RECLAMATION

Managing Water in the West

Environmental Assessment

Natomas Mutual Water Company &
Anadromous Fish Screen Program
Pritchard Lake Pumping Plant Fish Screen Project

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

January 2014

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Table of Contents

List of Figures & Tables

List of Acronyms and Abbreviations

AF	Acre-feet
AFSP	Anadromous Fish Screen Program
APE	Area of Potential Effect
ARPA	Archeological Resources Protection Act
BA	Biological Assessment
BO	Biological Opinion
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
cfs	cubic feet per second
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
ESA	federal Endangered Species Act
fps	feet per second
GGS	giant garter snake
hp	horsepower
ISI	Intake Screens, Inc.
ITA	Indian Trust Assets
NAAQS	National Ambient Air Quality Standards
NAGPA	Native American Graves Protection & Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLIP	Natomas Levee Improvement Program
NMWC	Natomas Mutual Water Company
NMFS	National Marine Fisheries Service
NOx	Nitrogen oxides
O_3	ozone
OHWM	Ordinary High Water Mark
$PM_{2.5}$	particulate matter less than 2.5 microns diameter
PM_{10}	particulate matter between 2.5 and 10 microns diameter
RBDD	Red Bluff Diversion Dam
ROG	reactive organic gases
Reclamation	Bureau of Reclamation
SAFCA	Sacramento Area Flood Control Agency
SHPO	State Historic Preservation Officer
SMAQMD	Sacramento Metro Air Quality Management District
SVAB	Sacramento Valley Air Basin
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

VELB	Valley Elderberry Longhorn Beetle
VOC	volatile organic compounds

Section 1.0 Introduction

1.1 Background

The Bureau of Reclamation (Reclamation), through the Anadromous Fish Screen Program (AFSP), proposes to provide federal funding to the Natomas Mutual Water Company (NMWC) to screen their existing unscreened diversion at Pritchard Lake along the Sacramento River, Sacramento County, California (Figure 1). NMWC owns and operates the Pritchard Lake Pumping Plant which provides water to agriculture and municipal users. The Proposed Action is the construction of a new pump station that is equipped with National Marine Fisheries Service (NMFS) and California Department of Fish & Wildlife (CDFW) approved state-of-the-art fish screens. As a cooperative effort between the AFSP (co-managed by Reclamation and U.S. Fish and Wildlife Service [USFWS]), CDFW, Sacramento Area Flood Control Agency (SAFCA), and NMWC, the Proposed Action will improve fish passage in the Sacramento River. Installation of the fish screens would help to prevent listed and other migratory or resident fish species in the Sacramento River from becoming entrained or otherwise impacted by the continued use of the Pritchard Lake Pumping Plant.

1.2 Need for the Proposal

Under the National Environmental Policy Act (NEPA), the Proposed Action's purpose is to screen NMWC's existing 150 cubic feet per second (cfs) unscreened diversion with a fish screen that meets current NMFS and CDFW fish screen design criteria. The Proposed Action is needed to minimize diversion impacts to out-migrating anadromous fish on the Sacramento River without impairing the ability of NMWC to divert water consistent with their existing water rights.

1.3 Potential Resource Issues

This EA analyzes the No Action and Proposed Action alternatives in order to determine the potential impacts and cumulative effects to the following environmental resources:

- Air Quality
- Biological Resources
- Cultural Resources

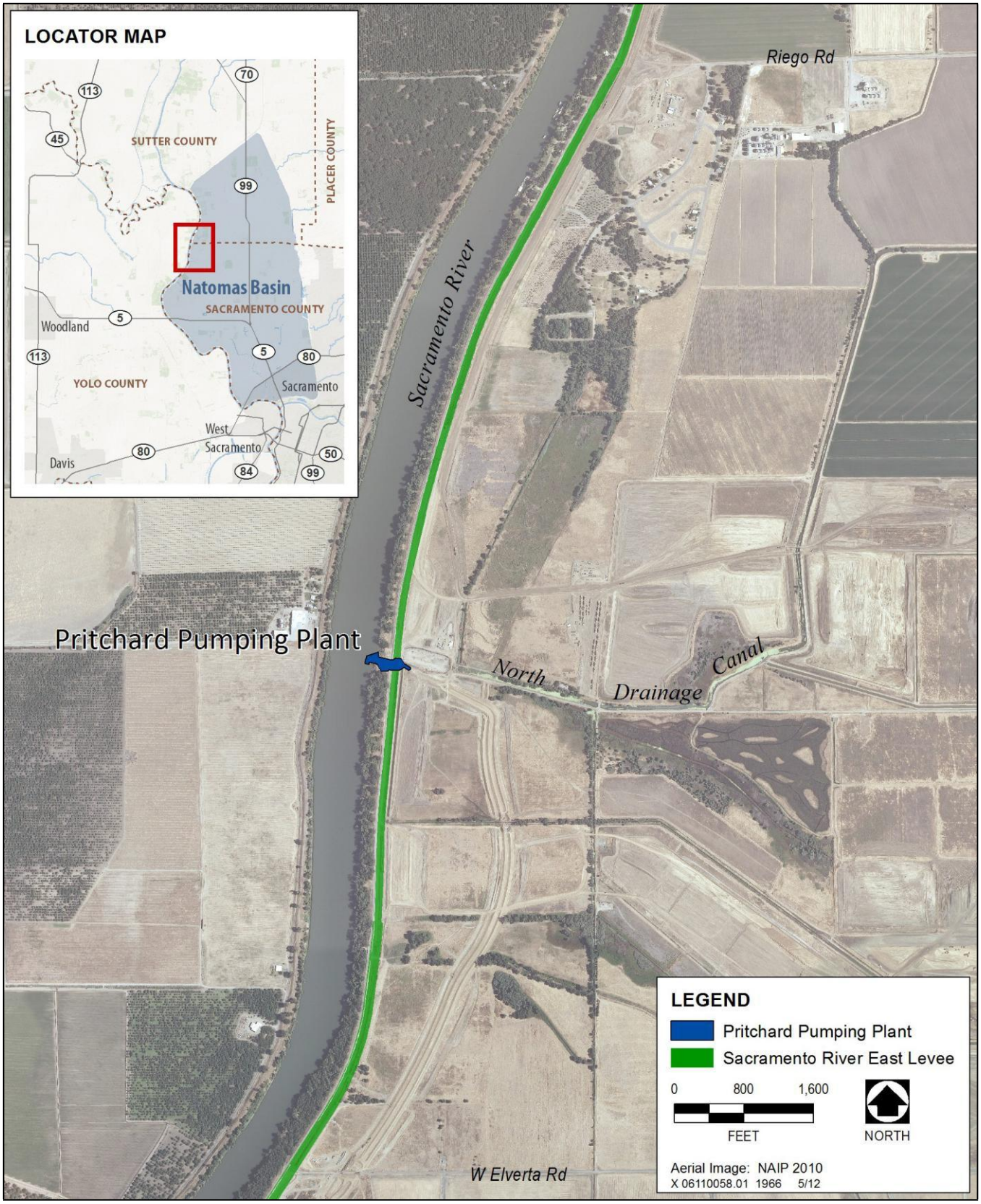
1.4 Resources Not Analyzed in Detail

Effects on several environmental resources were examined and found to be minor. For the reasons noted below, the following resources were eliminated from further review in this EA.

Indian Trust Assets

The Proposed Action does not have a potential to affect Indian Trust Assets (ITA). The nearest ITA is the Auburn Rancheria, approximately 17 miles east of the Proposed Action.

Figure 1 Pritchard Lake Pumping Plant Location



Environmental Justice

The Proposed Action would result in no significant changes in agricultural communities or practices and is therefore not likely to affect agricultural employment, which employs a higher proportion of low-income and minority workers than are employed in the general workforce. Accordingly, the Proposed Action would not have any significant or disproportionately negative impact on low-income or minority individuals within the project area.

Section 2.0 Alternatives

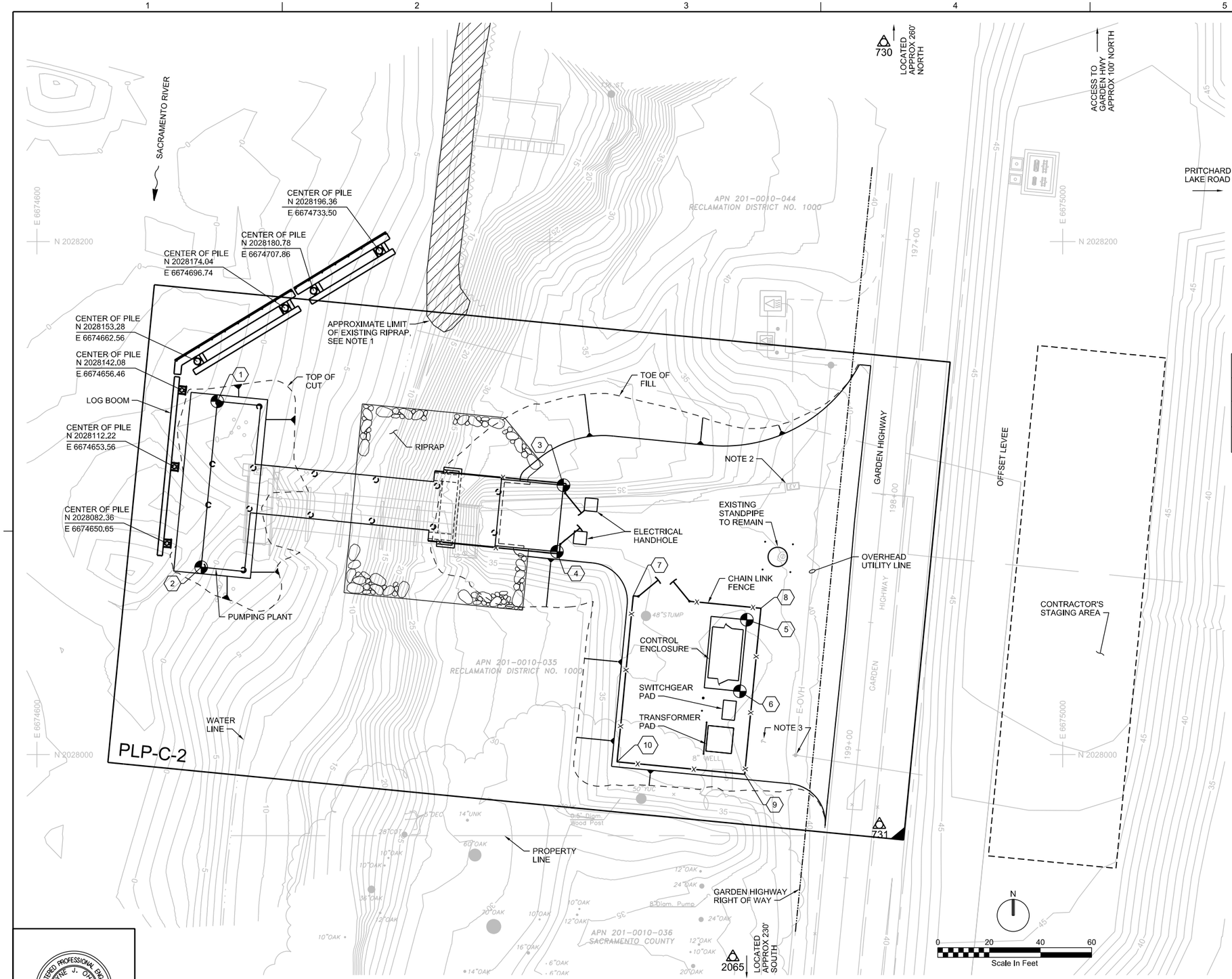
2.1 No Action Alternative

Under the No Action Alternative, the Pritchard Lake Pumping Plant would remain unscreened and potentially continue to entrain fish.

2.2 Proposed Action Alternative

The Proposed Action involves replacement of NMWC's existing Pumping Plant at its current location in line with the edge of the Sacramento River's east bank with a new structure equipped with three cylindrical fish screens that will prevent fish from getting entrained. Replacing the Pumping Plant will include removal of the existing intake structure, construction of a new access bridge and platform, installation of fish screens in front of the intakes, and construction of a log boom (debris deflection barrier) (Figures 2 and 3). Two of the three pumps will be replaced at this time, each having a 350 horsepower (hp) motor with a pumping capacity rating of 47 cubic feet per second (cfs) at a maximum operating head of 45 feet.

When the Proposed Action was originally developed, NMWC planned two consolidated positive-barrier fish screen diversion facilities along the lower Sacramento River as a result of the American Basin Fish Screen and Habitat Improvement Project (SAFCA 2008). The operation of these new consolidated diversion facilities would have allowed for the removal of up to five individual NMWC pumping plants, including the Pritchard Lake Pumping Plant. NMWC has completed construction of one consolidated diversion facility (Sankey Diversion Fish Screen). The second planned consolidated diversion facility, which included Pritchard Lake, is no longer being pursued because the cost effectiveness of a consolidated flat-plate screen facilities is not favorable. Therefore, the Pritchard Lake Pumping Plant will be individually screened and is the subject of this EA.



STRUCTURE CONTROL POINTS

NO	NORTHING	EASTING	DESCRIPTION
1	2028137.72	6674670.34	PUMPING PLANT (NE)
2	2028073.02	6674664.04	PUMPING PLANT (SE)
3	2028104.98	6674805.30	APPROACH SLAB
4	2028079.11	6674802.78	APPROACH SLAB
5	2028052.54	6674876.85	CONTROL ENCLOSURE PAD (NW)
6	2028024.68	6674874.13	CONTROL ENCLOSURE PAD (SW)
7	2028061.88	6674832.54	CHAINLINK FENCE
8	2028057.04	6674882.31	CHAINLINK FENCE
9	2027992.34	6674876.01	CHAINLINK FENCE
10	2027997.19	6674826.24	CHAINLINK FENCE

SURVEY CONTROL POINTS

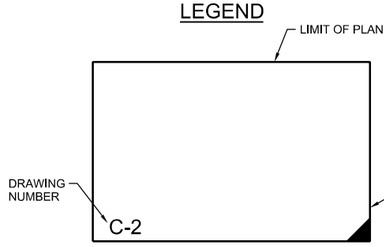
POINT #	NORTHING	EASTING	ELEV (NGVD29)*	DESCRIPTION
730	2028562.59	6674966.75	40.68	PSOMAS 1" IP W/PSO CAP
731	2027972.67	6674928.54	40.70	PSOMAS 1" IP W/PSO CAP
265	2027744.29	6674881.18	40.42	PSOMAS 1" IP W/PSO CAP

*SURVEY CONTROL POINT ELEVATIONS HAVE BEEN CONVERTED FROM NAVD88 DATUM TO NGVD29 DATUM BY USING THE FOLLOWING CONVERSION: SUBTRACT (-) 2.28' FROM NAVD88 ELEVATIONS TO GET NGVD29 ELEVATIONS.

NOTES:

1. RIPRAP AND SHEET PILE LOCATIONS FROM NATOMAS LEVEE IMPROVEMENT PROGRAM, SACRAMENTO RIVER EAST LEVEE (SREL) PHASE 2E IMPROVEMENT PROJECT PLANS BY MEAD AND HUNT, DATED 23 MARCH 2012.
2. RAISE EXISTING ELECTRICAL HANDHOLE TO GRADE.
3. PROTECT EXISTING UTILITY POLE AND GUY WIRE IN PLACE.

LEGEND



REGISTERED PROFESSIONAL ENGINEER WAYNE J. OHLIN C72287 CIVIL STATE OF CALIFORNIA

DSGN	W OHLIN
DR	B CHELONIS
CHK	B GATTON
APVD	J ROZGA

NO.	DATE	REVISION	BY	APVD

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

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AREA OFFICE: 2485 NATOMAS PARK DR. SUITE 600 SACRAMENTO, CA 95833 (916) 920-0300
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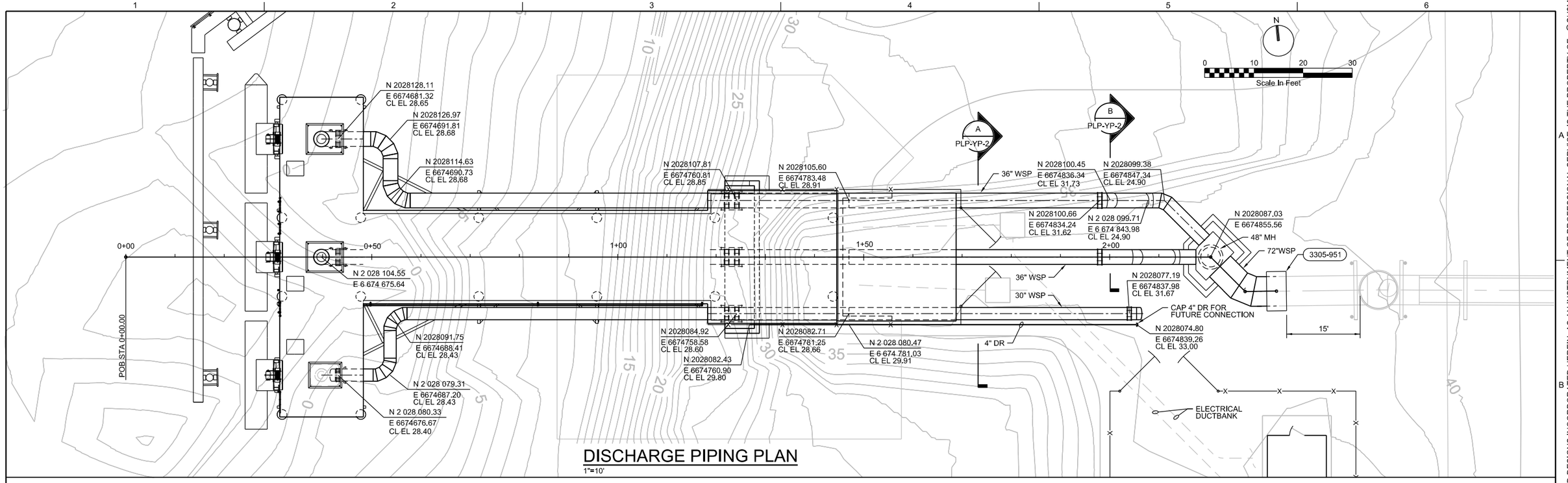
NATOMAS MUTUAL WATER COMPANY
AMERICAN BASIN FISH SCREEN AND HABITAT IMPROVEMENT PROJECT
PRITCHARD LAKE PUMPING PLANT REPLACEMENT

CIVIL

OVERALL SITE PLAN

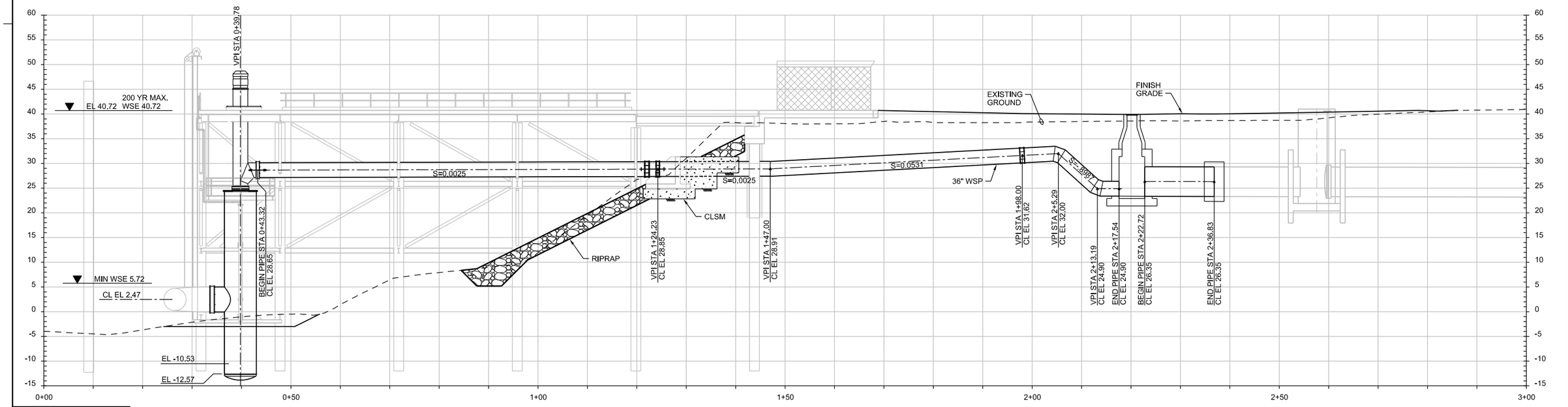
SHEET	14 of 62
DWG	PLP-C-1
DATE	NOVEMBER 2013
PROJ	172791

FILENAME: 005-c-01_172791.dgn PLOT DATE: 2013\11\18 PLOT TIME: 8:42:48 AM



DISCHARGE PIPING PLAN

1"=10'



1 PIPE PROFILE

PLP-C-1

HORIZ: 1"=10'
VERT: 1"=10'

NOTE: VERTICAL DATUM NGVD29.

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WAYNE J. OHLIN
C72287
CIVIL
STATE OF CALIFORNIA

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DR	CD MacDonald
CHK	B GATTON
APVD	J ROZGA

NO.	DATE	REVISION	BY	APVD

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NATOMAS MUTUAL WATER COMPANY

AMERICAN BASIN FISH SCREEN AND
HABITAT IMPROVEMENT PROJECT
PRITCHARD LAKE PUMPING PLANT REPLACEMENT

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DISCHARGE PIPING
PLAN AND PROFILE

SHEET	18 of 62
DWG	PLP-YP-1
DATE	NOVEMBER 2013
PROJ	172791

FILENAME: 005-YP-01_172791.dgn PLOT DATE: 2013\11\18 PLOT TIME: 10:04:44 AM

Because the Pritchard Lake Pumping Plant requires a fish screen, the existing facility is not adequate for three primary reasons. First, depths below the existing platform are not adequate to allow proper function of the fish screens at lower summer river levels. Second, the platform structure itself is too small to accommodate the pump spacing required for the screens. The existing platform is about 30 feet long and 10 feet wide. Each of the new screens (three total) is about 20 feet long and they are to be installed end to end along the river side the platform requiring a total of about 70 feet of space including clearance between screens. The new pumps and associated infrastructure also require somewhat more space than is available on the existing platform. Third, the existing platform collects a substantial amount of timber debris during high flow periods, which often damages the facility taking it out of service and requiring repair.

The solution to these three issues would be to construct a new platform. To meet the depth requirements, the new platform and new screens would be about 30 feet further into the Sacramento River channel than the existing platform. To accommodate the fish screens and larger pumps, the platform would be larger. To address the debris problem and because the new platform would be more exposed to boat traffic, a timber deflector and log boom would be included to protect it. A new access bridge would connect the platform to the shore for maintenance of the pumping plant. Each element is discussed in detail in the following sections.

2.2.1 Decommission and Removal

The existing pumping plant would be decommissioned and removed. The existing pumps, pipes, platform, walkway deck, and timber support bracing would be removed using shore-based cranes and support equipment. The existing timber piles would be removed using cranes to pull the piles out of the ground. If it is not possible to pull the piles, or they break during extraction, piles would be cut to match ground level and the above ground material would be removed from the river. As an option, it may be determined in the field that all piles would be cut to ground level. All debris will be recycled or disposed of in an appropriate commercial landfill.

An existing concrete vault that provides flow metering and a landing for the existing access bridge to the existing platform would be demolished and removed. An existing emergency drain pipe for the concrete vault would be removed during construction. The activity would be as described in the original project, where the pipe would be excavated and removed from the site. The footprint for this work would be the same, affecting about 435 square-feet of the bank of the river. Therefore, there would be no new effects from removal of the pipe that were not previously discussed and this element is not considered further.

As part of decommissioning, the existing supply pipes would be removed. This would require excavation of about 1,775 cubic-yards of soil to expose the pipes. The existing access road would be regraded to more natural contours to match adjacent terrain and excess spoils would be disposed of offsite.

2.2.2 Access Bridge

A new access bridge would be constructed. To support the new bridge 12, 24-inch diameter steel pipe piles would be driven into the bank and bed of the Sacramento River. The bridge would be approximately 24-feet wide, about 90 feet long extending from the bank to the platform. It is designed to be capable of supporting a boom truck required to service the pumps and screens. The pilings and bridge would also support the three water intake pipes (two 36-inch diameter and one 30-inch diameter) that originate on the platform.

2.2.3 Platform and Pumps

The platform itself would be approximately 16 feet wide by 70 feet long and supported by 8, 24-inch diameter steel pipe piles. The piles would be installed in the river bed to support the new platform, pumps, and fish screens. The platform provides the surface to which all the pump motors, pump controls, and screen controls would be mounted above the 200-year flood elevation on the deck of the platform. The pumps themselves would be placed vertically below the pump platform in three separate pump barrels.

The pump shafts would be inserted into pump barrels suspended below the platform. Because the water level is lowest during the period of operation in late spring to late summer, the pump impellors have to be below ground level to meet the depth requirement for proper operation of the pump in combination with the fish screen type selected. Therefore, the three pump cans (two, 78-inch diameter and one, 66-inch diameter) would be installed into the river approximately 10 feet below the river bed. Insertion of the pump cans below the river bed require some removal of material at the bottom of the river. Minor dredging was considered in the evaluation of the original project and this is not considered a substantial change from what was originally proposed.

2.2.4 Fish Screens

Intake Screens Inc. (ISI) will be providing the fish screens for the new pump facility. Screens would be custom designed but follow the stock design for the "T" model brushed cylinder screens. These screens have been chosen because they are appropriate for the site, pump capacity, and fish species present during operation. Each screen unit is comprised of two screened cylinders with a solid intake manifold between them. All screens will be about 4.5 feet in diameter. The overall length of each unit is 22 feet. The drums on each screen are made of wedge wire with a 50 percent open area and a spacing of 1.75 mm. The design was submitted to NMFS engineering and has received review and approval.

The screen units will be fixed at an operational depth of about three feet above the river bottom. Each unit is attached to a track mounted in front of the pump which is in turn attached to the platform. By placing the screens on tracks they can be easily removed from the water for routine service, inspection, or repair. Screens are rotated by a hydraulic motor in each half of the screen. The motor is supplied with pressurized hydraulic fluid by a pump mounted on the platform with the other screen controls. Debris is removed from the screen by brushes mounted both on the inside and outside of the drum.

According to ISI, the stock T54-90 screen can meet the specified minimum of 60 cfs of water to be pumped through it at an approach velocity of 0.33 feet per second (fps), with an allowance for some blockage of the screen. Three screens of the same size are proposed to allow use of any screen with any pump.

2.2.5 Log Boom and Timber Deflector

To protect the new Pritchard Lake Pumping Plant from floating debris and alert boaters to the structure, a log boom would be constructed in the river in front (west) of the pumping plant and a timber deflector would extend upstream (north) and will be angled back toward the river bank. The log boom would be about 20 feet west of the proposed platform. The proposed log boom is approximately 70 feet long and would be anchored by 3, 18-inch diameter steel pipe piles. The timber deflector would be approximately 135 feet long anchored by 4, 30-inch diameter steel

pipe piles. Multiple 32-inch diameter steel pipe main members would be faced with 3-inch by 12-inch timber fenders and counterbalanced with 20-inch diameter steel pipes. The log boom and timber deflector have ultra-high density polyethylene guides against the vertical pipe piles so they slide to float at the water surface.

2.2.6 Equipment Pad

Service of pumps would occur from truck-mounted boom cranes mobilized on the new access bridge. Service of the fish screens would be typically done on the platform with the screens pulled up to the top of their rails. For major service the screens would be moved to shore with a boom truck. To allow vehicular access to the new bridge, support construction equipment (e.g., cranes for pile driving), and achieve sufficient elevation to allow cranes to reach the platform, the existing plant access road will be expanded. Approximately 480 cubic yards of fill material will be placed in upland areas to create this improved access. Approximately 344 square-yards (410 cubic yards) of riprap (3,100 square-feet below the Ordinary High Water Mark [OHWM]) would be placed on the river bank (to approximately elevation 25 NGVD29 feet) for bank scour protection.

2.2.7 Construction

Most of the construction work will occur from shore by land-based equipment and personnel. Cranes will be used to install pilings and other components of the platform, pumps, screens, and walkway. While workboats or a construction barge may be required at times, no equipment is expected to be placed in the water. Riprap would be placed either by excavator or backhoe. Standard upland construction equipment (e.g., backhoes, road graders, dump trucks, etc.) would be used to support construction and for modifications to upland staging sites. In-water work (e.g., pile driving, pier removal, and riprap placement) would occur during the allowed in-water work window for the Sacramento River of July 1 to October 31. No coffer dam construction will be required as part of the project.

All pipe piles will be driven with the vibratory method if practical and may be finished with the diesel hammer as needed to reach required tip elevation. All pile driving will be completed during daylight hours and within the prescribed methods and limitations of the NMFS biological opinion.

To minimize overall system outage the new intake system would be constructed adjacent to the existing intake. The first step would be the removal of the existing intake, including existing pumps, pipes, wooden piles, walkway, and platform. Once these were removed, the new bridge and platform would be constructed. Following the bridge and platform would be installation of screens, pumps, pipes, and associated infrastructure all of which would be placed on the platform. Shore-based work (electrical and pipes) could occur at any time. Once the new intake system is operational, it will be connected to NMWC's distribution system.

Section 3.0 Affected Environment & Environmental Consequences

3.1 Air Quality

3.1.1 Affected Environment

The Proposed Action area is located within the Sacramento Valley Air Basin (SVAB), where Sacramento County is regulated by the Sacramento Metro Air Quality Management District (SMAQMD). The SMAQMD has reached National Ambient Air Quality Standards (NAAQS) and/or California Ambient Air Quality Standards (CAAQS) for criteria pollutants of concern except for: ozone (O_3), inhalable particulate matter between 2.5 and 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). As a result, the emissions of most concern are O_3 (which includes precursors such as volatile organic compounds [VOC] and nitrogen oxides [NOx]), PM_{10}, and $PM_{2.5}$. Table 1 below shows the attainment status and *de minimis/threshold* for the criteria pollutants of most concern.

Table 1. SVAB Attainment Status and *De Minimis* Thresholds for Federal General Conformity Determinations

Pollutant	Attainment Status[a]	*De Minimis/Thresholds* (tons/year)
VOC (as ozone precursor)	Nonattainment [b]	25[d]
NO_x (as an ozone precursor)	Nonattainment [b]	25[d]
PM_{10}	Nonattainment (CAAQS 24-hr and Annual) Attainment (NAAQS)[c]	100 (NAAQS)[d]
$PM_{2.5}$	Nonattainment (CAAQS Annual) Attainment (NAAQS 24-hr) [e]	100 (NAAQS)[d]

[a] Source: http://www.airquality.org/aqdata/attainmentstat.shtml
[b] The SVAB is designated as Severe for O_3 NAAQS, and Serious for CAAQS.
[c] Federal Register No. 2013-23245. Effective October 28, 2013, the EPA approved the redesignation of Sacramento County from a nonattainment area to an attainment area for the 24-hr PM_{10} NAAQS.
[d] 40 CFR 93.153
[e] Federal Register No. 2013-16785. Effective August 14, 2013, the EPA determined that the Sacramento nonattainment area in California has attained the 2006 24-hour $PM_{2.5}$ NAAQS.

3.1.2 Environmental Consequences

No Action Alternative

Under the No-Action Alternative, no construction activities would occur; therefore, no potential exists for project-related construction emissions.

Proposed Action Alternative

Construction emissions would vary from day to day and by activity, depending on the timing and intensity of construction, and wind speed and direction. Generally, air quality impacts from the Proposed Action would be localized in nature and decrease with distance. The emissions from construction activities for the Proposed Action would be temporary, and there would be no operational emissions. The ground disturbing activities would result in the temporary emissions of fugitive dust and vehicle combustion pollutants during the following activities:

- On-site earthwork (site preparation, demolition, piping, grading and stockpiling) and
- On-site construction equipment and haul truck engine emissions.

Construction work would occur within an existing pumping plant near the Sacramento River. Calculated emissions from the Proposed Action were estimated using the 2013 California Emissions Estimator Model (version 2013.2.1) for reactive organic gases (ROG)[1], NOx, PM_{10}, and $PM_{2.5}$. Total project emissions are presented in Table 2 below.

Table 2. Estimated Project Emissions[a]

Pollutant	Unmitigated (tons/year)	Mitigated (tons/year)
ROG/VOC	0.40	0.40
NO_x	3.33	3.33
PM_{10}	0.62	0.37
$PM_{2.5}$	0.41	0.28
Carbon dioxide equivalents	280.35	280.35

[a] Source: CalEEMod Version 2013.2.1

As shown in Table 2 above, the Proposed Action has been estimated to emit less than the *de minimis threshold* for NOx and ROG/VOC as O_3 precursors; therefore, a federal general conformity analysis report is not required. Notwithstanding this observation, the Proposed Action would comply with the SMAQMD's Regulation 4, Rule 403 control measures for fugitive dust, including construction emissions of PM_{10} and $PM_{2.5}$. One of these control measures includes the use of water in "the demolition of existing buildings or structures, construction operations, the construction of roadways or the clearing of land" for fugitive dust suppression (SMAQMD 1997). However, if dust suppression measures are not implemented, the estimated $PM_{2.5}$ and PM_{10} emissions from the Proposed Action would still be well below the respective SMAQCD thresholds.

[1] The term "volatile organic compounds" are synonymous with "reactive organic gases" for the purposes of this document since both terms refer to hydrocarbon compounds that contribute to ozone formation.

3.2 Biological Resources

3.2.1 Affected Environment

The Sacramento River is the longest river entirely within the state of California. Starting at the confluence of the South Fork and Middle Fork of the Sacramento River, near Mount Shasta in the Cascade Range mountains, the river flows south for 447 miles through the northern Central Valley of California, between the Pacific Coast Range and the Sierra Nevada. The Sacramento River is a vital source for agricultural (providing water for most of the Sacramento Valley's agricultural lands) and municipal water supplies throughout the state. The Proposed Action area is located along the Sacramento River in Sacramento County.

3.2.2 Potentially Affected Listed Species and Associated Critical Habitats

Central Valley Winter-Run Chinook Salmon

The Sacramento River winter-run Chinook salmon is listed as an endangered species under the federal ESA (59 FR 440-450, January 4, 1994). Critical habitat was designated for this species on June 16, 1993 (58 FR 33212). The Sacramento River winter-run Chinook salmon historically occurred in the spring-fed headwaters of the Sacramento River and some of its tributaries upstream of the Red Bluff Diversion Dam (RBDD). Shasta Dam blocked access to the primary spawning habitat for Sacramento River winter-run Chinook salmon. Construction and operation of RBDD and warmer water temperatures downstream of Shasta Dam resulted in decline of Sacramento River winter-run Chinook salmon abundance from tens of thousands of adults in the early 1970s to a few hundred adults in the early 1990s. Recently, improved passage conditions at RBDD and cooler water temperatures downstream of Shasta Dam appear to have increased abundance of adult fish returning to spawn.

Sacramento River winter-run Chinook salmon currently spawn in the Sacramento River downstream of Keswick Dam. Juveniles have been observed in the Delta during October through December, especially during high Sacramento River discharge caused by fall and early winter storms. Sacramento River winter-run Chinook salmon smolts may migrate through the Bay-Delta to the ocean from December to as late as May (Stevens 1989).

The portion of the Sacramento River in the Proposed Action area is characterized by a moderately managed channel that lacks structural habitat diversity due to the amount of riprap and routine vegetation control. The adjacent lands are predominately used for agriculture.

Sacramento River winter-run Chinook salmon use the Proposed Action area as a migration corridor. The Sacramento River is the main migration route from spawning grounds through the Delta to the ocean. Smolts may migrate through the Proposed Action area in the spring. Adults pass though the Proposed Action area from November to July on their way to spawn. Lack of appropriate flows, temperature, cover habitat, and spawning substrate prevents the area from being used for spawning or rearing habitat.

Central Valley Spring-Run Chinook Salmon
The Central Valley spring-run Chinook salmon is listed as threatened under the federal ESA (64 FR 50393–50415, September 16, 1999). Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The Central Valley spring-run Chinook salmon was historically the second most abundant run of Central Valley Chinook salmon (Moyle et al. 2002). It occupied the headwaters of all major river systems in the Central Valley where there were no natural barriers. Central Valley spring-run Chinook salmon migrated farther into headwater streams where cool, well-oxygenated water was available year round.

Central Valley spring-run Chinook salmon use the Proposed Action area as a migration corridor. Lack of appropriate flows, temperature, cover habitat and spawning substrate prevents the area from being used for spawning or rearing habitat.

Central Valley Steelhead
The Central Valley steelhead is listed as threatened under the ESA (63 FR 13347-13371, March 19, 1998). Critical habitat was designated for this species on September 2, 2005 (70 FR 52488). The Central Valley steelhead historically inhabited large and small streams throughout the Sacramento–San Joaquin watershed. It is now restricted to the upper Sacramento River downstream of Keswick Reservoir; the lower reaches of large tributaries downstream of impassable dams; small, perennial tributaries of the Sacramento River mainstem and large tributaries; and the Delta.

Central Valley steelhead use the Proposed Action area as a migration corridor during upstream (adult) and downstream (juvenile) migration. After emergence, juvenile steelhead begin downstream migration. Lack of appropriate flows, temperature, cover habitat, and spawning substrate prevents the area from being used for spawning or rearing habitat.

Green Sturgeon
The North American green sturgeon (Southern Distinct Population Segment [DPS]) is listed as threatened under the ESA (71 FR 17757, April 7, 2006). Critical habitat was designated for this species on October 9, 2009 (74 FR 52345). Little is known about the movements and habits of green sturgeon. It is assumed that they migrate throughout the Delta and rivers during any time of the year; therefore, they could be present within the Proposed Action area during construction (DWR 2004).

Other Special-status Species
The Proposed Action is unlikely to affect giant garter snake (GGS) because they are generally absent from the Sacramento River and no canals or other potential GGS habitat will be affected by the Proposed Action (USFWS 2011). The Proposed Action will have no effect to GGS.

The Proposed Action will also have no effect to the Valley Elderberry Longhorn Beetle (VELB) as there are no host plants (elderberry shrubs) in the Proposed Action area.

Lastly, NMWC purchased two Delta Smelt credits in 2011 for the American Basin Fish Screen & Habitat Improvement Project, which included the Proposed Action (Wildlands 2011).

3.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, the Pritchard Lake Pumping Plant would remain unscreened and would continue to potentially impact juvenile fish species.

Proposed Action Alternative

All previously described listed fish species have similar life histories, biological and habitat requirements. The main difference is the time of year when each of these species, as juveniles or adults, will migrate to and from the ocean. Although the timing of migration is different, all listed fish species use the Sacramento River, including the Proposed Action area, as a migratory corridor.

The potential environmental consequences resulting from construction of the Proposed Action are expected to be similar for Central Valley winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead and green sturgeon. Critical habitat and Essential Fish Habitat (EFH) for all species overlap within the Proposed Action area and therefore effects analysis for both are discussed collectively below.

Construction Pile Driving

Pipe piles will need to be installed to support the new Pritchard Lake Pumping Plant intake/fish screen. The Proposed Action as discussed in this EA would require installation of a total of 20, 24-inch diameter steel pipe piles to support the bridge and platform and three 18-inch and four 30-inch diameter steel pipe piles to support the log boom and timber deflector. The following discussion presents a detailed analysis of pile driving linked directly to the Proposed Action.

Vibrations are set-up in a metal object, such as a piling or piece of sheet pile, when the item is struck with some sort of impact hammer to drive it into the substrate. These vibrations are transmitted into the water as a sound pressure wave. As these waves move through the water, if they are strong enough, they have the potential to injure and even kill fish (Popper and Hastings 2009a, 2009b; ICF and Illingworth and Rodkin 2009). Noise levels are typically expressed in terms of decibels (dB) which is a convenient way of expressing sound pressure levels. When discussing effects to fish, three metrics are typically used: Peak sound pressure level (dB_{PEAK}), root mean square (RMS), and sound exposure level (SEL). Peak levels are simply the level of the highest magnitude following an event such as a hammer strike. The RMS is calculated by squaring the amplitude over a period of reference and then taking the mean of that squared value and then the square-root of the mean of the squared values (ICF and Illingworth and Rodkin 2009). The RMS term is commonly used to evaluate behavioral effects for a period of time that contains 90 percent of the acoustical energy (ICF and Illingworth and Rodkin 2009). The SEL term is used to discuss the total sound energy in a signal or series of signals. It is calculated by summing the square of the cumulative pressure over a time period which is typically set to a 1 second window (ICF and Illingworth and Rodkin 2009). All values discussed in this analysis are referenced to 1 micro Pascal.

Because sound pressure waves moving through water can alter behavior and harm fish, interim criteria for injury to fish from pile driving have been developed. These criteria are used in the evaluation of the Proposed Action in relation to fish and are:

- 206 dB_{PEAK}
- 187 dB_{SEL} for fish weighing 2 grams or more
- 183 dB_{SEL} for fish weighing less than 2 grams
- 150 dB_{RMS} for alteration of behavior

The background, or ambient, noise levels of the Proposed Action area are important because it is the variation from this background that could create disturbances and alter fish behavior. Background noise in river environments is difficult to predict with any precision and the project area has not been monitored. The flow of water over the substrate and through structures creates sound that varies with the amount and rate of moving water. During higher flows on the Russian River background noise was measured at 170 dB_{PEAK} and 155 dB_{RMS} (ICF and Illingworth and Rodkin 2009). It is unlikely that the Sacramento River in the immediate project area would be this loud when piles will be installed. Measurements of ambient conditions at the RBDD on the Sacramento River during pile driving activities in 2010 were measured at 155 dB_{PEAK} and 145 dB_{SEL} (June 2010). Ambient conditions in the Sacramento River at the Cypress Bridge replacement project near Redding were measured between 123 and 147 dB_{PEAK} with an average of 147 dB_{PEAK} (Heublein and Marine 2007). Given this range of background conditions in the Sacramento River, the background noise levels in the calculation tool were left as set at 150 dB. Because sound-pressure waves decay as they move through the water, the background noise is used in a calculation that predicts the distance from the pile installation site where the project-generated noise has attenuated to the background noise (i.e., the distance at which pile driving cannot be 'heard').

There are three different sizes of piles to be installed: 24-inch diameter piles that support the bridge and platform and 18-inch and 30-inch diameter piles that support the log boom/timber deflector. Based on the literature, sound levels generated by piles similar to those specified for the project as measured about 33 feet from the pile as it was installed are (all data from ICF and Illingworth and Rodkin 2009 unless otherwise noted):

- Impact Hammer
    - 24-inch pile: 200 dB_{PEAK}, 176 dB_{SEL}, and 187 dB_{RMS} (Russian River and Rodeo, San Francisco Bay)
    - 30-inch pile: 205 dB_{PEAK}, 170 dB_{SEL}, and 190 dB_{RMS} (Richmond-San Rafael Bridge)

- Vibratory Hammer
    - 24-inch pile: 170 dB_{PEAK}, and 155 dB_{RMS} (Russian River)
    - 30-inch pile: 196 dB_{PEAK}, and 171 dB_{RMS} (Whidbey Island, WA; Laughlin 2010)

The impact data for the 24-inch diameter piles is the average of data from ICF and Illingworth and Rodkin (2009) that was collected during 24-inch pile installation in the Russian River near Geyserville and for a dock in San Francisco Bay at Rodeo, CA. Data is not presented for the 18-inch piles; however, impacts associated with these piles would be less than that reflected for the 24-inch piles.

Table 3
Distances at which the thresholds for injury to fish and behavioral changes are expected based on the NMFS thresholds

	Exceeded Distance (feet)			
Pile Size	**206 dB_{Peak}**	**187 dB_{SEL} fish ≥ 2 grams**	**183 dB_{SEL} fish < 2 grams**	**Behavioral 150 dB**
Impact				
30 inch*	30	102	187	>3,000
24 inch*	13	85	157	>3,000
Vibratory				
30 inch	7	N/A	N/A	823
24 inch	0	N/A	N/A	72

Notes:
*-assumes 52 strike per minute with 1 minute total installation time

Table 4
Percent of channel width where sound pressure levels are above thresholds (based on distances calculated and presented in Table 3)

		Percent of Channel Width			
Pile Size	**Approx Channel Width (ft)***	**206 dB_{Peak}**	**187 dB_{SEL} fish ≥ 2 grams**	**183 dB_{SEL} fish < 2 grams**	**Behavioral 150 dB**
Impact					
30 inch	430	7	24	43	100
24 inch	450	3	19	35	100
Vibratory					
30 inch	430	2	N/A	N/A	100
24 inch	450	0	N/A	N/A	16

Note:
*-channel width from the instream most feature. Total channel width at the site is approximately 600 feet (ft).

Pipe Piles
The pipe piles would be driven into place using a vibratory hammer to the extent possible. Even when driven by vibratory means, the pipe piles would have to be initially set and then proofed at depth to verify load-bearing capacity with an impact hammer. Based on work at a nearby site, it is predicted that the setting and proofing step would take about one minute each of impact hammer time per pile and vibratory drive time would be about 10 minutes (Harris pers. comm. 2012). Because two methods would be used to install each pile, the following analysis is split into two parts. The first deals with the sound pressure levels created by the impact portion of the installation. The second addresses sound pressure levels generated by the vibratory hammer.

Impact Driving
The same process was used to evaluate the effects of using an impact hammer to start and proof all pilings that would support the bridge, platform, log boom, and timber deflector. Peak sound pressures for the 30-inch piles measured about 33 feet from the pile are essentially equal to the value that represents the injury threshold to fish. The measured SEL levels are lower than the injury threshold for the 30-inch pile. The SEL values are actually a cumulative measure and therefore it is useful to use the calculator to estimate the distance at which the cumulative exposure exceeds the thresholds for fish weigh more or less than two grams. This distance is dependent on the number of times the pile has to be struck by the hammer and the calculator assumes the fish are not moving. Because fish would not remain stationary, this analysis overestimates the magnitude of impact on individuals during pile installation.

All pile driving calculations are based on the following assumptions:

1. It takes one minute of impact hammer use to set the pile and another minute to proof the pile at depth.

2. Vibratory installation would take up to 10 minutes per pile using a Model 6680 driver and a Cat 800 HP power unit (or similar device).

3. A Conmaco impact hammer Model D30-32 or Model D19-42 or similar would be used at the maximum number of blows per minute (52).

4. No sound attenuation measures are put in place.

Using the sound levels collected at other pile driving projects in the calculator and estimating the number of hammer strikes, we see that installation of the 30-inch pile would exceed the peak threshold for about 30 feet and the SEL thresholds for 187 feet out from the pile (Table 3). Similarly, the 24-inch pile would exceed the peak threshold for about 13 feet and the SEL thresholds for 157 feet out from the pile location. The 150 dB behavioral threshold is exceeded for well over 3,000 feet from the installation site based on these calculations.

These distances were then applied to the actual project site and compared to the channel width. The peak exposure distances are relatively small in terms of overall percentage of channel width indicating that there will be an abundance of open water where sound pressure levels will be below this threshold (Table 4). However, the accumulated sound exposure threshold takes the total pile driving exposure into consideration. This analysis indicates that 19 to 43 percent of the channel width may be above the thresholds depending on fish size and pile size (Table 4). These distances are calculated from the piling located the furthest out into the channel. This percentage would decrease as work moves closer to shore and into shallower water.

The threshold for behavioral changes is 150 dB. Installation of the pilings will result in sound levels over 150 dB completely across the channel and for over 3,000 feet up and downstream. There will be some attenuation provided by the slight curve in the river at the project site, but it is expected to be minimal. The setting and proofing of pilings could briefly cause fish to move away from the Proposed Action within a relatively large area.

It is important to remember that impact pile driving will only occur for short periods of time before and after vibratory installation of the pile. Between impact hammer use, conditions will either return to background or experience sounds generated by the vibratory driver.

Vibratory Installation

Once the pipe piles are started with the impact hammer, they will be installed to design depth using a vibratory driver to the extent possible. Sound generation data for vibratory installation of piles is not as readily available as is impact-related data. An average of recorded data for 4, 30-inch diameter piles vibrated into place in at the Keystone Ferry Terminal (Whidbey Island, WA) was 196 dB_{PEAK} and 171 dB_{RMS} over distances of 20 to 36 feet (Laughlin 2010). During vibratory installation of 24-inch diameter piles in the Russian River, the sound generated by installation was not audible over background river noise levels of 170 dB_{PEAK} and 155 dB_{RMS}; at the same site, vibratory installation of a 48-inch diameter piling was audible but not measurable (ICF and Illingworth and Rodkin 2002). Vibratory installation of 24-inch piles at the Cypress Avenue bridge replacement project resulted sound pressure levels ranging from 149-187 dB_{PEAK} and averaged 165 dB_{PEAK} (Heublin and Marine 2007). Use of a vibratory driver to install 24-inch piles in extremely shallow water (less than one foot deep) at the Clear Creek Waste Water Treatment Plant resulted in sound pressure levels of 165 to 174 dB_{PEAK} and was reported as essentially undistinguishable from ambient because of noise generated by an immediately adjacent riffle (Pommerenck 2008). These other data sources support the choice of sound pressure levels used for analysis of vibratory installation of piles for the Proposed Action.

Using a vibratory driver to install the piles would greatly reduce the areas where fish would be exposed to higher levels of sound pressures. The calculator predicts that vibratory installation of the 30-inch piles could generate levels over the 206 dB_{PEAK} threshold for several feet around each pile whereas the 24-inch piles would not be expected to exceed this threshold at all (Table 3). The behavioral modification distances are still substantial for the 30-inch pile because the RMS value is relatively high. Results of the calculations indicate that fish would have to be over 800 feet from the installation site before pile installation faded into the background (Table 3 and Table 4). This would encompass the entire channel width at the project site and reach a fair distance up and downstream. However, while fish behavior would be affected in this area, the exposure period would be short (about 10 minutes) and below the injury threshold. Primary impacts to fish would be expenditures of energy to leave the zone of influence and possibly, exposure to higher rates of predation if movement brings them into contact with predators.

Summary of Pile Impacts

Installation of pilings at the project site would be expected to exceed the peak and cumulative thresholds for injury to fish over a portion of the channel width. The threshold for behavioral changes, but not injury, would be exceeded over the entire channel width when piles are set and proofed using an impact hammer. Use of a vibratory driver for installation of pipe piles would exceed the injury threshold only for the 30-inch diameter piles for several feet immediately around the pile. The behavior thresholds would also be exceeded, completely spanning the channel for the 30-inch piles down to about 16 percent of the channel for the 24-inch piles. Overall drive time is expected to be about 12 minutes per pile. The exposure period to impact driving is brief (about 1 minute). Vibratory installation would take about 10 minutes followed by another break as the drivers are moved to the next pile. The brevity of drive time and breaks in sound production would help minimize adverse effects.

Because it would exceed the injury thresholds, the Proposed Action could injure ESA-listed fish, depending on their size, if they are exposed to elevated sound levels during pile driving. While not directly injurious, elevated sound levels that disturbed fish could lead to expenditure of extra energy and potentially exposure to higher levels of predation if small fish are forced out of the channel-margin shallow water habitat and are exposed to predators in the main channel. This would apply to juvenile Chinook, steelhead, and green sturgeon within the Proposed Action area.

The avoidance and minimization measures are specifically designed to minimize sound pressure waves generated by installation of piles. First of all, pipe piles will be installed with a vibratory hammer or other non-impact (e.g., hydraulic) means to the extent possible. Use of these techniques minimizes the sound-pressure waves and therefore sound-generated impacts on fish to temporary disturbance associated with construction. If feasible, use of impact hammers will be limited to starting and proofing of the pipe piles. If subsurface conditions require the use of an impact hammer to drive the entire pile length, the avoidance and minimization measures provide a suite of actions to be taken that would minimize the generation of high magnitude sound-pressure waves. Measures range from gradually increasing the force on the hammer until it is just adequate to install the pile, working only during the day, and breaks between each installation of each pile.

Because the Sacramento River serves as a migratory pathway for adult and juvenile (and potential rearing) salmon and green sturgeon, activities would need to be conducted when populations are at their lowest extent. As discussed in the previous BA (2009), the summer in-water work window is the period of time when populations of sensitive fish are smallest. The adults of the different salmon populations have either already passed the Proposed Action area (Winter-run) by summer or are still in the ocean (Spring-run and steelhead). Juvenile salmon and steelhead migrations typically occur in spring or fall depending on the species (SAFCA 2009). Juvenile green sturgeon are likely present in the Sacramento River throughout the year. Pile driving impacts are also short-term and temporary. It is likely that the pipe piles can be installed in less than four days[2] at the Pritchard Lake Pumping Plant after which in-water sound levels will return to normal. For this reason, in-water work will only occur during the in-water work window (July 1-October 31) when populations of sensitive fish species are at their annual lowest levels.

[2] Based on driving time of 12 minutes per pile with 1 hour of set-up and welding per pile and a 10 hour work day.

Streambank Riprap
Placement of riprap below the OHWM will occur at the Pritchard Lake Pumping Plant to protect the new bridge abutment and the surrounding banks from erosional forces of flowing water. Riprap will be placed either by direct dumping from a backhoe/loader or placed with an excavator. Because construction will occur during the lower flow portions of the season, most of the area where rock will be placed would be dry or very shallow water during installation.

Dredging
Dredging was discussed in the 2009 BA (SAFCA 2009). Excavation for the pump barrels at the Pritchard Lake Pumping Plant would require removal of about 21 cubic-yards of material to allow proper installation. The effect of removing this material is considered to have already been evaluated in the previous BA.

Water Quality
Changes in water quality have the potential to affect listed species of fish. The main avenues of impact are from construction related avenues (e.g., spills of fuel or oil, erosion of exposed soils, release of concrete slurry). Potential water quality changes have been evaluated in detail in the previous BA (SAFCA 2009). The Proposed Action would not change water quality in any way not previously discussed. Water quality monitoring would occur in accordance with the Regional Water Quality Control Board Section 401 Clean Water Act certification requirements.

Fish Screens
The Pritchard Lake Pumping Plant's existing intakes are not screened and possibly result in the entrainment and mortality of federally-listed species of fish. There is no evidence of mortality and no estimate of the magnitude of this impact on these species. The ISI screens are proven reliable screens common on many intakes throughout the Central Valley. They are sized appropriately for the Pritchard Lake Pumping Plant's intakes and there is no reason to expect that they will not function reliably thereby minimizing the operational effects of the Pritchard Lake Pumping Plant on federally-listed fish.

The NMFS criteria for fish screens includes approach velocities at or below 0.33 fps, sweeping velocities greater than the approach velocities, minimum spacing for wedge-wire screens of 1.75 mm, and minimum open space of 27 percent (NMFS 1997). The ISI screens are typically built with 1.75 mm gaps out of wedge-wire of equal width and have open area of 50 percent. The screens are sized appropriately for the pump intake capacities and will result in acceptable approach velocities. Sweeping velocities are maximized by locating the intake further out into the river channel. Not only does this minimize the time fish interact with the screen, but it reduces debris deposition onto the screen surface. Further minimizing fish and debris interaction with the screens is achieved by placing the screens as far down in the water column as possible, thereby helping protect juvenile salmonids that typically migrate closer to the surface.

An Operations and Maintenance Schedule for the new screened intake is under development. Among other elements, this document will specify inspection intervals, maintenance requirements, and emergency response procedures for the fish screens. The Operations and Maintenance Schedule will be submitted to AFSP for review prior to construction.

By installing screens on these three intakes, NMWC is taking the necessary steps to reduce the potential for take of federally listed species of fish. The screens are designed to prevent salmon fry and larger fish from entering the pumps. This would be considered a beneficial effect of the Proposed Action.

Operation

There are no operational changes to the facility in terms of when or how much water is pumped. Installation of screens on the intakes, as discussed previously, should essentially eliminate entrainment of federally-listed fish. This would be considered a beneficial effect of the Proposed Action.

Direct Effects Analysis for Salmonids and Green Sturgeon

As discussed in the previous BA (SAFCA 2009), the Proposed Action area is designated critical habitat for the Sacramento River winter-run Chinook salmon ESU, the Central Valley spring-run Chinook salmon ESU, and Central Valley steelhead DPS. Because there were no in-water components when it was prepared, the previous BA concluded that there would be no adverse modification of critical habitat. Because the Proposed Action includes modifications to instream areas, a more detailed critical habitat analysis is warranted. The primary constituent elements (PCEs) of critical habitat are those features essential for the conservation of a species and are typically defined in the Federal Register notices defining critical habitat. For spring-run Chinook and Central Valley steelhead, the PCEs are similar and include freshwater spawning sites, rearing areas, and migration corridors; estuarine areas free of obstruction; near shore marine habitat; and offshore marine areas (70 FR 51488). For winter-run Chinook, PCEs were not specifically defined using the PCE term, but essential habitat features are essentially the same. For winter-run Chinook these include access to spawning areas; clean spawning gravels; flows suitable for spawning, incubation, fry development, and downstream transport of juveniles; riparian habitat for juvenile development and survival; and downstream access for outmigration (50 FR 33212).

There is no spawning habitat in the Proposed Action area. Salmon and steelhead migrate through the area as adults and juveniles indicating that the migration corridor PCE is present. It is possible that a limited amount of rearing occurs in the action area in spring, but warm water temperatures in the summer and early fall likely restrict how long suitable rearing conditions are present. Because of this, the rearing habitat PCE is assumed to be present in the action area for some portion of the year. In addition to these PCEs, essential habitat features of critical habitat for winter-run Chinook that are present in the Proposed Action area include 1) uncontaminated prey and habitat and 2) riparian habitat for juvenile development and survival. The Proposed Action's effect on each of PCE present in the action area is discussed in the following paragraphs.

Migration Corridor

The Proposed Action's construction would result in structures further into the river than the existing intake. The new platform would be about 35 feet further into the channel and the new log boom and timber deflector another 20 feet from the platform. In addition to the 420 feet of open channel that would remain unaffected, all of these structures are open and passage through them would be possible at all times. They do not create a barrier to movement of fish either up or downstream moving individuals.

Pile driving required for the new bridge and platform would result in brief periods of time when sound generated by the project could be higher than ambient across the entire channel. This would form when an impact hammer is used to set and proof piles. This acoustic barrier would be below the injury threshold and last for the one minute that it takes to set and proof each pile. When the impact hammer is not being used sound levels would be substantially lower during vibratory installation of piles or at background levels during other construction activities. During vibratory installation of the 30-inch diameter piles the entire channel width would subject to noise levels over the presumed effective quiet and behavioral threshold of 150 dB. During installation of the 24-inch piles only about 16 percent of the channel would be affected. The construction window for installation of piles is July 1 to October 31 when very few fish, if any, are expected to be in the action area because of relatively warm summer water temperatures.

Rearing Habitat
Rearing habitat in the lower-gradient areas of the Central Valley includes the margins of streams and floodplains that are used temporarily during juvenile outmigration (Moyle 2002). While the Proposed Action would involve work on the shoreline and a new in-water structure, it would not result in a substantial adverse modification of existing conditions.

Uncontaminated Prey and Habitat
This PCE is specific to winter-run Chinook and reflects the need fish have for clean food items and habitat. There is no information readily available about the contamination status of prey or habitat within the Proposed Action area. However, the Proposed Action would not alter contaminant levels in prey or habitat.

Riparian Habitat
This PCE is specific to winter-run Chinook and reflects the importance of riparian areas in improving instream conditions. Riparian habitat has already been altered within the Proposed Action area and was part of a separate consultation (SAFCA 2009; NMFS 2010). The Proposed Action will cause no additional changes to riparian habitat, and therefore, have no effect on riparian habitat.

Conclusion
There would be a temporary adverse modification of critical habitat for Chinook and steelhead during construction as sound from pile driving would be higher than ambient in the river. This would occur only during pile driving, be limited in duration, and only during daylight hours. Conditions would return to baseline once pile driving was complete. Regardless, this would be considered a temporary adverse modification of designated critical habitat.

The Sacramento River is included in designated critical habitat for this the southern DPS of green sturgeon. The PCEs of green sturgeon critical habitat found in the area are likely functioning adequately. The Proposed Action would not modify any of these factors (water flow, water quality, migratory corridor, or sediment quality) in such a way that would reduce their ability to support green sturgeon. While the new Pritchard Lake Pumping Plant extends into the river further than the old one by about 55 feet (including the log boom), there are still about 430 feet of open channel and the new structure will not create a barrier to movement that would be

considered a degradation of the existing migratory corridor. Construction of the Proposed Action would result in a temporary sound barrier across the channel as discussed for salmonids and the affects to green sturgeon critical habitat would be similar. The Proposed Action would have no effect on the other PCEs. Therefore, because the Proposed Action would temporarily modify the migration corridor critical habitat PCE, it would temporarily adversely modify southern DPS green sturgeon critical habitat.

Indirect Effects on Salmonids and Green Sturgeon

Indirect effects are defined as "effects that are caused by or result from the Proposed Action, are later in time, and are reasonably certain to occur" (USFWS and NOAA Fisheries, March 1998). There would be no indirect adverse effects to salmonids or green sturgeon resulting from the Proposed Action's installation. The Proposed Action's fish screens would provide a long-term beneficial effect to the species and associated critical habitat as it would create a safer passageway. With the Proposed Action's installation, fish entrainment would be substantially reduced, if not eliminated.

Determination of Effects on Salmonids and Green Sturgeon

The Proposed Action's construction would generate sound pressure levels during pile driving that could be harmful to fish. Construction would occur during the approved in-water work window when it is unlikely any listed salmon or steelhead would be present; however, individual juvenile green sturgeon may be in the river throughout the year. The Sacramento River in this area is likely too warm to support rearing salmonids during the summer in-water work window. Even though individual fish may be present, the avoidance and minimization measures that include a gradual build-up of pile driver force and breaks during pile driving would create a gradual increase in noise levels giving fish ample time to move out of the area. In addition, installation of fish screens on the currently unscreened intakes would remove the long-term entrainment impacts to listed species. Because of this, while the Proposed Action could temporarily affect individuals, it is not expected to have a substantial detrimental effect on populations or jeopardize the existence of any of these species. Implementation of the avoidance and minimization measures would minimize the potential for adverse effects to Chinook salmon, steelhead, and green sturgeon. Therefore, because the Proposed Action could affect individuals, but would not adversely affect the population, it may affect individuals, but is not likely to adversely affect the different ESU/DPSs' population levels.

Avoidance And Minimization Measures

NMWC has committed to implement a substantial number of avoidance and minimization measures. Of specific interest to the proposed changes discussed in this document are the measures associated with water quality (SAFCA 2009) and special-status fish (SAFCA 2009). The plan for mitigating impacts to shaded riparian aquatic (SRA) was presented in a memorandum dated September 30, 2009 (Fitzer 2009). Because of USACE regulations restricting vegetation on levees, the location of the mitigation has changed to a site on the American River. Preliminary analysis of the proposed mitigation site along the American River shows that the site would provide enough acreage of SRA mitigation to compensate for the NLIP Phase 3 and 4a Project impacts at a minimum of 1:1 acreage. Regardless of this change of place, the overall approach is the same as discussed in the memorandum (see Fitzer 2009). For the Proposed Action, the following avoidance and minimization measures have been developed:

- The Operations and Maintenance Plan will be submitted to AFSP for review and approval at least 30 days prior to completion of construction.

- A revised SRA mitigation memorandum will be submitted separately for NMFS review and comment.

- Contractor shall perform any in-water construction activities between July 1 and October 31. When in-water work is conducted a qualified biologist shall be present during such work to monitor construction activities and ensure compliance with mitigation requirements and permit terms and conditions.

- Pipe pile shall only be driven by vibratory or non-impact methods (hydraulic) that result in sound pressures below threshold levels (see Effects Analysis) to the extent practical, but may be finished with the diesel hammer as needed to reach required tip elevation.

- Pile driving will only occur during daylight hours, generally from one hour after sunrise to one hour before sunset.

- Pile driving equipment will start at low power levels and strike frequency and gradually increase settings until satisfactory progress is made.

- Provide a minimum 15-minute break between each pile installation to allow fish within the action area to move.

3.3 Cultural Resources

3.3.1 Affected Environment

Cultural resources is a term used to describe both 'archaeological sites' depicting evidence of past human use of the landscape and the 'built environment' which is represented in structures such as dams, roadways, and buildings. The National Historic Preservation Act (NHPA) of 1966 is the primary Federal legislation which outlines the Federal Government's responsibility to cultural resources. Other applicable cultural resources laws and regulations that could apply include, but are not limited to, the Native American Graves Protection and Repatriation Act (NAGPA), and the Archaeological Resources Protection Act (ARPA). Section 106 of the NHPA requires the Federal Government to take into consideration the effects of an undertaking on cultural resources on or eligible for inclusion in the National Register of Historic Places (National Register). Those resources that are on or eligible for inclusion in the National Register are referred to as historic properties.

The Section 106 process is outlined in the Federal regulations at 36 CFR Part 800. These regulations describe the process that the Federal agency takes to identify cultural resources and the level of effect that the proposed undertaking will have on historic properties. In summary, the Federal agency must first determine if the action is the type of action that has the potential to affect historic properties. If the action is the type of action to affect historic properties, the agency must identify the area of potential effects (APE), determine if historic properties are present within that APE, determine the effect that the undertaking will have on historic properties, and consult with the State Historic Preservation Office (SHPO), to seek concurrence on the findings. In addition, the Federal agency is required through the Section 106 process to coordinate with Indian Tribes concerning the identification of sites of religious or cultural significance, and consult with individuals or groups who are entitled to be consulting parties or have requested to be consulting parties.

Cultural resources in this area are generally prehistoric in nature and include remnants of native human populations that existed before European settlement. Prior to the 18th Century, many Native American tribes inhabited the Central Valley. Given the depositional nature of the valley, it is possible that many cultural resources lie undiscovered across the valley. The Sacramento Valley supported extensive populations of Native Americans, principally the Nisenan, also known as the Southern Maidu, in the vicinity of the current project area during the late prehistoric period. Cultural studies in the Sacramento Valley have been relatively extensive relative to other areas of the Central Valley. Numerous Nisenan, and earlier, sites have been found adjacent to the Sacramento River, primarily on existing natural levees. However, the conversion of land and intensive farming practices over the last century, as well as an extensive levee system along the river, has destroyed many Native American cultural sites.

The historic era cultural resources along the Valley are diverse. Many of the historic era resources are related to farming and water management in the Sacramento Valley. Additionally, many of the urban landscapes have potentially significant architecture and other historic features such as roads and bridges.

3.3.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, existing conditions would persist. Reclamation would not have an undertaking as defined by Section 301(7) of the NHPA and thus there would be no Federal nexus on Reclamation's part to initiate Section 106 review. As a result, implementation of the No Action alternative would result in no impacts to cultural resources by Reclamation.

Proposed Action Alternative

The Proposed Action involves the federal funding of the NMWC to replace the existing three pumps and installing three fish screens on the Pritchard Lake Pumping Plant. Reclamation will fund this activity which constitutes an undertaking as defined by Section 301(7) of the NHPA initiation Section 106 and its implementing regulations at 36 CFR § 800. The proposed project area has been investigated by the U.S. Army Corps of Engineers (USACE) as part of the Section 106 process pursuant to 36 CFR § 800.4. Within the project footprint three historic cultural resources were identified. These include the foundations from a mid-twentieth century house, a

historic trash dump, and the Pritchard pump house. USACE determined that these resources were not eligible for inclusion in the NRHP, and received concurrence from SHPO with this determination. As such, should the Proposed Action alternative be selected, the resulting activity will have no impact on properties listed, or eligible for listing, on the National Register of Historic Places.

Section 4.0 Consultation and Coordination

On December 18, 2013, Reclamation submitted a Biological Assessment to the National Marine Fisheries Service (NMFS) requesting consultation on the conclusion that the project "may affect, is not likely to adversely affect" federally listed salmonids and sturgeon, "temporarily adversely modify" their designated critical habitat and "is not likely to have an adverse effect" on Pacific Salmon EFH. Reclamation is awaiting the consultation letter from NMFS and will not proceed with the Proposed Action until it is received.

As the Proposed Action was determined to be an undertaking with the potential to affect historic properties, Reclamation is completing the Section 106 process, pursuant to 36 CFR Part 800, which includes consultation with the California State Historic Preservation Officer (SHPO). Until the Section 106 consultation is completed, the Proposed Action will not proceed.

Section 5.0 References

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