RECLAMATION

Managing Water in the West

Environmental Assessment

Colusa Indian Community Council - Compton Diversion Fish Screen Project

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

August 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

List of Appendices

List of Acronyms and Abbreviations

AES	Analytical Environmental Services
AF	Acre-feet
AFSP	Anadromous Fish Screen Program
APE	Area of Potential Effect
CAA	Clean Air Act
CCAPCD	Colusa County Air Pollution Control District
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CICC	Colusa Indian Community Council
CNDDB	California Natural Diversity Database
CO_2	carbon dioxide
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
cyds	cubic yards
DBH	diameter at breast height
EA	Environmental Assessment
FWA	Family Water Alliance
GHG	Greenhouse Gas
ISI	Intake Screens, Inc.
ITA	Indian Trust Assets
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOx	oxides of nitrogen as nitrogen dioxide
Reclamation	Bureau of Reclamation
RM	River Mile
ROG	reactive organic gas
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SOP	Standard Operating Procedure
SVAB	Sacramento Valley Air Basin
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

Section 1.0 Introduction

1.1 Background

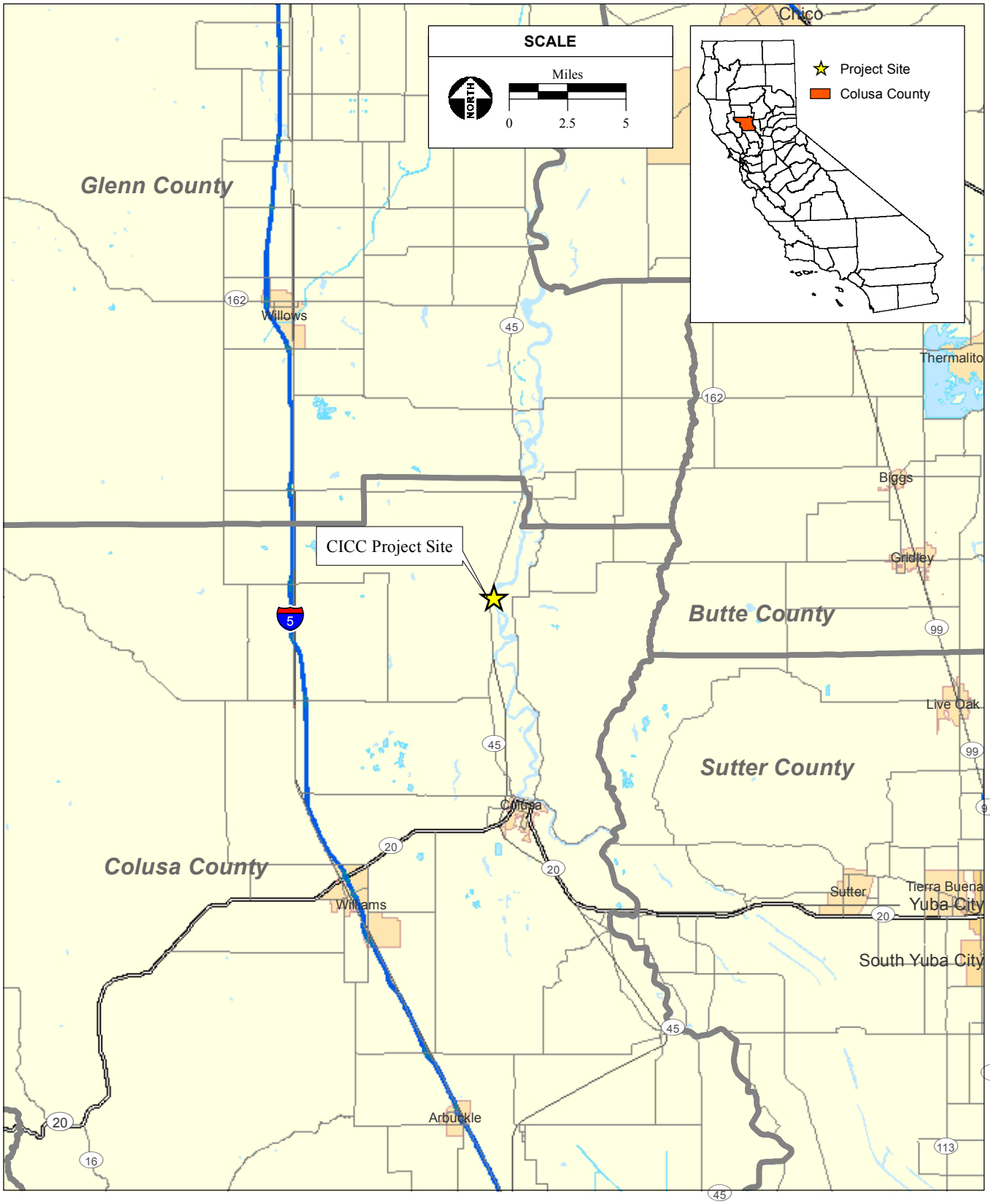
The Bureau of Reclamation (Reclamation) through the Anadromous Fish Screen Program (AFSP), which it co-manages with U.S. Fish and Wildlife Service (USFWS), proposes to provide federal funding to the Colusa Indian Community Council (CICC) to screen their existing 22 cubic feet per second (cfs) unscreened Compton Diversion (Proposed Action). CICC's diversion is located on the Sacramento River (River Mile [RM] 158.0), approximately 10 miles north of the town of Colusa, California (Figure 1). The Proposed Action is a cooperative effort between the AFSP, California Department of Fish and Wildlife (CDFW), Family Water Alliance (FWA), and CICC. The fish screen meets design requirements of the National Marine Fisheries Service (NMFS) and CDFW (CDFW 2000, NMFS 1997).

The Central Valley Project Improvement Act (CVPIA), Section 3406(b))(21), authorizes the Department of the Interior to develop and implement measures to avoid losses of juvenile anadromous fish resulting from unscreened diversions on the Sacramento and San Joaquin Rivers and their tributaries. These measures include construction, rehabilitation, and replacement of fish screens and relocation of diversions to less fishery sensitive areas. The Proposed Action 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 pumps.

In conformance with the National Environmental Policy Act of 1969 (NEPA), as amended, Reclamation has prepared this Draft Environmental Assessment (EA) to evaluate and disclose the Proposed Action's potential environmental impacts.

1.2 Need for the Proposal

The loss of juvenile anadromous fish at water diversions in the Central Valley of California has been identified as contributing to the decline of anadromous fish populations. The Proposed Action is designed to prevent endangered and threatened fish species within the Sacramento River system from being entrained by this water diversion, including federally listed salmonids and green sturgeon, without impairing the ability of CICC to divert water consistent with their existing water rights. In addition, the Proposed Action would allow the existing, dredged channel to silt in naturally and return to pre-channel conditions.



SOURCE: StreetMap North America, 2009; AES, 2012

Figure 1
Regional Location

1.3 Potential Resource Issues

This EA analyzes the No Action and the Proposed Action alternatives in order to compare the potential impacts and cumulative effects on environmental resources. Land use, visual resources, recreation, transportation, noise, hazards and hazardous material, socioeconomics, global climate, public services, utilities, and service systems are not analyzed because they were not identified as having potential environmental effects resulting from the Proposed Action. In addition, Reclamation considered and determined that the Proposed Action would not impact the following resources:

- Indian Trust Assets (ITA): The Proposed Action does not have a potential to negatively impact ITAs. The Proposed Action is requested by CICC for the activities to be performed to assist the Tribe with water supply.

- Indian Sacred Sites: No known Indian sacred sites have been identified within the footprint of the Proposed Action.

- 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.

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

- Air Quality
- Biological Resources
- Cultural Resources

Section 2.0 Alternatives

2.1 No Action Alternative

Under the No Action Alternative, CICC's Compton Diversion would continue operating under existing conditions. The current diversion is unscreened and therefore potentially entrains fish. The measures recommended to avoid losses of juvenile anadromous fish under Section 3406 (b)(21) of the CVPIA would not be implemented at the current CICC diversion.

2.2 Proposed Action Alternative

Under the Proposed Action, Reclamation proposes to provide federal funding to CICC to screen their existing unscreened surface water diversion on the Sacramento River. Installation of the fish screen, which meets NMFS's and CDFW's design requirements, would prevent endangered and threatened fish species, including federally listed salmonids and green sturgeon, from being entrained without impairing the ability of CICC to divert water consistent with their existing water rights. In addition, the Proposed Action would protect fish species from current predation issues within the channel. It would also eliminate the need to dredge the intake channel and allow the channel to silt in naturally.

A new self-cleaning fish screen would be placed at the entrance of the existing intake channel and then connected to the existing pumping plant via an underground pipeline (see Appendix A for construction design drawings). The fish screen would be a 12-foot-diameter cone screen placed on a pile-supported 12-foot by 12-foot steel base. The new screen would be located along the low flow river bank. The base of the screen would be placed at or just above the current sandy river bottom which is about the same as the current intake channel invert elevation. At the lowest water levels, the screen would be submerged about three feet deep with the top of the screen just out of the water. The screen's pile-supported base would have a 36-inch-diameter opening and pipe section that would connect to a new 350-foot pipeline. Four, six-inch-diameter pipe piles would be driven into the river bottom to secure the structure to the river. Each pile would be about 30 feet long. The base would be clamped and bolted to these piles.

The 36-inch pipeline would be a Steel Reinforced Polyethylene (SRPE) pipe. The pipeline alignment would follow the southern edge (left bank) of the existing intake channel between the intake screen location and the existing pumps. The pipeline would be buried up to five feet below the intake channel bottom to prevent river scouring or air entrainment issues. The pipeline would be placed in an open trench cut by an excavator and backfilled using the excavated material. The pipeline would connect to the intake screen at the upstream end and a new manifold/intake adapter structure at the downstream end. The total length of pipeline would be about 350 feet long. The new manifold/intake adapter would consist of a large diameter steel pipe manifold with a pipeline connection on one side and two pump conductor pipes on the other side. The pumps would draw screened water from the conductor pipes rather than from the existing channel. The pumps would fit into each conductor pipe which would also serve as the lower pump supports.

A temporary bladder cofferdam would be placed at the intake channel entrance to isolate the diversion channel from the main river during the pipeline installation to prevent turbidity or water quality issues. The screen base and attached pipeline section would not be installed within the cofferdam area. The bladder cofferdam would not be designed to prevent seepage or to dewater the intake channel as the pipeline would be dug in the wet. The existing pumps would be turned on as necessary to remove excess water in the channel and to keep any turbidity away from the channel entrance.

The screen unit would be accessed via the existing embankment road along the intake channel. The screen would be designed to be in-place year round; however, a crane or long reach excavator could remove the screen if desired or if necessary. The screen's brush cleaning system is operated by a hydraulic power system. A hydraulic power unit would be placed in the existing pump house with a small control panel. Hydraulic hoses would be placed in the pipeline and connect the screen unit to the manifold/intake adapter at the existing facility.

The screen and its base would be designed for the expected river loads and possible debris impacts. The pipeline would also be placed below the existing river bed elevation to protect it from erosion. The pipeline would be segmented to allow for removal of one or more sections (Appendix A).

Project Components

Intake Screens, Inc. (ISI) would design and install a self-cleaning fish screen, base, pipeline, pump manifold/intake adapter, and controls. The new intake screen would replace the currently unscreened diversion with a state-of-the-art fish screen.

The existing pump structure would be retrofitted to accommodate the new fish screen. While the pumps divert water directly from a dead end channel, the new pipeline and screen would enable the pumps to draw screened water from the channel entrance. Once the pipeline is connected to the pumps, the existing intake channel can silt in without any pumping or operational impacts and dredging of this channel would no longer be necessary.

The fish screen would be installed between September 1 and December 31 when the pumps are no longer needed for irrigation purposes. In-water activities are scheduled during the NMFS in-water work window between September 1 and October 15. The initial work would consist of placing the screen base and the upstream 40 feet of pipeline section. This work would consist of excavating two cubic yards of material (consisting of soil/silt/rock) from the river bottom, placing the screen base, and driving the piles for the base. Once the screen base is set, a water-filled bladder cofferdam would be placed across the intake channel and over the initial pipe section. The pipe would be plugged to isolate the intake channel. The pipeline alignment would then be excavated (with some water in the channel) and the pipe sections set. The material that would be dredged, or that has been previously dredged, from the channel would be used to backfill the pipeline as it is installed toward the pump station.

ISI's fish screen system for CICC's Compton Diversion is comprised of five main components that include:

1. Cone Screen with Brush Cleaner
2. Pile Supported Screen Base
3. Pipeline
4. Manifold/Intake Adapter Structure
5. Fish Screen Control Panel and Hydraulic Power Unit

1. Cone Screen with Brush Cleaner:
The screen would provide fish protection for the two pumps with a combined maximum pumping capacity of 22 cfs. The fish screen unit would be approximately 130 square feet of screen area when fully submerged. If the water is two feet above the screen base, there would be 100 square feet of screen surface area available. At peak diversion, this translates to an average approach velocity of about 0.22 feet per second (fps) through the screen, even at an extreme low water condition. The screen unit would be made of type 304 stainless steel. The screen would be situated just above the riverbed to provide sufficient screen area and high enough to prevent being buried by the river's moving bedload. The screen material would consist of #69 continuous slot wedgewire with 0.068 inch slot openings (50% net open area). It should be noted that this design is based around an existing facility retrofit and offers the best compromise of reducing maintenance dredging and eliminating the dead end channel condition.
The screen surface would be cleaned by three brushes that rotate both clockwise and counterclockwise about the screen's axis when powered by a hydraulic motor system. The cleaning cycles may be set for periodic or continuous operation.

An electric motor-driven hydraulic pump unit (HPU) is used to power a hydraulic cleaning system that enables the brushes to rotate. Hoses connected to this HPU would run from the pump structure to the screen unit through the proposed new pipeline. The hoses would be run in a conduit for protection. A hose junction box would be placed near the screen so it can be removed easily.

A high torque marine duty hydraulic motor using a NMFS-approved hydraulic oil would be used to drive a gear reducer and, in turn, the brush system. The brushes would rotate at a rate of approximately two to four revolutions per minute. Hydraulic relief valves, pressure switches, and unit monitoring would ensure the system would not over-pressurize or be damaged.

To inhibit corrosion, all screen components except the hydraulic motor would be made of type 304 stainless steel. The hydraulic motor would be painted with an epoxy coating, electrically isolated, and cathodically protected. Hoses and fittings would also be protected from corrosion, wear, and ultraviolet damage.

2. Pile supported screen base:
The screen would be mounted on top of a 12-foot by 12-foot-square metal base. A 36-inch-diameter intake opening cut into the center of the base would divert water into a 36-inch pipeline. The base would be clamped and bolted to four, six-inch-diameter standard pipe piles. Each of the four piles would be driven about 30 feet into the river bed or to refusal. A crane supported vibratory hammer would be used to drive the piles into the river bottom. The base and attached pipeline section would be constructed of mild steel and epoxy coated. The pipeline section would be flanged to bolt to the SRPE pipeline.

3. Pipeline:
The pipeline would be a 36-inch-diameter SRPE. This pipe would be laid in a trench cut along the existing channel diversion alignment. Prior to trenching and pipeline installation, a temporary bladder cofferdam made from excavated material from the existing diversion channel, would be placed just behind the screen location and across the channel entrance. The temporary cofferdam would be approximately six feet in length. The existing pump station would be used to partially dewater the channel and to prevent any silt laden water from entering the main river section by the Proposed Action. An excavator would be used to trench and backfill the pipeline. Excavated materials would be reused to backfill the installed pipeline. No excavated materials would be removed off site for disposal. It is anticipated that about 360 cubic yards of material would be excavated in the channel section for the pipeline.

4. Manifold/Intake Adapter:
A fabricated steel manifold would adapt the pipeline to the two existing pumps. The structure would be pile-supported using two 12-inch-diameter driven piles. The two pump conductor pipes would be supported additionally using the existing or new pile supports on the bank.

5. Fish screen control panel and hydraulic power unit
The Fish Screen Control Panel (FSCP) would consist of a timer based control panel and a hydraulic power unit. The controls would be housed inside a NEMA 4 enclosure and placed inside a larger NEMA 12 or 3R cabinet that would also contain the HPU. The FSCP/HPU would house all hydraulic and electrical control systems necessary for the manual and automatic operation of the fish screen cleaning system. The basic features of the system include a timer-based interface to control the cleaning cycle and duration, as well as to monitor the function of the fish screen hydraulic and electrical systems. Three phase power (460 VAC) would be required to operate the FSCP and HPU. This power must be provided by the owner for operation. The primary electrical load is from a maximum 5 Hp electric motor-driven hydraulic pump unit used for the cleaning system.

The proposed sequence of work is:

1. Mobilize crane, excavator, and materials on-site;
2. Excavate the screen base area as necessary;
3. Set screen base and initial 40 feet of pipeline;
4. Set elevations and drive piles on the screen base;
5. Place cofferdam across the intake channel and the (plugged) pipe section;
6. Excavate the existing channel bottom area for placement of the pipeline;
7. Place the pipe in sections along the alignment between the intake and the pump station;

8. Remove the pumps and the lower pump supports;
9. Place manifold/intake adapter in the channel and drive piles for its support;
10. Connect the pipeline to the intake adapter;
11. Connect new pump conductors to the adapter and the support system;
12. Place screen unit on base;
13. Place hydraulic lines between the screen and control panel;
14. Install control panel in the pump house; and
15. Connect to electrical and test the system.

Section 3.0 Affected Environment & Environmental Consequences

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, 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 and municipal water supplies throughout the state. The area surrounding the Proposed Action is composed of agricultural lands that consist of walnut orchards.

The Proposed Action area is located at the end of a dredged side channel off the mouth of the Sacramento River approximately 0.2 miles east of California State Route 45 on a private gravel road. The private gravel road extends perpendicular from the highway and then runs parallel to the Sacramento River approximately 0.1 miles to the pump station. There is an existing dirt access road (that consists of bare ground that is annually excavated material from the existing intake channel) along the south side of the intake channel embankment that is maintained by the property owner.

CICC operates two slant pumps at the end of a side channel that connects to the mainstem of the Sacramento River. The combined maximum pumping rate of both pumps is 22 cfs. The pump station is located at the end of an unlined intake side channel approximately 350 feet away from a low section of the Sacramento River. The banks of the unlined side channel are comprised of loose sands and silts that are deposited during high flows, as the velocity in the channel is very low and sediment falls out of suspension and. The channel depth is very shallow at low river flows (two to five feet), and must be dredged periodically for the pumps to operate.

The Proposed Action area is comprised of open water, ruderal/developed area, and great valley riparian forest. Nearby habitats include annual grassland and agriculture. Great valley riparian forest is a biologically rich habitat adapted to the natural processes of the Sacramento River. Dominant vegetation in the surrounding Sacramento River area include box elder (*Acer negundo*), Valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), and various species of willows (*Salix sp.*). The open river channel adjacent to the Proposed Action area has been designated critical habitat for the California Central Valley steelhead and Central Valley Chinook salmon.

3.1 Air Quality

3.1.1 Affected Environment

The Proposed Action area is located within the Sacramento Valley Air Basin (SVAB), which is under the jurisdiction of the Colusa County Air Pollution Control District (CCAPCD). The SVAB is generally affected by regionally high pollution emissions.

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

Potential air quality impacts associated with the Proposed Action are limited to those resulting from short-term construction activities involved with construction of the fish screen system. The CCAPCD does not provide significance criteria for criteria pollutants designated as non-attainment; however, the adjacent Feather River Air Quality Management District provides a significant threshold of 25 pounds per day of reactive organic gases (ROG) and nitrogen oxides (NOx) (both are ozone precursors). Therefore, for this analysis, impacts would occur if project-related ROG and NOx emissions exceeded 25 pounds per day. ROG and NOx emissions are estimated to be 2.09 and 14.47 pounds per day, respectively (CDFW 2013). The following assumptions and emission factors were used to estimate project-related emissions (CDFW 2013):

- Construction would occur over a 60-day period;
- OFFROAD2007 emission factors were used to estimate construction emissions;
- Construction equipment included one crane and one excavator and/or a pile driver, two material haul trucks, and 10 worker vehicles;
- Workers would travel 25 miles one-way per day;
- Haul trucks would travel 100 miles per day; and
- Emission factors were based on construction year 2013.

Operation of the fish screens would include periodic vehicle trips by maintenance staff and equipment that would emit negligible ROG and NOx than emitted during construction given the scale of the Proposed Action.

The distance to the nearest sensitive receptor is approximately 1.5 miles east. Substantial concentrations of air pollutants, including diesel particulate matter from construction equipment, would not be present at that distance. Given the agricultural nature of the surrounding area and the distance to the nearest sensitive receptor, construction-related odors would not affect a substantial number of people.

3.2 Biological Resources

3.2.1 Affected Environment

The Proposed Action area consists of the Sacramento River channel and an existing dredged diversion channel, approximately 350 feet long, which leads to the CICC diversion facility. Earthen material is dredged from the existing channel and is annually deposited on the north bank of the existing diversion. The dredged material is leveled and utilized as an access road for annual operational and maintenance activities on the north side of the channel. A reconnaissance-level biological survey was conducted by Analytical Environmental Services (AES) in April 2012. The north side of the channel is void of natural habitat within and around the access road in addition to the immediately adjoining areas due to operation and maintenance activities occurring throughout the year. The Proposed Action area is comprised of the open water of the Sacramento River, walnut orchards, and the great valley riparian forest. Dominant vegetation in the surrounding Sacramento River area and on the south side of the channel bank include box elder (*Acer negundo*), Valley oak (*Quercus lobata*), Fremont cottonwood (*Populus fremontii*), and various species of willows (*Salix sp*.). Though the south side of the channel is heavily vegetated, the Proposed Action's activities would not result in impacts to the area as all proposed activities would be implemented from the existing access road on the north bank and within the existing channel. Development of land to irrigate crops has been the historic land use within in the CICC resulting in the absence of migratory corridors and sufficient habitat criteria required to support many special-status species that could have the potential to occur within the Proposed Action area. A search was conducted of the USFWS species list and California Natural Diversity Database (CNDDB) for species that have the potential to occur within the Moulton Weir USGS 7.5-minute quadrangle. While several species were identified, only the following federally listed species have the potential to occur in the Proposed Action area based on habitat surveys:

- Green sturgeon (*Acipenser medirostris*)
- California Central Valley steelhead (*Oncorhynchus mykiss*)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*)
- Swainson's hawk (*Buteo swainsoni*), Western yellow-billed cuckoo (*coccyzus americanus occidentalis*), Bank Swallow (*riparia riparia*), - state listed and Migratory Bird Treaty Act species
- Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB)

3.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative, the CICC's Compton diversion would remain unscreened and would continue to potentially impact juvenile fish species.

Proposed Action Alternative

Under the Proposed Action Alternative, a new 12-foot-diameter self-cleaning fish cone screen would be placed at the entrance of the existing intake channel on the Sacramento River and then connected to the existing pumping plant via a 350-foot underground pipeline. The pipeline would be buried up to five feet below the intake channel bottom to prevent river scouring or air entrainment issues. The pipeline would be placed in an open trench cut by an excavator and backfilled using the excavated material. A temporary water-filled bladder cofferdam would be placed at the channel entrance, using existing earthen material, to isolate the diversion channel from the main river during the pipeline installation to prevent species occupancy, turbidity and water quality issues from occurring.

Fish Species:

The Proposed Action's potential environmental consequences are expected to be similar for Central Valley winter-run Chinook salmon, Central Valley spring-run Chinook salmon, California Central Valley steelhead and green sturgeon. 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.

Potential effects associated with in-river construction work would involve equipment and activities that would produce pressure waves, and create underwater noise and vibration, thereby temporarily altering in-river conditions. The Proposed Action would involve the installation of a temporary bladder cofferdam, pipeline and steel piles at the CICC surface water diversion site on the Sacramento River. In-water work would consist of the installation of four, six-inch diameter pipe piles and supports that would be necessary for the installation of the pipeline and fish screen components. The Proposed Action's activities would be confined to the mouth of the existing channel on the Sacramento River, the existing channel diversion and the existing pump structure. Based on the type of piles to be used for installation, shallow site conditions and usage of a vibratory hammer, the peak and accumulated sound pressures for 12-inch steel pipe piles are anticipated to be 192 dB (peak) and 177 dB (accumulated). The proposed six-inch steel pipe piles would result in lower dB levels. These levels are below NMFS approved criteria for injury to fish from 12-inch pile driving activities (206 dB peak and 187 dB accumulated for fish greater than two grams and 177 dB accumulated for fish less than two grams). (Appendix B).

Construction activities would produce both pulsed (i.e., impact pile driving) and continuous (i.e., vibratory pile driving) sounds. Fish react to sounds which are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2009) identified several studies that suggest fish may relocate to avoid certain areas of noise energy (Caltrans 2009).

Additional studies have documented effects of pile driving (or other types of continuous sounds) on fish, although several are based on studies in support of large, multi-year bridge construction projects. Sound pulses (SPL) at received levels of 160 dB may cause subtle changes in fish behavior while SPLs of 180 dB may cause noticeable changes in behavior. SPLs of sufficient strength have been known to cause injury to fish and fish mortality (referenced in Caltrans 2009).

The areas likely impacted by the pile driving associated with fish screen installations are relatively small and lack significant cover or other important habitat features that would attract listed salmonids. The most likely impact to fish from pile driving activities at the Proposed Action area would be temporary behavioral avoidance of the areas. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution, and behavior is anticipated. In addition, a fish avoidance plan would be implemented within the existing diversion channel prior to the temporary cofferdam installation to ensure there would be no adverse impacts to aquatic species from the Proposed Action (Appendix C).

To further reduce potential impacts to fish, construction would incorporate a soft start. The use of a soft-start procedure is believed to provide additional protection to fish species by warning, or providing fish species a chance to leave the area prior to the hammer operating at full capacity. The pile driving engineer would utilize soft-start techniques (ramp-up and dry fire) recommended by NMFS for impact and vibratory pile driving. The soft-start requires contractors to initiate noise from vibratory hammers for fifteen seconds at reduced energy followed by a one minute waiting period. This procedure would be repeated two additional times. In addition, pile driving would only be conducted between two hours post-sunrise through two hours prior to sunset, between the periods of September 1 and October 15, with in-water work being no more than two days.

Underwater installation activities could temporarily create minor sediment plumes which could directly affect salmonids. Turbidity could affect salmonid species by releasing gill occluding sediments. The turbidity plume resulting from site preparation is not expected to extend across the entire river and salmonids would be able to effectively avoid the plume and their upstream or downstream migration would not be blocked. The period of increased turbidity would be limited to the period of installation of the intake structure. In-water activities for the project are scheduled between September 1 and October 15. The potential effects of construction activities on water quality is expected to be intermittent and temporary, return rapidly to baseline conditions, and be localized within the river channel (approximately 100 feet wide and 100 feet or less downstream of the site). No long-term turbidity related effects are expected. All listed salmonid species are known to occur in the Proposed Action area during their respective periods of juvenile and adult migration to and from the ocean. However, an analysis of the different migration periods and survey data shows that salmonids are unlikely to be using the area when construction would occur during the proposed time period. It is important to note that there would be a temporary cofferdam placed at the channel entrance, using existing earthen material, to isolate the diversion channel from the main river during the pipeline installation to prevent species occupancy, turbidity and water quality issues from occurring.

Green sturgeon move to estuaries and the lower reaches of rivers between late winter and early summer, and ascend rivers to spawn in the spring and early summer. Adult green sturgeon leave the rivers soon after spawning. Movement and foraging during downstream migration occurs at night for both larvae (approximately 10 days post-hatch) and juveniles (73 FR 52084; Cech et al. 2000, as cited in Reclamation 2008). Juvenile emigration reportedly occurs from May through September. The proposed in-water construction window would be limited to daylight hours when green sturgeon are less active and during the low-flow period to minimize potential exposure of juvenile green sturgeon to construction effects. In addition, a temporary cofferdam would be installed that would segregate the construction area from the Sacramento River. In addition, a Fish Avoidance Plan will be implemented by CICC prior to construction to ensure that if any fish are within the Proposed Action area, they would be moved via passive methods outside of it into the river itself (Appendix C).

Critical Habitat and Essential Fish Habitat (EFH):
Critical habitat and Essential Fish Habitat (EFH) for fish species overlap within the Proposed Action area. There would be a temporary adverse modification of critical habitat for species 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.

The installation of this fish screen system would prevent endangered and threatened fish species within the Sacramento River system from being entrained by this water diversion without impairing the ability of CICC to divert water consistent with their existing water rights. In addition, the Proposed Action would protect fish species from current predation issues within the existing diversion channel and would eliminate the need to dredge the intake channel and allow the channel to silt in naturally.

Valley Longhorn Elderberry Beetle:
Surveys of the action area were completed by both AES biologists (April 2012) and BOR biologists (February 2014). One elderberry shrub was reported within the vicinity of the surrounding Proposed Action area though the shrub is located outside the 100-foot avoidance area recommended in *The Valley Elderberry Longhorn Beetle Recovery Plan* (USFWS 1984). The location of the shrub is surrounded by existing dense vegetation that will not be disturbed by the Proposed Action. There were no other shrubs located in the surrounding areas. In addition, the Proposed Action activities would be implemented during the VELB's dormant season (adult VELB emerge, feed on foliage, and are active from early March to early June). Therefore, the Proposed Action would not adversely impact VELB or their habitat.

Migratory Birds:
Swainson's hawk and Western yellow-billed cuckoo may use trees in the area for nesting and Bank Swallow may use the existing banks of the Sacramento River for nesting. No impacts to nesting migratory birds would result however, as construction would occur between September and November, which is outside the nesting season.

3.3 Cultural Resources

3.2.1 Affected Environment

Cultural resources is a broad term that includes prehistoric, historic, architectural, and traditional cultural properties. The National Historic Preservation Act (NHPA) of 1966, as amended, is the primary Federal legislation that outlines the Federal Government's responsibility to cultural resources. Section 106 of the NHPA requires the Federal Government to take into consideration the effects of an undertaking on cultural resources listed 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.

Cultural resources investigations were conducted by Tom Origer and Associates in 2013-2014 (Mercer and Origer 2014). A record search and archival research was conducted along with an in-field survey. A total of approximately three acres, including the area of potential effects (APE) for the Proposed Action, was surveyed for cultural resources. The only cultural resources identified within the APE includes the pump and intake channel and Segment 137 of the Sacramento Flood Control Project Levee system. The pump station was originally constructed in the 1950s according to CICC records, and has been maintained and upgraded since that time to conform to modern standards. The pump station is therefore less than 50 years old and does not meet the general age criteria for consideration as a historic property pursuant to 36 CFR § 60.4. The pump station does not meet the National Register criteria considerations as it does not possess exceptional significance in its association to events or people that are important in the history of water delivery in the Sacramento Valley, nor does it possess exceptional significance in its design and construction as a type of water delivery facility.

Segment 137 of the Sacramento Flood Control Project Levee system, which includes the APE for this undertaking, is part of a proposed multiple property listing that is currently being developed for levees associated with the Sacramento river Flood Control Project as part of continuing Section 106 compliance work conducted for a U.S. Army Corps of Engineers undertaking (personal communication with California Department of Water Resources). Given that this Section 106 process is still ongoing, and there has been no consensus regarding this determination, Reclamation assumes for the purposes of this undertaking only that the Sacramento River Levee is eligible for inclusion on the National Register under Criterion A for its association with the first flood control legislation enacted by the United States Congress in 1917. No modifications are proposed to the Sacramento Flood Control Project Levee Segment 137. The existing maintenance road on top of the levee will be used to access the project area, and will require no improvements.

Reclamation initiated consultations under Section 106 of the NHPA on a finding of no adverse effect to historic properties. The existing access road from the levee will require no modifications, and all construction activities are confined to the existing fill material derived from constructing the intake channel, banks, and adjacent levee. A response from the State Historic Preservation Officer (SHPO) concurring with Reclamations' findings and determination is pending.

3.2.2 Environmental Consequences

No Action Alternative
Under the No Action Alternative, there would be no impacts on cultural resources because the proposed fish screen would not be constructed, and there would be no change in operations. Conditions related to cultural resources would remain the same as existing conditions.

Proposed Action Alternative
The Proposed Action is the type of activity that has the potential to affect historic properties. A records search, a cultural resources survey, and Tribal consultation did not identify historic properties within the APE. Reclamation concluded that there will be no adverse effect to historic properties; therefore, no cultural resources would be affected as a result of implementing the Proposed Action.

Section 4.0 Consultation and Coordination

Endangered Species Act
On May 23, 2014, Reclamation submitted a Biological Assessment to NMFS requesting consultation on the conclusion that the project "may affect, is not likely to adversely affect" federally listed salmonids and sturgeon, "is not likely to adversely affect" their designated critical habitat and would have "no effect" on Pacific Salmon EFH. Reclamation received a concurrence letter from NMFS on August 18, 2014 agreeing with Reclamation's conclusions.

National Historic Preservation Act
The NHPA of 1966, as amended (16 U.S.C. 470 et seq.), requires that Federal agencies give the Advisory Council on Historic Preservation an opportunity to comment on the effects of an undertaking on historic properties, properties that are eligible for inclusion in the National Register. The 36 CFR Part 800 regulations implement Section 106 of the NHPA.

Section 106 of the NHPA requires Federal agencies to consider the effects of Federal undertakings on historic properties, properties determined eligible for inclusion in the National Register. Compliance with Section 106 follows a series of steps that are designed to identify interested parties, determine the APE, conduct cultural resource inventories, determine if historic properties are present within the APE, and assess effects on any identified historic properties. Reclamation initiated NHPA Section 106 consultation with the California SHPO on a finding of "no adverse effect to historic properties" pursuant to 36 CFR §800.5(b).

Section 5.0 References

Adams, P.B., C.B. Grimes, J.E. Hightower, S.T. Lindley, and M.L. Moser. 2002. *Status Review for North American Green Sturgeon, Acipenser medirostris. National Marine Fisheries Service*. 58 pp.

California Department of Fish and Wildlife. 2013. Initial Study/Mitigated Negative Declaration. Family Water Alliance Phase 8 Projects, Colusa Indian Community Council. April 2013. Prepared by Analytical Environmental Services for Lead Agency, CDFW.

California Department of Fish and Wildlife. 2000. *Fish Screen Criteria.* June 19, 2000.

California Department of Transportation (Caltrans). 2009. *Final Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*. Prepared for Caltrans by ICF Jones & Stokes and Illingworth and Rodkin Inc. February 2009.

Mercer, Julianne and Janine Origer. 2014. A Cultural Resources Survey for the Colusa Indian Community Council Fish Screen Project, Colusa County, California. Prepared by Tom Origer & Associates for Analytical Environmental Services.

National Marine Fisheries Service 1997. *NMFS Fish Screening Criteria for Anadromous Salmoninds*. National Marine Fisheries Service, Southwest Region. http://swr.nmfs.noaa.gov/hcd/fishscrn.pdf

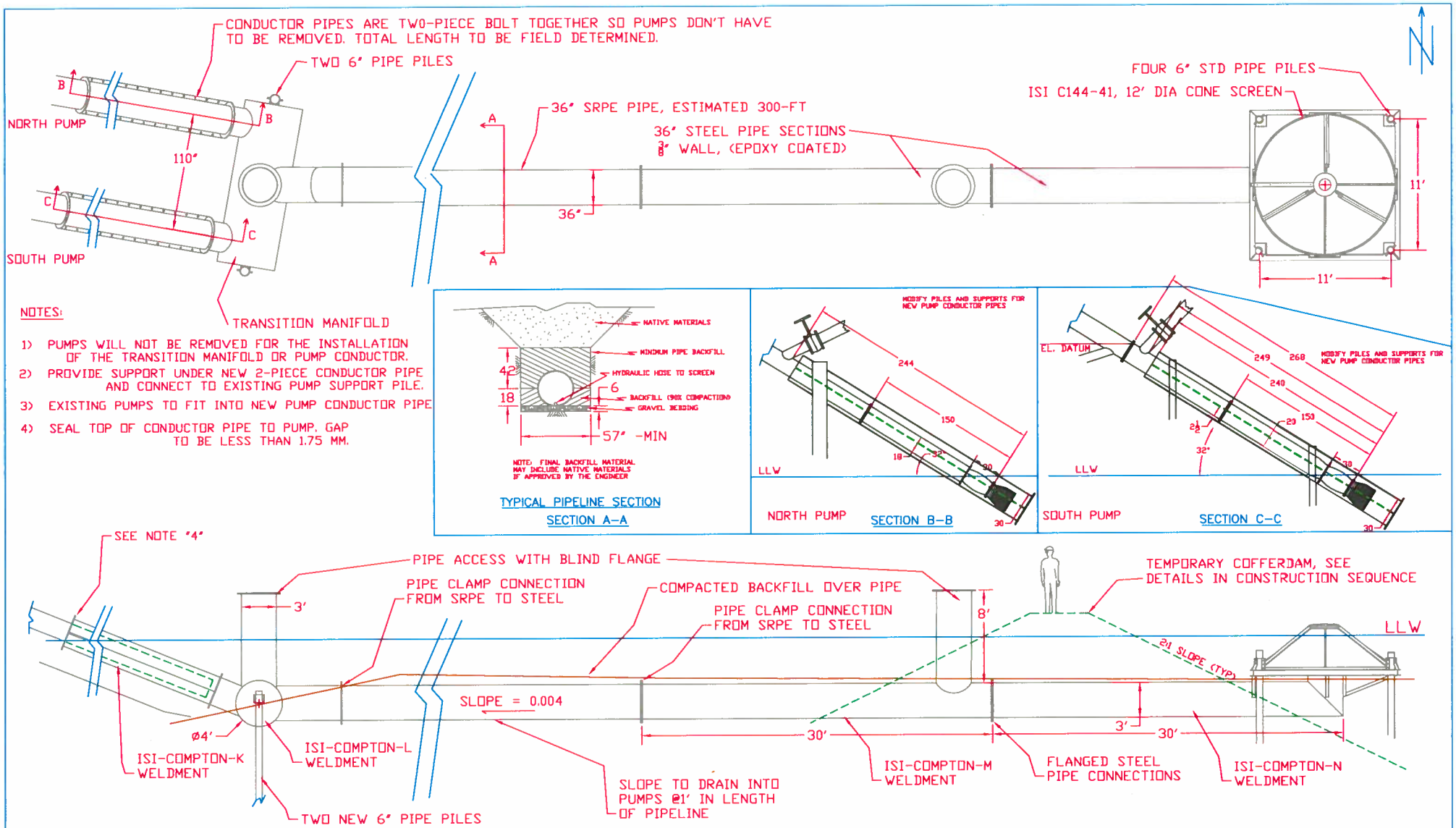
Popper, A.N. and M.C. Hastings. 2009. The Effects of Human-generated Sound on Fish. Integrative Zoology. 4:43-52.

Reclamation. 2008. *Biological Assessment on the Continued Long-term Operations of the Central Valley Project and the State Water Project.* August 2008.

U.S. Fish and Wildlife Service. 1984. Valley Elderberry Longhorn Beetle Recovery Plan. U.S Fish and Wildlife Service, Portland, Oregon. 62pp.

APPENDICES

APPENDIX A
CONSTRUCTION DRAWINGS



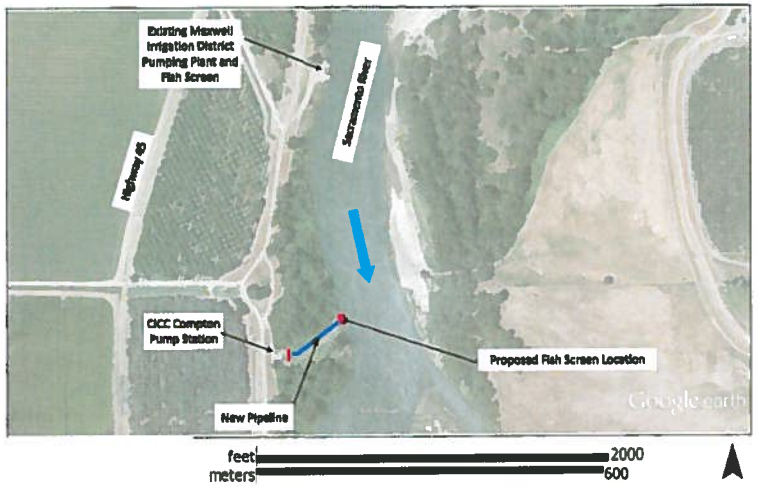
ALL DIMENSIONS IN INCHES UNLESS NOTED			
REV #	DESCRIPTION	DATE	INITIAL

Designs are property of INTAKE SCREENS INC; and are subject to change without notice.

STANDARD TOLERANCES
Fractional Dimensions ± 1/32
Decimal Dimensions ± .005

www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road - Sacramento, California 95832
(916) 665-2727 (916) 665-2729 FAX

DATE	4/22/14
APP'D BY	DARRYL HAYES
DRAWN BY	JACOB CHAPIN
"B" SHEET SCALE	1:90
PROJECT:	COMPTON
DESCRIPTION:	LAYOUT
MATERIAL:	
DRAWING NUMBER:	ISI-COMPTON-C
SHEET NUMBER	1

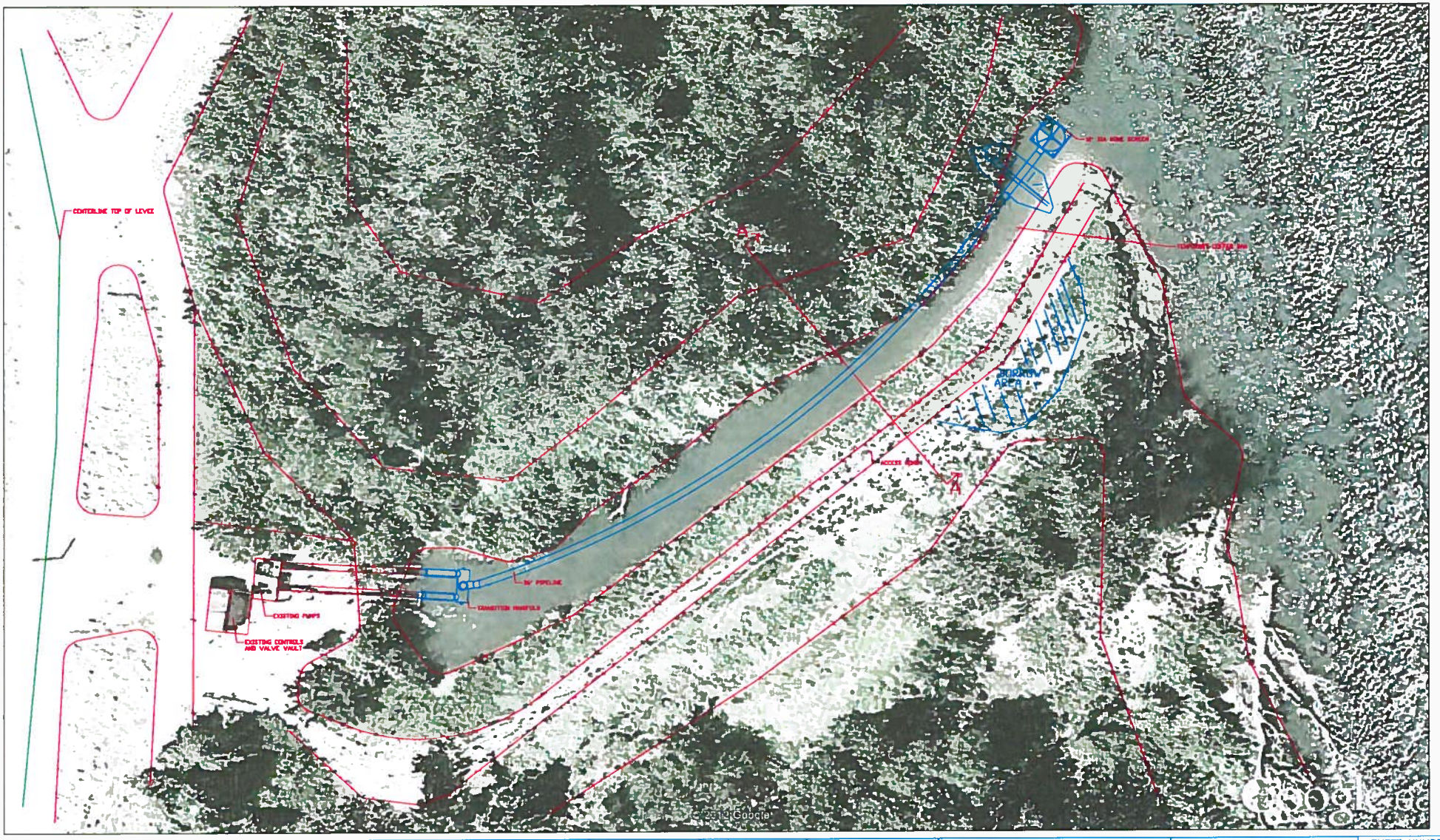


PROJECT LOCATION

File: ..\..\..\Desktop\Compton Site drawing 2.pdf
Error! Bookmark not defined.

PROJECT SITE COMPONENTS

ALL DIMENSIONS IN INCHES UNLESS NOTED	www.intakescreensinc.com CA C.L. 796197 ISI Intake Screens, Inc. 3417 River Road - Sacramento, California 95832 (916) 665 2727 (916) 665 2729 FAX	DATE 10/17/12 APP'D BY DARRYL HAYES DRAWN BY JACOB CHAPIN "B" SHEET SCALE NTS	PROJECT: COMPTON
REV # / DESCRIPTION / DATE / INITIAL			DESCRIPTION: LAYOUT MATERIAL:
Designs are property of INTAKE SCREENS INC; and are subject to change without notice. STANDARD TOLERANCES Fractional Dimensions ± 1/32 Decimal Dimensions ± .005			DRAWING NUMBER: ISI-COMPTON-C
			SHEET NUMBER 2



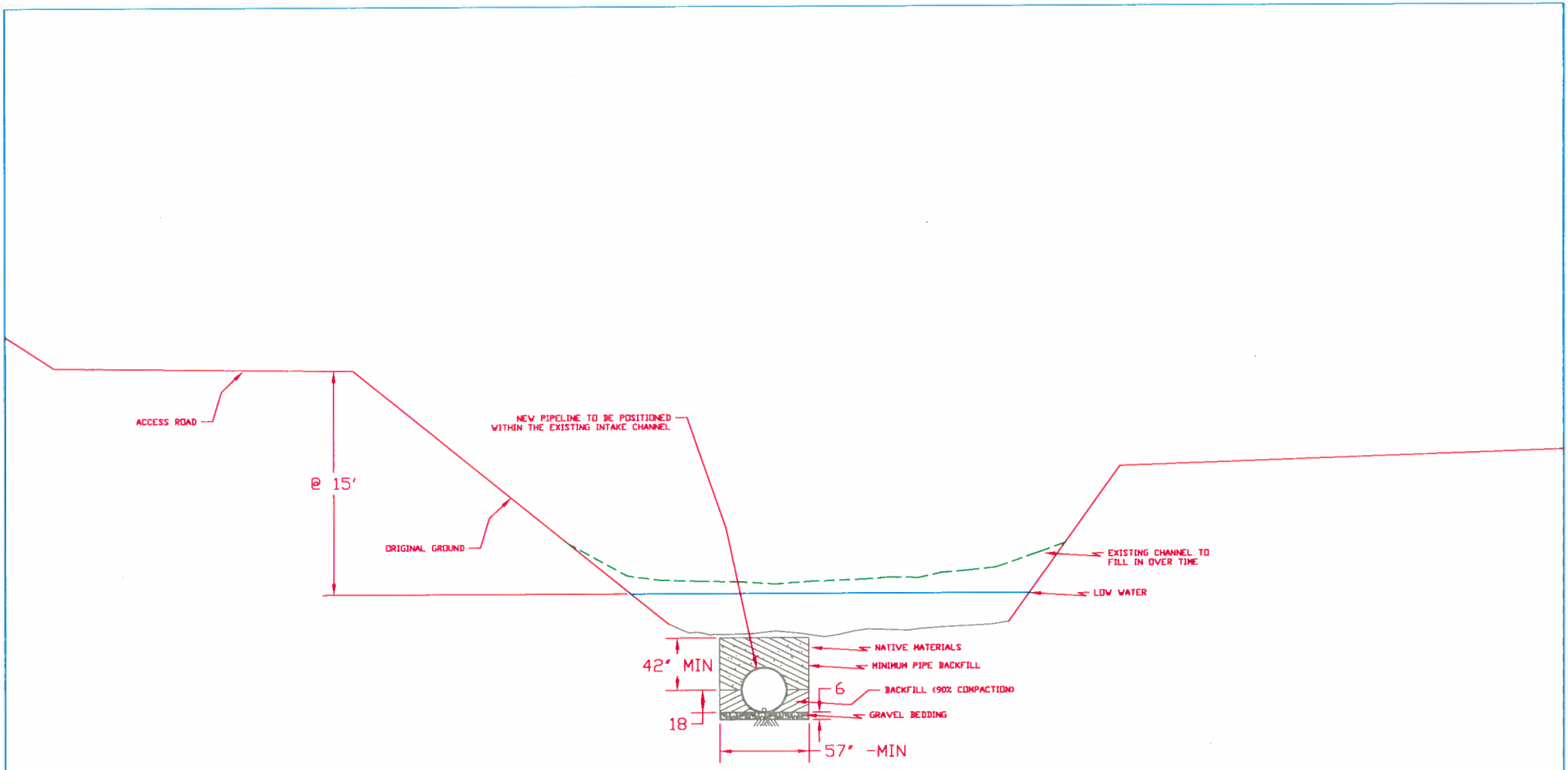
ALL DIMENSIONS IN INCHES UNLESS NOTED			
REV #	DESCRIPTION	DATE	INITIAL

Designs are property of INTAKE SCREENS INC; and are subject to change without notice.

STANDARD TOLERANCES
Fractional Dimensions ± 1/32
Decimal Dimensions ± .005

www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road - Sacramento, California 95832
(916) 665-2727 (916) 665-2729 FAX

DATE 4/22/14	PROJECT:	DESCRIPTION:	DRAWING NUMBER:	SHEET NUMBER
APP'D BY DARRYL HAYES	COMPTON	LAYOUT – OVERLAY	ISI-COMPTON-C	3
DRAWN BY JACOB CHAPIN		MATERIAL:		
"B" SHEET SCALE 1:90				



SECTION A–A

ALL DIMENSIONS IN INCHES UNLESS NOTED

REV #	DESCRIPTION	DATE	INITIAL

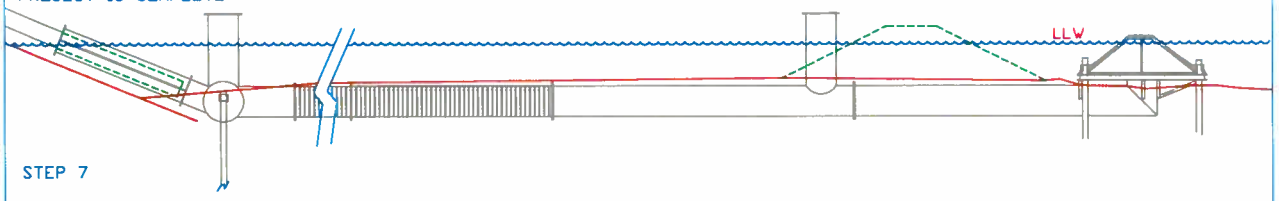
Designs are property of INTAKE SCREENS INC; and are subject to change without notice.

STANDARD TOLERANCES
Fractional Dimensions ± 1/32
Decimal Dimensions ± .005

www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road - Sacramento, California 95832
(916) 665-2727 (916) 665-2729 FAX

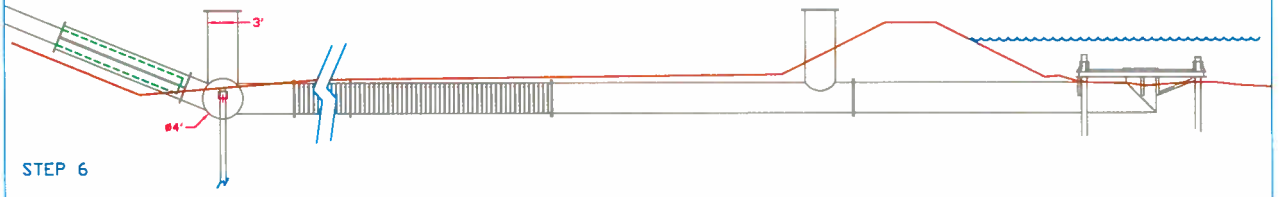
DATE	12/6/13
APP'D BY	DARRYL HAYES
DRAWN BY	JACOB CHAPIN
"B" SHEET SCALE	NTS
PROJECT:	COMPTON
DESCRIPTION:	CROSS–SECTION
MATERIAL:	
DRAWING NUMBER:	ISI–COMPTON–C
SHEET NUMBER	4

SET ISI CONE SCREEN
REMOVE COFFERDAM
PROJECT IS COMPLETE



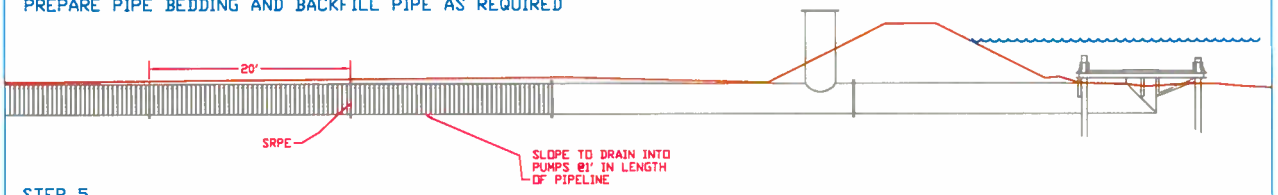
STEP 7

SET TRANSITION MANIFOLD AND DRIVE PILES
CONNECT SRPE TO MANIFOLD AND BACKFFILL PIPES
SET CONDUCTOR PIPES AROUDN PUMPS AND SUPPORT AS REQUIRED



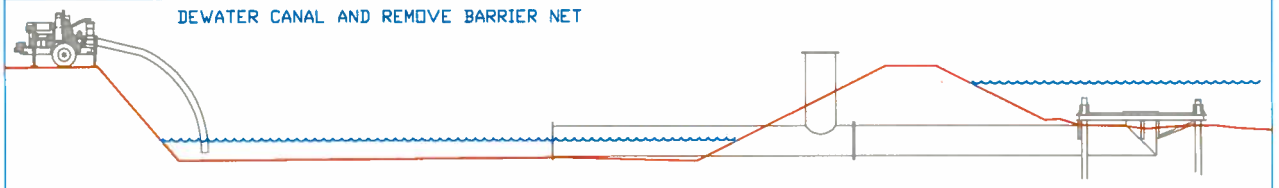
STEP 6

EXCAVATE TRENCH FOR PIPE
PREPARE PIPE BEDDING AND BACKFILL PIPE AS REQUIRED



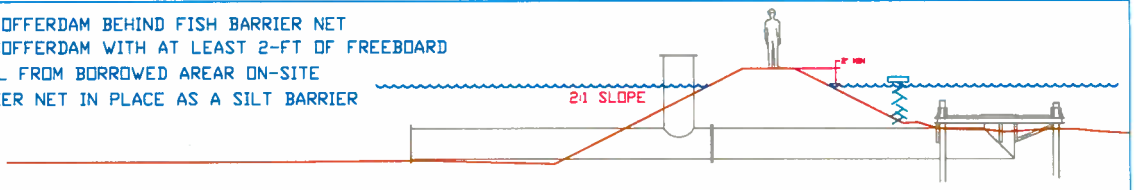
STEP 5

DEWATER CANAL AND REMOVE BARRIER NET



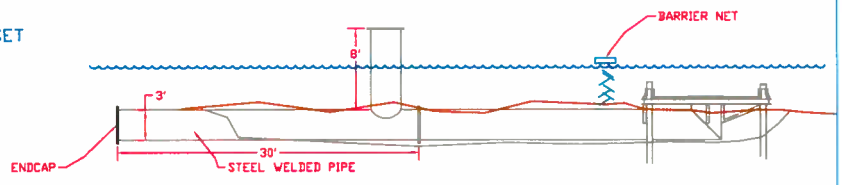
STEP 4

CONSTRUCT COFFERDAM BEHIND FISH BARRIER NET
CONSTRUCT COFFERDAM WITH AT LEAST 2-FT OF FREEBOARD
ALL MATERIAL FROM BORROWED AREAR ON-SITE
LEAVE BARRIER NET IN PLACE AS A SILT BARRIER



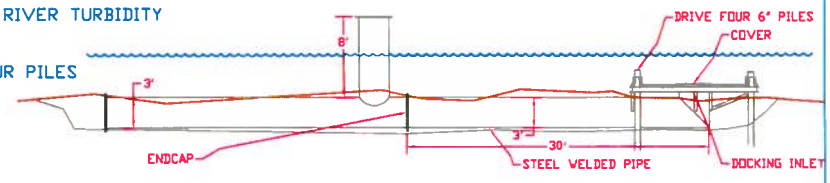
STEP 3

SHUT OFF PUMPS
MOVE FISH OUT OF INTAKE CHANNEL AND SET
FISH BARRIER NET AT CHANNEL ENTRANCE



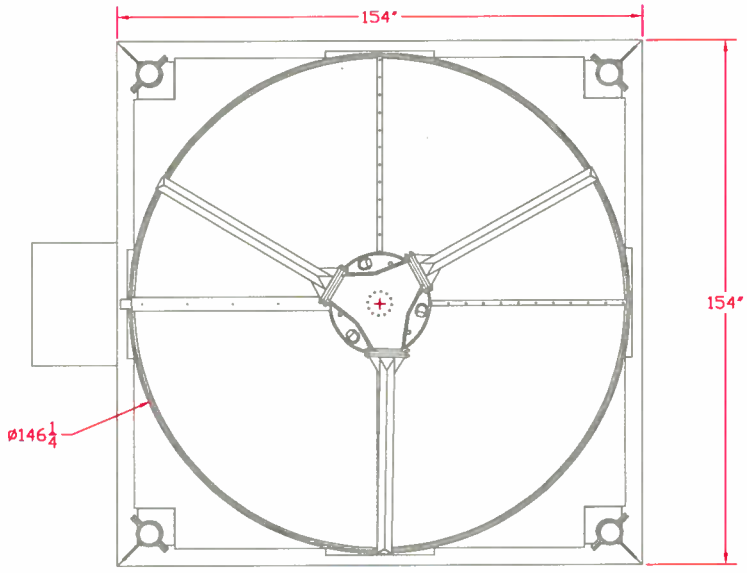
STEP 2

EXCAVATE RIVER BOTTOM FOR SCREEN BASE AND PIPE INSTALLATION
RUN PUMPS DURING EXCAVATION TO REDUCE RIVER TURBIDITY
PLACE COVER PLATE ON DOCKING INLET
SET DOCKING INLET IN POSITION, DRIVE FOUR PILES

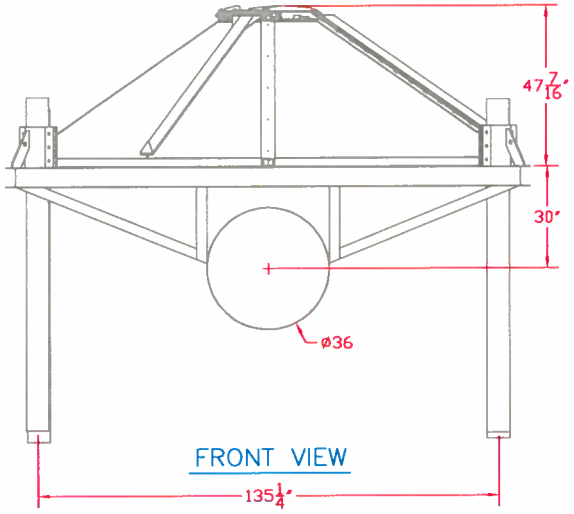


STEP 1

ALL DIMENSIONS IN INCHES UNLESS NOTED	ISI Intake Screens, Inc. www.intakescreensinc.com	DATE 4/22/14	PROJECT: COMPTON	DESCRIPTION: CONSTRUCTION SEQUENCE	DRAWING NUMBER: ISI-COMPTON-C	SHEET NUMBER 5
REV 0 DESCRIPTION DATE INITIAL		APP'D BY DARRYL HAYES				
Designs are property of INTAKE SCREENS INC and are subject to change without notice.		DRAWN BY JACOB CHAPIN		MATERIAL:		
DRAWING TOLERANCES Fractional Dimensions ± 1/32 Decimal Dimensions ± .030		SHEET SCALE NTS				

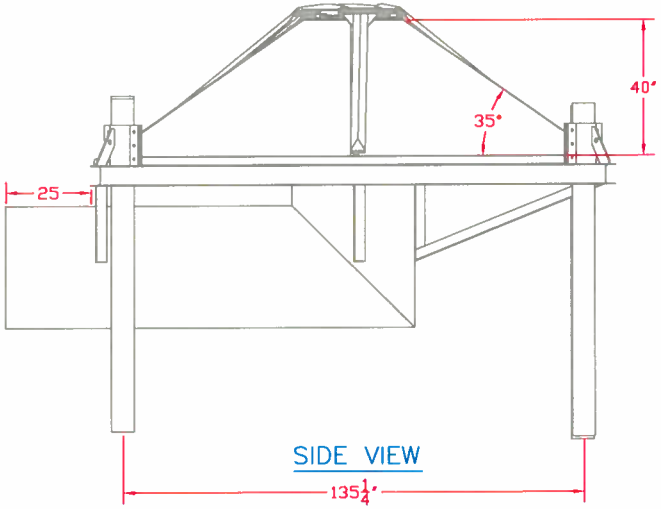


TOP VIEW



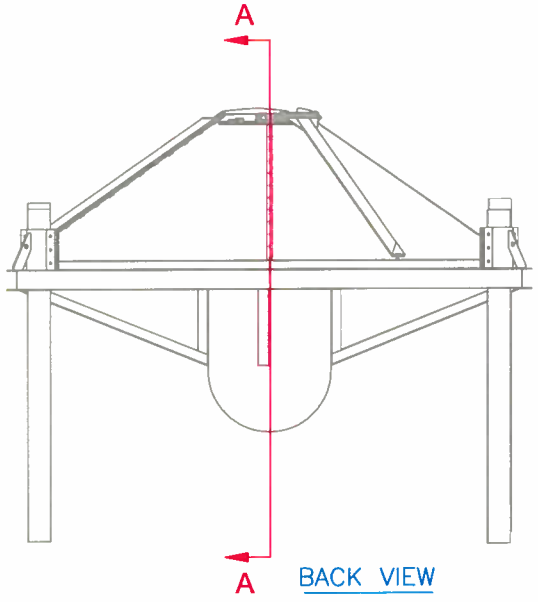
FRONT VIEW

135 1/4"



SIDE VIEW

135 1/4"



BACK VIEW

ALL DIMENSIONS IN INCHES UNLESS NOTED			
---	---	---	---
REV #	DESCRIPTION	DATE	INITIAL

Designs are property of INTAKE SCREENS INC; and are subject to change without notice.

STANDARD TOLERANCES
Fractional Dimensions ± 1/32
Decimal Dimensions ± .005

www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road · Sacramento, California 95832
(916) 665 2727 (916) 665 2729 FAX

DATE 4/4/12
APP'D BY DARRYL HAYES
DRAWN BY JACOB CHAPIN
"B" SHEET SCALE 1:36

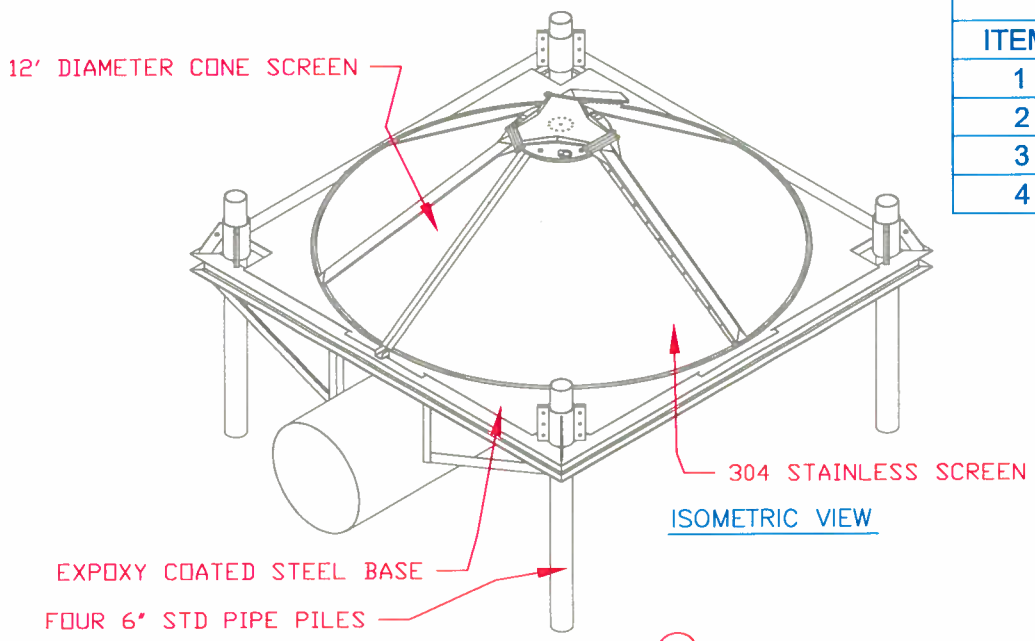
PROJECT: COMPTON

DRAWING NUMBER: ISI-COMPTON-SCREEN ON BASE

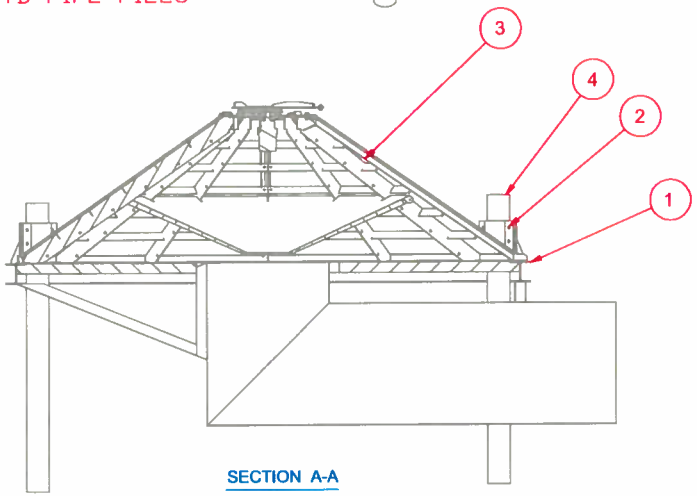
MATERIAL: 304 SS SCREEN / A36 EPOXY COATED BASE

SHEET NUMBER: PAGE 1 OF 2

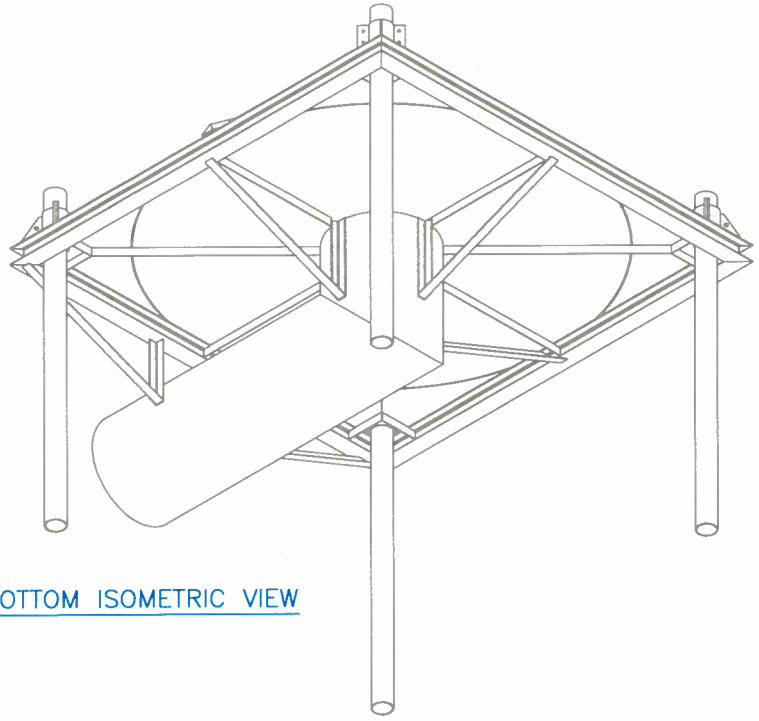
ISI-COMPTON-SCREEN ON BASE Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	ISI-COMPTON-BASE	12' CONE SCREEN BASE
2	4	ISI-NSJ-PILE-CLAMP	6" ROUND PIPE PILE CLAMP
3	1	ISI-12FT-D	12' CONE SCREEN
4	4	6"-PILE	PILE



ISOMETRIC VIEW



SECTION A-A



BOTTOM ISOMETRIC VIEW

ALL DIMENSIONS IN INCHES UNLESS NOTED

REV #	DESCRIPTION	DATE	INITIAL
--	--	--	--

Designs are property of INTAKE SCREENS INC; and are subject to change without notice.

STANDARD TOLERANCES
Fractional Dimensions ± 1/32
Decimal Dimensions ± .005

www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road Sacramento, California 95832
(916) 665 2727 (916) 665 2729 FAX

DATE 4/4/12
APP'D BY DARRYL HAYES
DRAWN BY JACOB CHAPIN
"B" SHEET SCALE 1:36

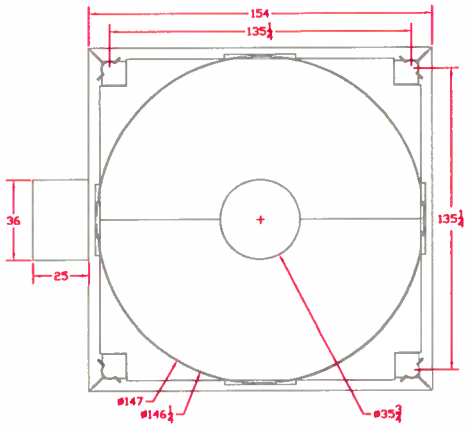
PROJECT: COMPTON

DRAWING NUMBER: ISI-COMPTON-SCREEN ON BASE

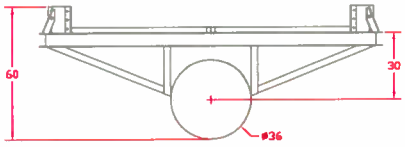
MATERIAL: 304 SS SCREEN / A36 EPOXY COATED BASE

SHEET NUMBER: PAGE 2 OF 2

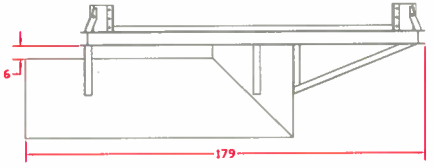
ISI-COMPTON-BASE Parts List					
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL	MASS
1	2	ISI-COMPTON-01	12-FT NSJ BASE PLATE	3/16" A36	509.597 lbmass
2	1	ISI-COMPTON-02	12-FT BASE, 42" VERTICAL	42" CORIGATED PIPE	115.229 lbmass
3	1	ISI-COMPTON-03	12-FT BASE, 42" HORIZONTAL	42" 12 GA CORIGATED PIPE, 53 lb/ft	391.779 lbmass
4	4	ISI-COMPTON-08B	12-FT BASE RIB	3" x 3/16" A36 FLAT BAR	10.702 lbmass
5	4	ISI-NSJ-04	12-FT BASE BEAM	W6x15 A36	192.318 lbmass
6	2	ISI-NSJ-05	12-FT BASE RING	2-1/2" x 3/8" A36 FLAT BAR	7.736 lbmass
7	4	ISI-NSJ-06	12-FT BASE SPACER	2" x 3/16" A36 FLAT BAR	3.408 lbmass
8	8	ISI-NSJ-07	12-FT PILING OPENING FLAT BAR	3" x 3/16" A36 FLAT BAR	2.141 lbmass
9	4	ISI-NSJ-09	12-FT BASE SHORT RIB	3" x 3/16" A36 FLAT BAR	8.401 lbmass
10	3	ISI-NSJ-10	12-FT BASE SHORT ANGLE	3" X 3" X 3/16" A36 ANGLE	11.411 lbmass
11	2	ISI-NSJ-11	12-FT BASE ANGLE 11	3" X 3" X 3/16" A36 ANGLE	23.519 lbmass
12	3	ISI-NSJ-12	12-FT BASE ANGLE 12	3" X 3" X 3/16" A36 ANGLE	23.519 lbmass
13	4	ISI-NSJ-13	12-FT BASE PILING CLAMP ROUND	6" STD PIPE	1.367 lbmass
14	1	ISI-NSJ-14	12-FT BASE VERTICAL SHORT ANGLE	3" X 3" X 3/16" A36 ANGLE	9.089 lbmass
15	1	ISI-NSJ-15	12-FT BASE VERTICAL SHORT ANGLE 15	3" X 3" X 3/16" A36 ANGLE	9.089 lbmass
16	8	ISI-NSJ-16	12-FT PILING CLAMP SIDE	3-1/2" X 5/8" A36 FLAT BAR	7.200 lbmass
17	4	ISI-NSJ-17	12-FT BASE PILING GUSSET	3-1/2" X 5/8" A36 FLAT BAR	5.032 lbmass



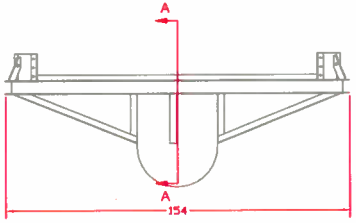
TOP VIEW



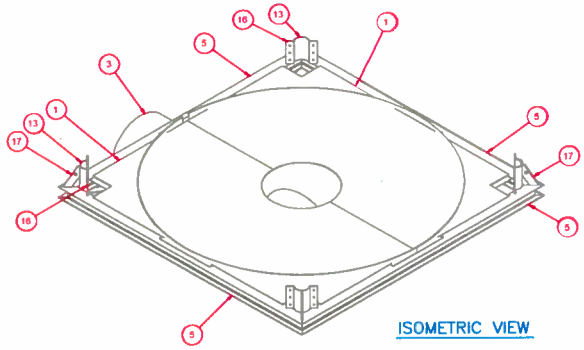
BACK VIEW

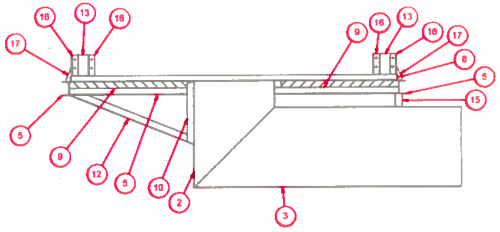


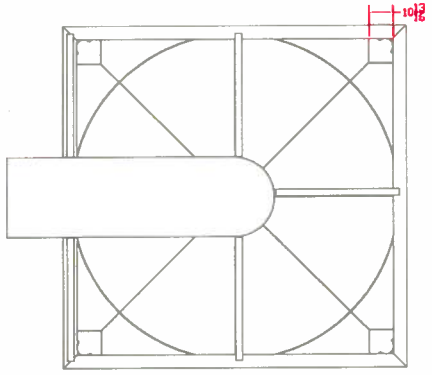
SIDE VIEW



FRONT VIEW

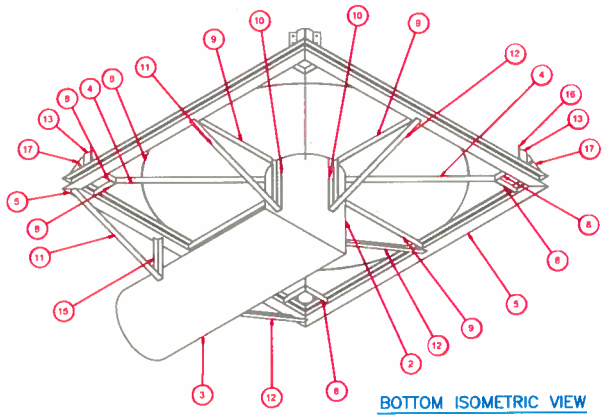

ISOMETRIC VIEW


SECTION A-A



BOTTOM VIEW

2600-LBS


BOTTOM ISOMETRIC VIEW

ALL DIMENSIONS IN INCHES UNLESS NOTED			
REV #	DESCRIPTION	DATE	INITIAL
Designs are property of INTAKE SCREENS INC; and are subject to change without notice.	STANDARD TOLERANCES Fractional Dimensions ± 1/32 Decimal Dimensions ± .005		

www.intakescreensinc.com
CA C.L. 796197
ISI Intake Screens, Inc.
8417 River Road · Sacramento, California 95832
(916) 665-2727 (916) 665-2729 FAX

DATE 4/4/12	PROJECT: COMPTON	DESCRIPTION: 12' CONE SCREEN BASE	DRAWING NUMBER: ISI-COMPTON-BASE
APP'D BY DARRYL HAYES			SHEET NUMBER
DRAWN BY JACOB CHAPIN		MATERIAL: A36 STEEL / EPOXY COATED	USED ON ASSEMBLY: ISI-COMPTON
"B" SHEET SCALE 1:55			

APPENDIX B
NOISE ANALYSIS

Intake Screens, Inc.
Generalized for Typical Cone Fish Screen Project Installation
Environmental Analysis of Pile Driving Impacts on Fishery Resources
(Analysis is based on utilizing standard 12-inch steel pilings)

Colusa Indian Community Council (CICC) Fish Screen Project

Project Location:
The Proposed Action area is located on the Sacramento River, approximately 0.2 miles east of California State Route 45 in Colusa County.

Existing Site Information:
CICC operates their Compton Diversion on the Sacramento River for agricultural purposes. Within the Proposed Action area the Sacramento River meanders within the levee banks. The channel depth is very shallow at low river flows (two to five feet). The unlined intake channel and adjacent banks are composed of very loose sands and silts deposited during high flow events since the velocities in the intake channel are very low. The top of the current intake channel banks are about 10 feet above the low water elevation and are overtopped every few years during high flow events. The intake channel is currently dredged of silt annually and the material is deposited on top of the existing dirt access road in order to provide water to the pumps during low river flows. The pump platform is located above the flood elevation but below the right riverbank levee. Once the pipeline is connected to the pumps, there would be no need to dredge the channel and the existing channel could return to pre-channel conditions. A private gravel road extends perpendicular from the highway and then runs parallel to the Sacramento River approximately 0.1 miles to the pump station. There is an existing access road along the intake channel embankment.

Project Description:
A new self-cleaning fish screen would be placed at the entrance of the existing intake channel on the Sacramento River and then connected to the existing diversion via an underground pipeline. The fish screen would be a 12-foot-diameter cone screen placed on a pile-supported 12-foot by 12-foot steel base. The new screen would be located along the low flow riverbank. The base of the screen would be placed at or just above the current sandy river bottom, which is about the current intake channel invert elevation. At the lowest water levels, the screen would be submerged about three feet deep with the top of the screen just out of the water. The screen's pile supported base would have a 36-inch-diameter opening and pipe section that would connect to a new 350-foot pipeline. Four, 6-inch diameter pipe piles would be driven into the river bottom to secure the structure to the river. Each pile would be about 30 feet long. The base would be clamped and bolted to these piles.

The 36-inch pipeline would be a Steel Reinforced Polyethylene (SRPE) pipe. The pipeline alignment would follow the southern edge (left bank) of the existing intake channel between the intake screen location and the existing pumps. The pipeline would be buried up to five feet below the intake channel bottom to prevent river scouring or air entrainment issues. The pipeline would be placed in an open trench cut by an excavator and backfilled using the excavated material. The pipeline would connect to the intake screen at the upstream end and a new manifold/intake adapter structure at the downstream end. The total length of pipeline would be about 350 feet long. The new manifold/intake adapter would consist of a large diameter steel pipe manifold with a pipeline connection on one side and two pump conductor pipes on the other side. The pumps would draw screened water from the conductor pipes rather than from the existing channel. The pumps would fit into each conductor pipe, which would also serve as the lower pump supports.

A temporary water-filled bladder cofferdam would be placed at the channel entrance to isolate the diversion channel from the main river during the pipeline installation to prevent turbidity or water quality issues from occurring. The screen base and attached pipeline section would not be installed within the cofferdam area. The cofferdam would not be designed to prevent seepage or to dewater the channel, as the pipeline would be dug in the wet. The existing pumps would be turned on as necessary to remove excess water in the channel and to keep any turbidity away from the channel entrance.

The screen unit would be accessed via the existing embankment road along the intake channel. The screen would be designed to be in-place year round; however, a crane or long reach excavator could remove the screen if desired or if necessary. The screen's brush cleaning system is operated by a hydraulic power system. A hydraulic power unit would be placed in the existing pump house with a small control panel. Hydraulic hoses would be placed in the pipeline and connect the screen unit to the manifold/intake adapter at the existing facility.

The screen and its base would be designed for the expected river loads and possible debris impacts. The pipeline would also be placed below the existing riverbed elevation to protect it from erosion. The pipeline would be segmented to allow for removal of one or more sections.

Description of Piles and Pile Driving Activities

ISI typically drives a number of in-water support pilings for the installation of fish screens on various diversions located within the Sacramento-San Joaquin River systems, tributaries and Delta region.

Pile driving activities normally occur between August 1 and October 15. ISI typically is able to drive between six (6) and ten (10) piles per day from a land-based crane utilizing 6-inch to 12-inch Standard Schedule 40 steel pipe pilings, with pile penetrations expected up to 40 feet below the existing ground surface. All pilings are normally driven in less than 10-feet of water and into a silt and stiff clay river bottom material.

Pile Driver Information

ISI will be utilizing an APE Model 64X Vibratory Extractor pile driver for installation of pilings on 2014 fish screen projects (see attached driver specifications).

Vibratory hammers use oscillatory hammers that vibrate the pile, causing the sediment surrounding the pile to liquefy and allow pile penetration. Peak sound pressure levels for vibratory hammers can exceed 180 dB; however, the sound from these types of hammers rises relatively slowly. The vibratory hammer produces sound energy that is spread out over time and is generally 10 to 20 dB lower than impact pile driving.

Vibratory hammers can be feasible and utilized for pile installation, but it is typical that piles need to be proofed (i.e., tested for bearing capacity and structural integrity) with an impact pile driver. The project engineer may find it necessary to proof pilings using an impact type pile driver, but past experience has shown it has not been needed.

Noise Criteria

Noise criteria is based on utilization of standard 12-inch steel piles. NMFS approved criteria for injury to fish from pile driving activities are 206dB peak and 187dB accumulated SEL for all fish greater than 2 grams. These criteria were developed based on scientific evaluation and are considered to be very conservative (Popper, et al. 2006 – referenced in Caltrans 2009). For example, assumptions number four in Appendix A of Popper, et al. (2006) states that the SEL criterion is based on exposure of fish weighing 0.01g. Furthermore, data from Hasting and Popper (2005) suggest that the "no injury" level for 0.01g occurs at 193dB SEL (referenced in Caltrans 2009).

The Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish (Caltrans 2009) summarizes anticipated unattenuated sound pressures for in-water pile driving using vibratory hammers. Based on the type of pile to be used for installation and the shallow site conditions (12-inch steel pipe pile), the peak and accumulated sound pressures are anticipated to be:

Vibratory hammer: 192dB peak and 177dB accumulated

The anticipated peak and accumulated sound pressure levels are below the threshold to injure fish (Table 1):

Table 1. Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities

	Peak (<2g/60mm)	Accumulated (<2g/60mm)
Interim Criteria for Injury[1]	**206 dB**	**187 dB - for fish size of two grams or greater.** **183 dB 0 for fish of less than two grams***
Anticipated Vibratory Hammer (12" Steel Pipe)[2]	**192 dB**	**177 dB**

Source:
[1]Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities. June 12, 2008 (attached).
[2]Caltrans 2009.

Piles less than Standard 12-inch diameter are significantly less than the values shown above and many of the fish screen projects will be using smaller piles, such as 8-inch, if applicable to the project.

Impact Assessment

Pile Driving Effects on Potential Prey (Fish): Construction activities will produce both pulsed (i.e., impact pile driving) and continuous (i.e., vibratory pile driving) sounds. Fish react to sounds which are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005, 2009) identified several studies that suggest fish may relocate to avoid certain areas of noise energy (Caltrans 2009). Additional studies have documented effects of pile driving (or other types of continuous sounds) on fish, although several are based on studies in support of large, multiyear bridge construction projects (Scholik and Yan 2001, 2002; Govoni et al. 2003; Hawkins 2005; Hastings 1990, 2007; Popper et al. 2006; Popper and Hastings 2009 – referenced in Caltrans 2009). Sound pulses (SPLs) at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior

(Chapman and Hawkins 1969; Pearson et al. 1992; Skalski et al. 1992 – referenced in Caltrans 2009). SPLs of sufficient strength have been known to cause injury to fish and fish mortality (CALTRANS 2001; Longmuir and Lively 2001 – referenced in Caltrans 2009). The most likely impact to fish from pile driving activities at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated.

Pile Driving Effects on Potential Foraging Habitat: In addition, the area likely impacted by the pile driving associated with fish screen installation is relatively small. Potentially a maximum of 1.82 meters (19.6 feet) (based on a 60-inch [1.5-meter] diameter pile) of species foraging habitat may have decreased foraging value as each pile is driven. Avoidance by potential prey (i.e., fish) of the immediate area due to the temporary loss of this foraging habitat is also possible. The duration of fish avoidance of this area after pile driving stops is unknown, but a rapid return to normal recruitment, distribution and behavior is anticipated.

Measures to Further Reduce Potential Impacts to Fish

Soft Start: The use of a soft-start procedure is believed to provide additional protection to fish species by warning, or providing fish species a chance to leave the area prior to the hammer operating at full capacity. The pile driving engineer will utilize soft-start techniques (ramp-up and dry fire) recommended by NMFS for impact and vibratory pile driving. The soft-start requires contractors to initiate noise from vibratory hammers for fifteen seconds at reduced energy followed by a one minute waiting period. This procedure will be repeated two additional times.

Daylight Construction: Pile driving will only be conducted between two hours post-sunrise through two hours prior to sunset (civil twilight), between the periods of August 1 and October 15. Should fish species be detected during pile driving, all pile driving activities will be ceased until fish exit project area.

APE Model 64X Vibratory Driver Extractor Specifications

The Worlds Largest Provider of Foundation Construction Equipment

SPECIFICATIONS	DATA
Eccentric Moment	781 in-lbs (9.00 kgm)
Drive Force	59 tons (525 kN)
Frequency Maximum (VPM)	0 - 2,400 vpm
Max Line Pull	51 tons (454 kN)
Max Bare Hammer Weight	4,650 lbs (2,109 kg)
Throat Width	13.75 in (35 cm)
Length	70.00 in (178 cm)
Height w/o Clamp	42.50 in (108 cm)

APE Model 275 Power Unit

SPECIFICATIONS	DATA
Engine Type	Caterpillar C7 Tier III
Horse Power	275 HP (202 kW)
Drive Pressure	0 - 4,800 psi (331 bar)
Drive Flow	85 gpm (322 lpm)
Clamp Pressure	Consult Factory
Clamp Flow	Consult Factory
Speed	Consult Factory
Weight	11,000 lbs (4,990 kg)
Length	117 in (296 cm)
Width	59 in (149 cm)
Height	84 in (212 cm)
Hydraulic Reservoir	Consult Factory
Fuel Capacity	Consult Factory

Corporate Offices
7032 South 196th
Kent, Washington 98032

NOAA's Fisheries Northwest and Southwest Regions	*U.S. Fish and Wildlife Service Regions 1 & 8*	*California/Washington/ Oregon Departments of Transportation*	*California Department of Fish and Game*	*U.S. Federal Highway Administration*

MEMORANDUM

June 12, 2008

From: Fisheries Hydroacoustic Working Group

Subject: Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities

To: Applicable Agency Staff

The signatory agencies, identified below, have agreed in principle to use the attached Interim Criteria for Injury to Fish from Pile Driving Activities. The agreement was concluded at a meeting in Vancouver, Washington on June 10-11, 2008 with key technical and policy staff from the Federal Highway Administration, NOAA Fisheries, U.S. Fish and Wildlife Service, the Departments of Transportation from California, Oregon, and Washington; and national experts on sound propagation activities that affect fish and wildlife species of concern. The agreed upon criteria identify sound pressure levels of 206 dB peak and 187 dB accumulated sound exposure level(SEL) for all listed fish except those that are less than 2 grams. In that case, the criteria for the accumulated SEL will be 183 dB.

These criteria will apply to all new projects beginning no later than 60 days from the date of this memorandum. During the interim 60 day period, the Transportation Agencies will work with the Services to identify projects currently in the consultation process and reach agreement on which criteria will be used to assess project effects.

The agencies agree to review the science periodically and revise the threshold and cumulative levels as needed to reflect current information. Behavioral impacts to fish and impacts to marine mammals are not addressed in this agreement. Sub-injurious effects will continue to be discussed in future meetings.

The respective agencies also agree to develop appropriate training for staff on these revised criteria, as well as a process to review and possibly refine the criteria, when appropriate.

For questions or concerns about the revised criteria, we recommend staff contact their agency environmental coordinator or agency expert on pile driving issues.

Carol H. Adkins

Federal Highway Administration*

*FHWA supports the use of these interim criteria in the states signing this agreement in principle. FHWA leaves the schedule for implementation to the discretion of the state DOTs in cooperation with their respective FHWA Division Offices and the Services.

Michael Tehan

NOAA Fisheries – NWR

Russell M Strach

NOAA Fisheries – SWR

Ken S Berg

US Fish and Wildlife Service Region 1

Richard E Rogers Jr.

US Fish and Wildlife Service Region 8

California Department of Transportation

California Department of Fish and Game

H. L. Lon Cy Geo - Environmental Mgr

Oregon Department of Transportation

FHWG Agreement in Principle
Technical/Policy Meeting Vancouver, WA
June, 11 2008

Interim Criteria for Injury	Agreement in Principle
Peak	206 dB (for all size of fish)
Cumulative SEL	187 dB - for fish size of two grams or greater. 183 dB - for fish size of less than two grams.*

**see Table—to be developed*

APPENDIX C
FISH AVOIDANCE PLAN

FISH AVOIDANCE PLAN

1.0 BACKGROUND

Diversions from rivers have the potential to substantially affect biological resources, including California Central Valley steelhead *(Oncorhynchus mykiss),* fall-run, winter-run and spring-run Chinook salmon (*Oncorhynchus tshawytscha),* green sturgeon (*Acipenser medirostris*), warm water fish species, and other terrestrial or aquatic species of special concern. Existing diversions from rivers often use a strong pump, and screening the entrances to these diversions can prevent fish entrapment or mortality within the pump. The fish screen installation process includes the installation of a temporary water-filled bladder cofferdam which may have the capacity to trap any fish present during and subsequent to the construction process. Fish restrained behind the cofferdam would no longer be capable of accessing the main stem of the river. Contained fish could become impinged or trapped within any nearby water intake apparatus such as pipes or pumps. They may be more susceptible to other dangers associated with construction including increased risk of predation mortality, exposure to increased turbidity and closer proximity to potentially damaging sound pressure waves. Low-impact measures will be utilized to encourage fish to evacuate the construction area and to prevent their return during installation of the cofferdam. Should listed aquatic species such as Chinook salmon, steelhead or sturgeon become entrapped behind the cofferdam, a fish avoidance procedure may also be utilized as a protective measure to ensure fish survival.

2.0 COLUSA INDIAN COMMUNITY COUNCIL COMPTON DIVERSION

The Colusa Indian Community Council (CICC) is proposing to screen its existing Compton diversion off the Sacramento River (Proposed Action). The CICC Compton diversion is located outside of the main channel, but within the floodway where fish have the potential to occur. As part of the construction process, a temporary bladder cofferdam will be installed across the inlet to allow for installation of the fish screen components.

3.0 FISH AVOIDANCE PLAN

3.1 LOW IMPACT ACTIVITY AND FISH COUNT

Salmon, steelhead and sturgeon tend to avoid areas of activity. An initial approach, prior to installation of the temporary water-filled bladder cofferdam, would be to engage in low impact activity in the area which would encourage any adult fish using the area as a holding pool to move to a new location. Immediately prior to construction of the temporary cofferdam, technicians should conduct a visual survey for anadromous salmonids and other fish species by snorkeling within the channel and using a counting device to record the number of fish visually observed. The visual surveys will be performed twice. The first survey will serve as a baseline and a second survey will check the accuracy of the first survey.

Should fish continue to be present in the construction area additional fish avoidance procedures will have to be enacted to save these individuals before the temporary cofferdam is installed.

3.2 CROWDING NET

The use of fish seining prior to dredging has been employed in the past as part of the California Department of Fish and Wildlife (CDFW) Streambed Alteration Agreement process. If the visual surveys indicate the presence of adult salmon within the construction area, a seine will be used to crowd the fish towards the outlet of the channel and back into the river. A block net, or a second seine, will prevent reentry of fish into the project site.

Begin by placing the crowding seine across the width of the channel as near as possible to the closed end. The net should be tall enough to span the entire vertical water column of the canal, and should be weighted at the bottom to ensure proper position within the channel and to prevent fish from escaping underneath the net or around the edges. The net will be moved towards the downstream end of the channel so that fish are corralled into the main course of the river.

The net may need to be maneuvered differently depending on the channel depth. In shallow water that is easily waded, the edges of the net can be moved by qualified staff positioned within the canal. The net will need to be managed by several technicians, including people to move the ends of the net and to monitor the central sections for breaches where fish may escape. In deeper water, the net may need to be maneuvered using other equipment such as motor driven rafts or boats.

After the first pass of the seine, a block net will be installed securely across the mouth of the channel so that it is positioned outside of the future location of the cofferdam. The block net will act to prevent fish from reentering the project site and can be composed of the original seine used for the first pass or a separate net designated for this purpose. The block net will remain in place until the construction of the temporary cofferdam is complete.

Use additional seine passes to crowd and evacuate remaining fish trapped behind the block net. As the seine is maneuvered towards the mouth of the channel, the block net may be temporarily moved aside to allow fish to escape the crowded area. Trapped fish may also be removed using large, long-handled dip nets. Captured fish shall be relocated immediately to adjacent habitat of suitable type and composition in the river. If there is a delay relocating fish, ensure fish health by limiting temperature fluctuation in holding water so that there is less than a three degree Fahrenheit difference from river temperature. Temperature should be measured at intervals of fifteen minutes. Water should be aerated and fish should be monitored during the entire capture period for health.

A snorkel crew should then conduct another visual survey to determine if fish remain within the channel. The process of inspection, crowding, and fish removal should be repeated until no fish are observed during the visual survey. The block net may be removed once construction of the temporary cofferdam is complete.

4.0 REPORTING REQUIREMENTS

Upon the completion of the fish avoidance and salvage activities, a Fish Salvage Operation Report will be submitted to Bureau of Reclamation (Reclamation), National Marine Fisheries Service (NMFS), CDFW and U.S. Fish and Wildlife Service (USFWS). The report will document the procedures implemented to avoid and salvage fish within the cofferdam and will include information on the number of fish salvaged and the type and size of fish and special-status fish salvaged. The project proponents will respond to any comments by agencies, including those listed above, on the initial report and submit a finalized version in order to comply with appropriate reporting requirements.