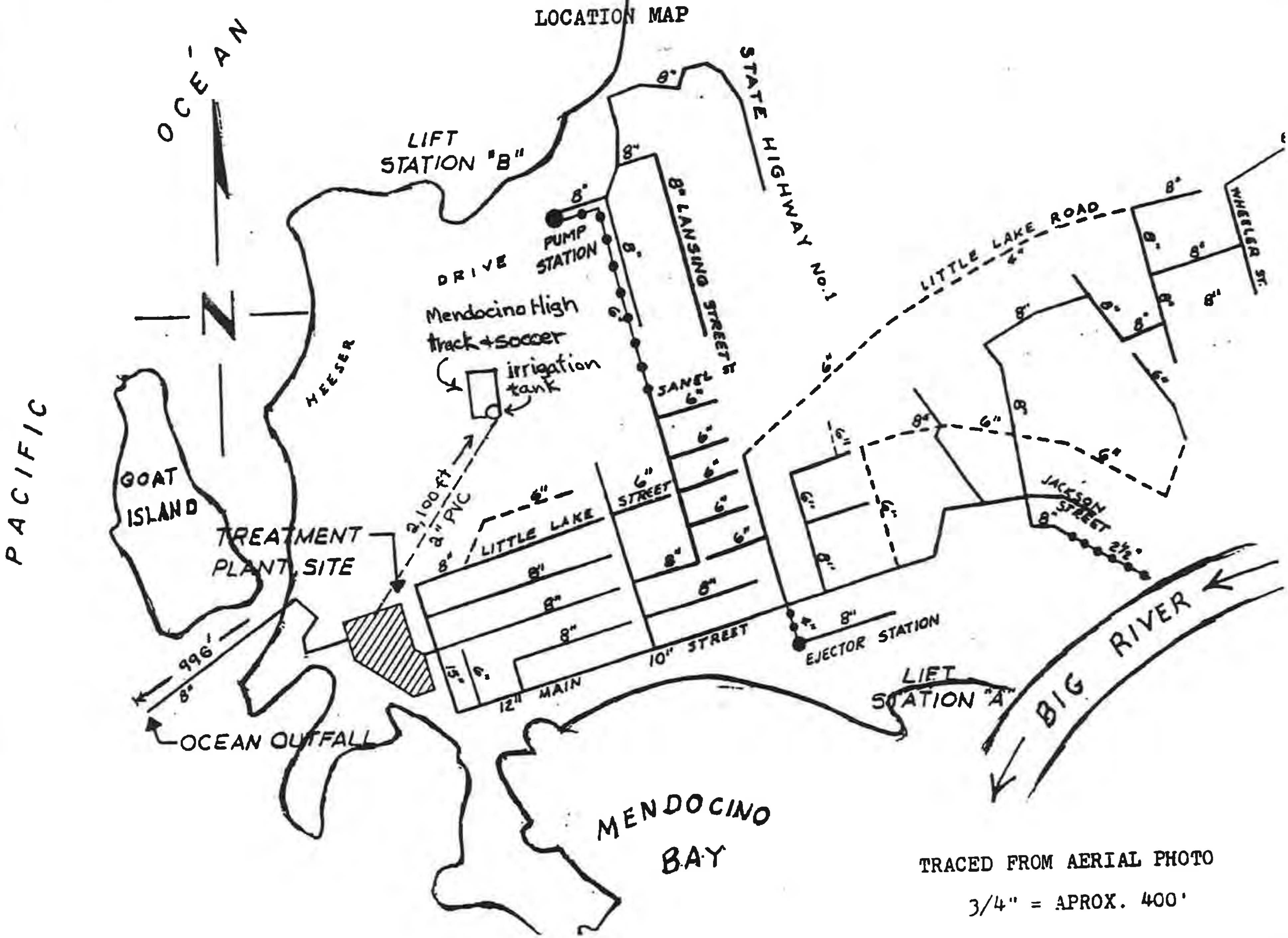
enclosures

B

MCCSD Wastewater Treatment Facility Location Map

MENDOCINO CITY COMMUNITY SERVICES DISTRICT WASTEWATER TREATMENT PLANT

LOCATION MAP



TRACED FROM AERIAL PHOTO

3/4" = APROX. 400'

C

Water Quality Compliance Data

Table C
Compliance Limit[1] Versus Monitoring Data Comparison
Mendocino City Community Services District

Parameter	Sample Location	Statistic	Limit	Observed Maximum (2015-2016)
Flow (MGD) [2]	INF-001	Lowest Average Monthly Flow	0.3	0.1
		Peak Daily Average Flow	1.0	0.3
BOD[3] (mg/L)[4]	EFF-001	Average Monthly	30	3
		Average Weekly	45	5
	REC-001	Average Monthly	10	3
		Average Weekly	15	5
		Maximum Daily	20	5
BOD (Percent Removal)	EFF-001	Average Monthly Minimum	85	99[5]
TSS[6] (mg/L)	EFF-001	Average Monthly	30	5
		Average Weekly	45	9
	REC-001	Average Monthly	10	5
		Average Weekly	15	9
		Maximum Daily	20	9
TSS (Percent Removal)	EFF-001	Average Monthly Minimum	85	98[5]
Oil and Grease (mg/L)	EFF-001	Average Monthly	25	41
		Average Weekly	40	41
		Instantaneous Maximum	75	41
Settleable Solids (ml/L)[7]	EFF-001	Average Monthly	1.0	0.1
		Average Weekly	1.5	0.1
		Instantaneous Maximum	3.0	0.1
Turbidity (NTU)[8]	EFF-001	Average Monthly	75	0.4
		Average Weekly	100	1.5
		Instantaneous Maximum	225	1.5
	REC-001	Instantaneous Maximum	10	0.8
		24-hour Average	2	0.3
		24-hour 95th Percentile	5	0.8
pH (standard units)	EFF-002	Instantaneous Minimum	6	6.8[5]
		Instantaneous Maximum	9	7.5
	REC-001	Instantaneous Minimum	6	7.2[5]
		Instantaneous Maximum	9	7.5
Total Coliform (MPN/100 ml) [9]	EFF-002	1-Month Median	70	2
		Single Sample	230	79
	REC-001	7-Day Median	2.2	7.5
		30-Day Maximum	23	7.5
		Single Sample	240	7.5
Total Residual Chlorine (mg/L)	EFF-003	Maximum Daily	0.81	0.10
		Instantaneous Maximum	6.06	0.10
		6-Month Median	0.20	0.06
TCDD Equivalents[10] (ug/L)[11]	EFF-003	Average Monthly	3.94E-07	3.15E-07
Chronic Toxicity (Pass/Fail)	EFF-003	Instantaneous Minimum	Pass	Pass
Total Nitrate (as N)[12]	REC-001	Average Monthly	10	3.7
Filtration (gpm/sf)[13]	REC-001	Instantaneous Maximum	5	2

Table C Compliance Limit[1] Versus Monitoring Data Comparison Mendocino City Community Services District				
Parameter	**Sample Location**	**Statistic**	**Limit**	**Observed Maximum (2015-2016)**
CT[14] (mg-min/L)[15]	REC-001	Total per Batch	450	450
Contact Time (min)[16]	REC-001	Total Minimum	90	90

1. Waste Discharge Requirements and Water Recycling Requirements Order R1-2015-0039
2. MGD: million gallons per day
3. BOD: biochemical oxygen demand
4. mg/L: milligrams per liter
5. Observed minimum average monthly percent removal 2015-2016
6. TSS: Total suspended solids
7. ml/L: milliliters per liter
8. NTU: nephelometric turbidity units
9. MPN/100 ml: most probable number per 100 milliliters
10. Dioxin
11. ug/L: micrograms per liter
12. Nitrate plus Nitrite as Nitrogen
13. gpm/sf: gallons per minute per square foot of filter surface area
14. CT: chlorine concentration and contact time
15. mg-min/L: milligram minutes per liter
16. minutes

D

Sewer System User Summary

Table D
Sewer System Users
Mendocino Community Services District

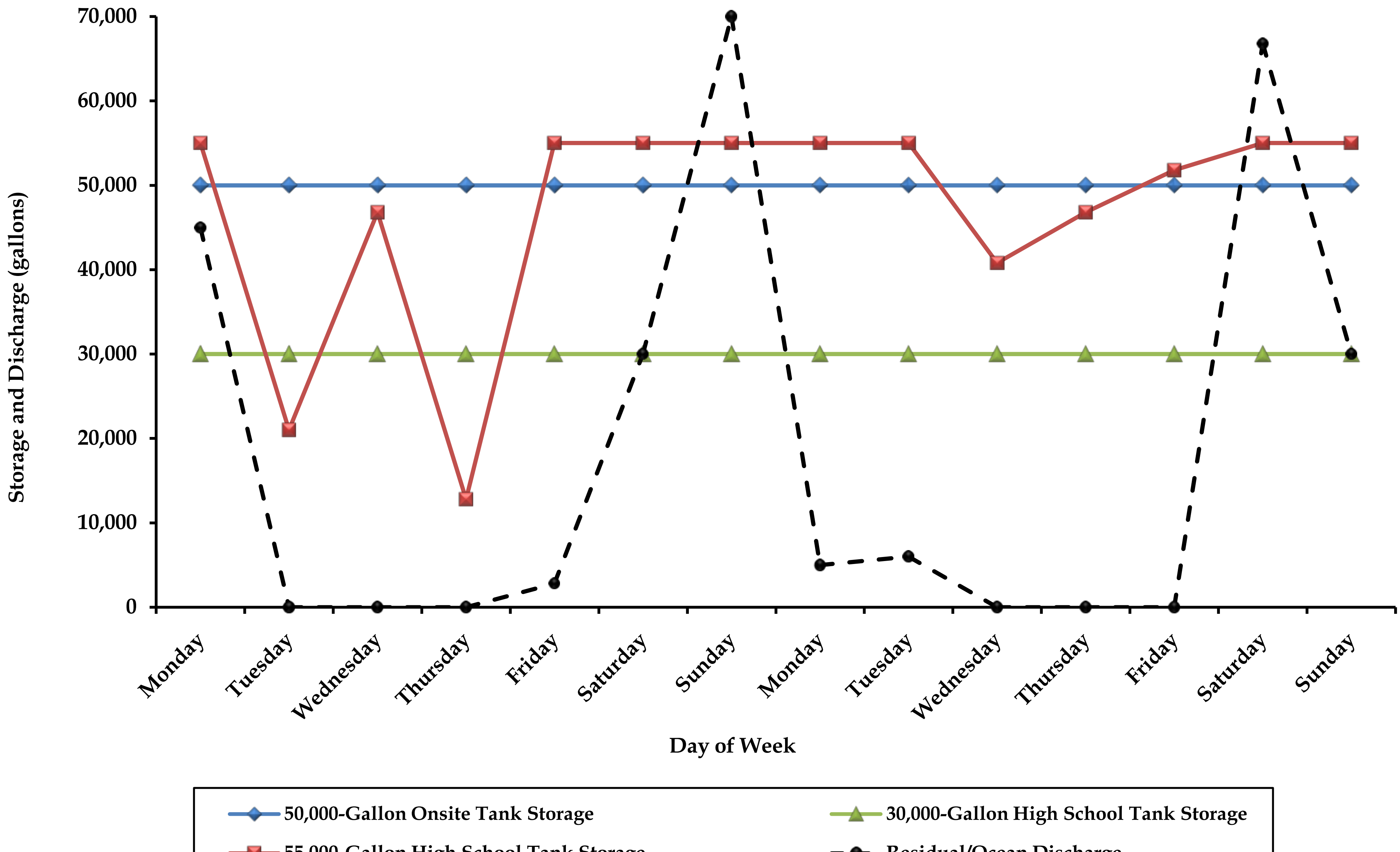
User Category	Units	Gal(1)/ Unit	Unit Description	EDU(2)/ Unit
Residence: 1-2 Bedroom Residences	416	200	gpd(3)/residence	1.00
Residence: Guest Cottage	10	100	gpd/unit	0.50
Residence: Sleeping Unit	1	120	gpd/unit	0.60
Vacation Home or Single Family Rental	23	200	gpd/unit	1.00
Inn: Dwelling Unit with Kitchen	13	160	gpd/unit	0.80
Inn: Dwelling Unit with Kitchen and Laundry	11	200	gpd/unit	1.00
Inn: Sleeping Unit without Kitchen	107	120	gpd/unit	0.60
Inn: Sleeping Unit without kitchen, with Laundry	124	160	gpd/unit	0.80
Home Occupation: Residence	1	200	gpd/residence	1.00
Home Occupation: Business Portion of Home	400	0.15	gpd/sf(4)	0.00075
Retail Store/Gallery/Office	140,334	0.15	gpd/sf	0.00075
Library	1	200	gpd/unit	1.00
Restaurant: Full Service with Bar	2,778	3.4	gpd/sf of dining area	0.017
Restaurant: Full Service without Bar	3,242	2.9	gpd/sf of dining area	0.0145
Restaurant: No Service with Seats, No Dish Wash	1,563	2.1	gpd/sf of dining area	0.0105
Restaurant: No On-Premise Consumption	698	2.1	gpd/sf of work area	0.0105
Bar: Bar Area	117	6.7	gpd/lf(5) of bar	0.0335
Bar: Patron Area	5,637	1.4	gpd/sf of patron area	0.0070
Service Station/Garage	1	1,000	gpd/unit	5.00
Grocery Store	6,512	0.2	gpd/sf display and work area	0.001
Church with Kitchen	265	5	gpd/seat	0.025
Church without Kitchen	110	3	gpd/seat	0.015
Hall/Auditorium	705	3	gpd/seat	0.015
Theater	81	5	gpd/seat	0.025
School	472	15	gpd/student	0.075
Government Office/Building	3,884	0.15	gpd/sf of office or work area	0.00075
Personal Service: Hair Salons	1,183	1	gpd/sf of work area	0.005
Personal Service: Hot Tubs	800	1.5	gpd/sf of work area	0.0075
Ballpark	1	800	gpd/unit	4.00
Mendocino Coast Park and Recreation	7,047	0.15	gpd/sf	0.00075
State Park	1	8,000	gpd/unit	40.00
Fire Station	2	200	gpd/unit	1.00
Veterinary Clinic	416	0.77	gpd/sf	1.60

1. Gal: gallons
2. EDU: Equivalent Dwelling Units
3. gpd: gallons per day
4. sf: square feet
5. lf: linear feet

E

Recycled Water System Daily Storage Tank Volume Scenario

Proposed Recycled Water System Storage Tank and Residual/Ocean Discharge Daily Volumes: Scenario 1[1]
Mendocino Community Services District



1. Recycled Water Demands: Plant water: 39,000 gallons Tuesday/Thursday, 19,200 gallons Wednesday; high school athletic field irrigation: 40,000 gallons every other day starting first Tuesday; onsite fill station: 25,000 gallons Monday-Friday. Tank Fill Priorities: 1) 50,000-gallon tank; 2) 30,000-gallon tank; 3) 55,000-gallon tank.