Meeting of the Central Valley Flood Protection Board
December 18, 2015

Staff Report - Permit

U.S. Fish and Wildlife Service
Ecosystem Restoration and Floodwater Attenuation Project on the West Unit of the San Joaquin River National Wildlife Refuge, Stanislaus County

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1.0 – REQUESTED ITEM

Consider approval of draft Permit No. 19066 (Attachment B) to install three new 48-inch gated pipes with manually-operated slide gates, and to authorize one existing 36-inch gated pipe under the west (left bank) project levee of the San Joaquin River on the U.S. Fish and Wildlife Service' San Joaquin River National Wildlife Refuge (Refuge).

2.0 – APPLICANT

U.S. Fish and Wildlife Service (USFWS)

3.0 – PROJECT LOCATION

The proposed Ecosystem Restoration and Floodwater Attenuation (ERFA) Project (Project) is located along the west side of the San Joaquin River between its confluence with the Tuolumne River and State Highway 132 on the Refuge in Stanislaus County in California's Central Valley, approximately 9 miles west of Modesto. See Attachment A for vicinity and Project maps.

4.0 – PROJECT DESCRIPTION

The Project is a component of the Three Amigos Non-Structural Alternative Flood Management Project (Three Amigos Project) further described below. The proposed Project is to install three new 48-inch diameter gated pipes fitted with manually-operated slide gates, and to authorize one existing 36-inch diameter gated pipe under the project levee of the San Joaquin River on the Refuge land. The Project will provide improved river-floodplain connectivity for over 2,500 acres of restored floodplain habitat along the west side of the San Joaquin River between its confluence with the Tuolumne River and Highway 132. Connectivity is currently provided through levees that breached during past flood events. The existing levee will be modified (gated pipes will be installed) to promote inflow and drainage that preserves and supports wildlife habitat values at the Refuge.

5.0 – PROJECT BACKGROUND

The flood event in January 1997 caused overtopping and breaching of levees along the San Joaquin River in the jurisdictions of Reclamation Districts (RD) 2099, 2100, and 2102, impacting over 3,000 acres of farmland within and adjacent to the Project Area. As a result of these devastating floods, an Interagency Levee Task Force was formed and identified 'non-structural alternatives' to levee repair and rehabilitation for this area. A 'non-structural alternative' or NSA, is an alternative to repairing and/or restoring flood control features to U.S. Army Corps of Engineers (USACE) standards.

USFWS purchased the property in 1998 and incorporated it into the Refuge (a Unit of the San Luis National Wildlife Refuge Complex). Subsequent habitat restoration on these lands has been supported by state and federal agencies as well as area non-profits and is consistent with the Refuge's Comprehensive Conservation Plan (USFWS 2006c). In total, since 2001, more than 2,000 acres of riparian forests have been replanted on these lands, and over 450 acres of seasonal and perennial wetlands have been established through minor grading. All of this habitat restoration has been designed to be consistent with the Three Amigos Project, including the establishment of drainage patterns across the site that promote wildlife values and reduce the risk of fish stranding. The Project consists of installing gated pipes, as described in Section 8 below, to allow floodwaters to appropriately enter and drain from the site.

6.0 – AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710

California Code of Regulations (CCR), Title 23 (Title 23):

- § 6, Need for a Permit
- § 112, Streams Regulated and Nonpermissible Work Periods
- § 116, Borrow and Excavation Activities – Land and Channel
- § 120, Levees
- § 121, Erosion Control
- § 123, Pipelines, Conduits and Utility Lines
- § 124, Abandonment of Pipelines

7.0 – AGENCY COMMENTS AND ENDORSEMENTS

Comments and endorsements associated with the Project are as follows:

- The USACE Sacramento District 408 decision letter has not been received. The draft permit has been written with the assumption that the USACE District Engineer will have no objections to the Project, subject to conditions. The letter will be incorporated into the permit as Exhibit A.
- The applicant and property owner, USFWS, will maintain the proposed Project in perpetuity.

8.0 – PROJECT ANALYSIS

8.1 – Project Construction

An approximate 50-foot section of existing levee will be excavated up to a maximum depth of 20 feet below grade to allow pipe installation. Three new 48-inch diameter High-Density Polyethylene pipes of 155 feet in length will be installed by placing the pipes on top of a minimum of 12 inches of Controlled Low-Strength Material. Each pipe will be equipped with manual slide gates accessible from the levee crown. Backfilling will be performed to typical engineering standards (ASTM D1557-91) using the excavated soil, and any additional soil needed will be imported to meet California Code of Regulations (CCR) Title 23 standards for embankment fill. The side slopes will be graded to match existing slopes, and the levee footprint will remain unchanged. Attachment C includes drawings of the Project layout and cross section.

8.2 – Hydraulic Analysis

As part of the proposed Project the applicant provided two-dimensional hydrodynamic flood modeling to analyze alternatives for connecting the floodplain flow to the San Joaquin River to support ecosystem processes and reduce downstream discharges (Source: Ecosystem Restoration and Floodwater Attenuation at the San Joaquin River National Wildlife Refuge, Water Control Structure Study, March 24, 2015). Based on the results of the analysis a conceptual design was developed for the Project.

8.3 – Geotechnical Analysis

No geotechnical investigation was submitted by the applicant since there is no need for foundation, slope stability or seepage analyses.

8.4 – Key Project Benefits

The proposed Project has the following benefits:

- Reduces damage to restored habitat areas on the Refuge;
- Permanently provides about 2,500 acres of floodplain for floodwater attenuation to reduce San Joaquin River stages; and
- Reduces the risk of fish entrapment on the Refuge as floodwaters drain back to the River.

8.5 – Adjacent Property Owners

Board staff notified all adjacent property owners of the proposed Project on November 19, 2015 and has received no objections or protests to date.

9.0 – CEQA ANALYSIS AND FINDINGS

Board staff has prepared the following California Environmental Quality Act (CEQA) responsible agency findings:

The Board, as a responsible agency under CEQA, has reviewed the Initial Study Negative Declaration (IS/ND) (SCH Number: 2015112021, November 2015) for the Ecosystem Restoration and Floodwater Attenuation (ERFA) Project on the West Unit of the San Joaquin National Wildlife Refuge prepared by the lead agency, Department of Water Resources (DWR).

These documents including Project design may be viewed or downloaded from the Board's website at http://www.cvfpb.ca.gov/meetings/2015/12-18-2015.cfm under a link for this agenda item. The documents are also available for review in hard copy at both Board and DWR offices.

The DWR determined the Project would not have a significant effect on the environment, and approved and filed a Notice of Determination on December 15, 2015 with the State Clearinghouse. Board staff finds that the proposed Project will not have a potentially significant effect on the environment and that there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent.

The documents and other materials which constitute the record of the Board's proceedings in this matter are in the custody of Leslie Gallagher, Executive Officer, Central Valley Flood Protection Board, 3310 El Camino Ave., Rm. 151, Sacramento, California 95821.

10.0 – CALIFORNIA WATER CODE § 8610.5 CONSIDERATIONS

- Evidence that the Board admits into its record from any party, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

  The Board has considered all the evidence presented in this matter, including the original application for Permit No. 19066 and technical documentation provided by the applicant, Staff Report and attachments, and the original environmental document.

- The best available science that related to the scientific issues presented by the Executive Officer, Legal Counsel, DWR or other parties that raise credible scientific issues.

  The applicant used a two-dimensional (2D) MIKE FLOOD hydrodynamic model to evaluate the flooding dynamics and habitat enhancement potential. MIKE models (developed by DHI, formerly the Danish Hydraulic Institute) are used worldwide and are recognized industry standards to conduct scientific analysis of surface water systems. The Board staff applied Title 23 standards during its review of the Project designs, and the USACE is applying its levee design and geotechnical standards in their review. For these reasons the applicant and project reviewers have collectively used the best available science and data to design and review the proposed Project.

- Effects of the decision on the facilities of the State Plan of Flood Control, and consistency of the proposed Project with the Central Valley Flood Protection Plan as adopted by Board Resolution 2012-25 on June 29, 2012.

  The Project will provide improved river-floodplain connectivity for over 2,500 acres of restored floodplain habitat along the west side of the San Joaquin River, and will promote inflow and drainage that preserves and supports wildlife habitat values at the Refuge, consistent with the environmental goals of 2012 Central Valley Flood Protection Plan. The Project will also provide a flood risk reduction benefit by reducing peak flood stages measured on the San Joaquin River at Maze Road Bridge by 0.6 feet relative to a “no Refuge flooding” condition. For these reasons the proposed Project will have no adverse effect on facilities of the State Plan of Flood Control, and it is consistent with the adopted 2012 Central Valley Flood Protection Plan and Title 23 standards.

- Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

  Climate change may alter the frequency of floodplain inundation in the San Joaquin River and on the Refuge, but without any specific climate change hydrology available for modeling, depth and duration of future post-climate change flooding are unknown at this time. Furthermore, no development is expected in the floodplain other than future Refuge management.

11.0 – STAFF RECOMMENDATION

Board staff recommends that the Board:

- adopt responsible agency findings pursuant to CEQA;
- approve Permit No. 19066 subject to a USACE Section 408 decision; and,
- direct the Executive Officer to take the necessary actions to execute the permit and file a Notice of Determination pursuant to CEQA with the State Clearinghouse.

12.0 – LIST OF ATTACHMENTS

A – Project Vicinity and Location Maps

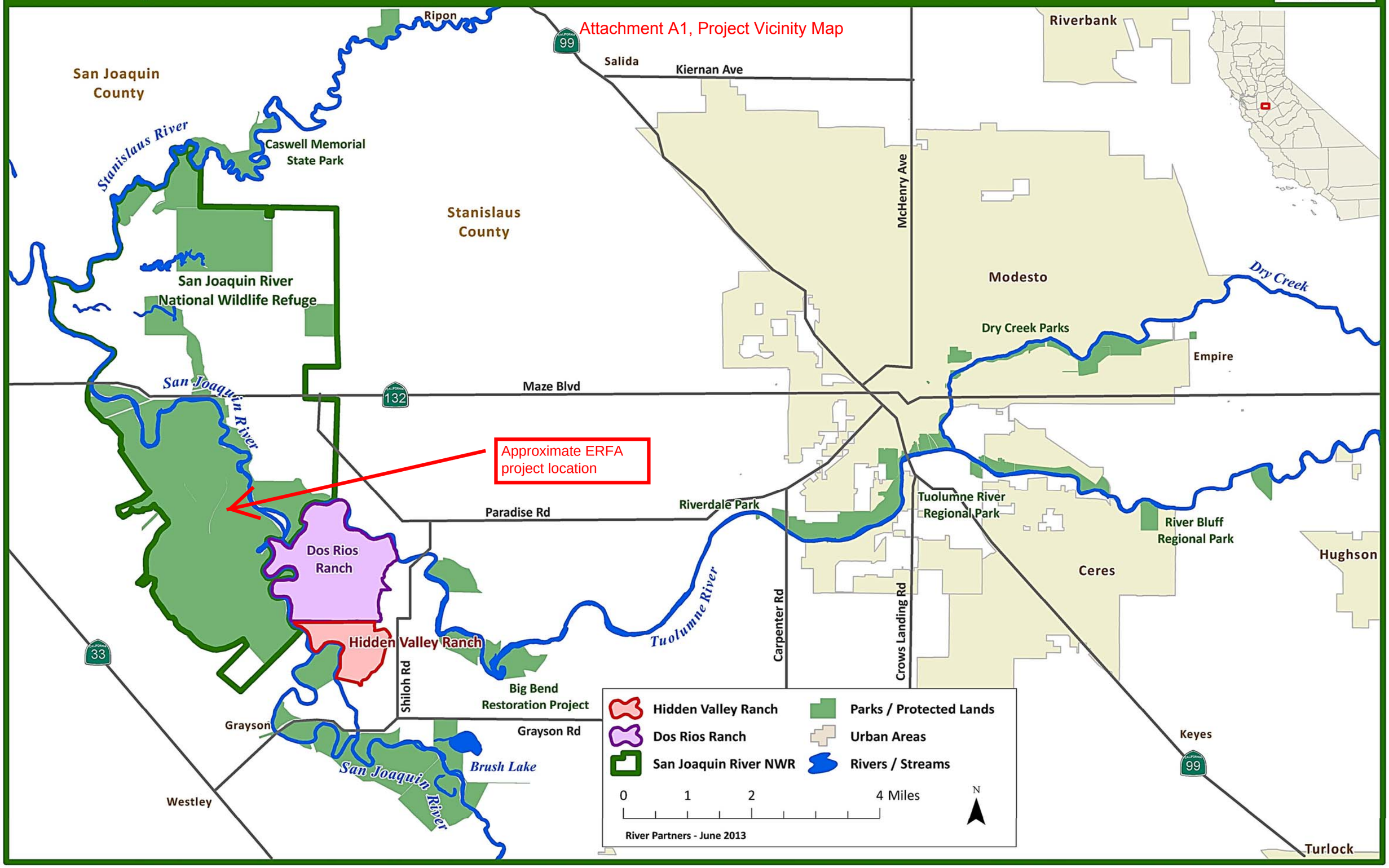
B – Draft Permit No. 19066

Exhibit A – USACE Decision Letter

C – Project Layout and Cross Section

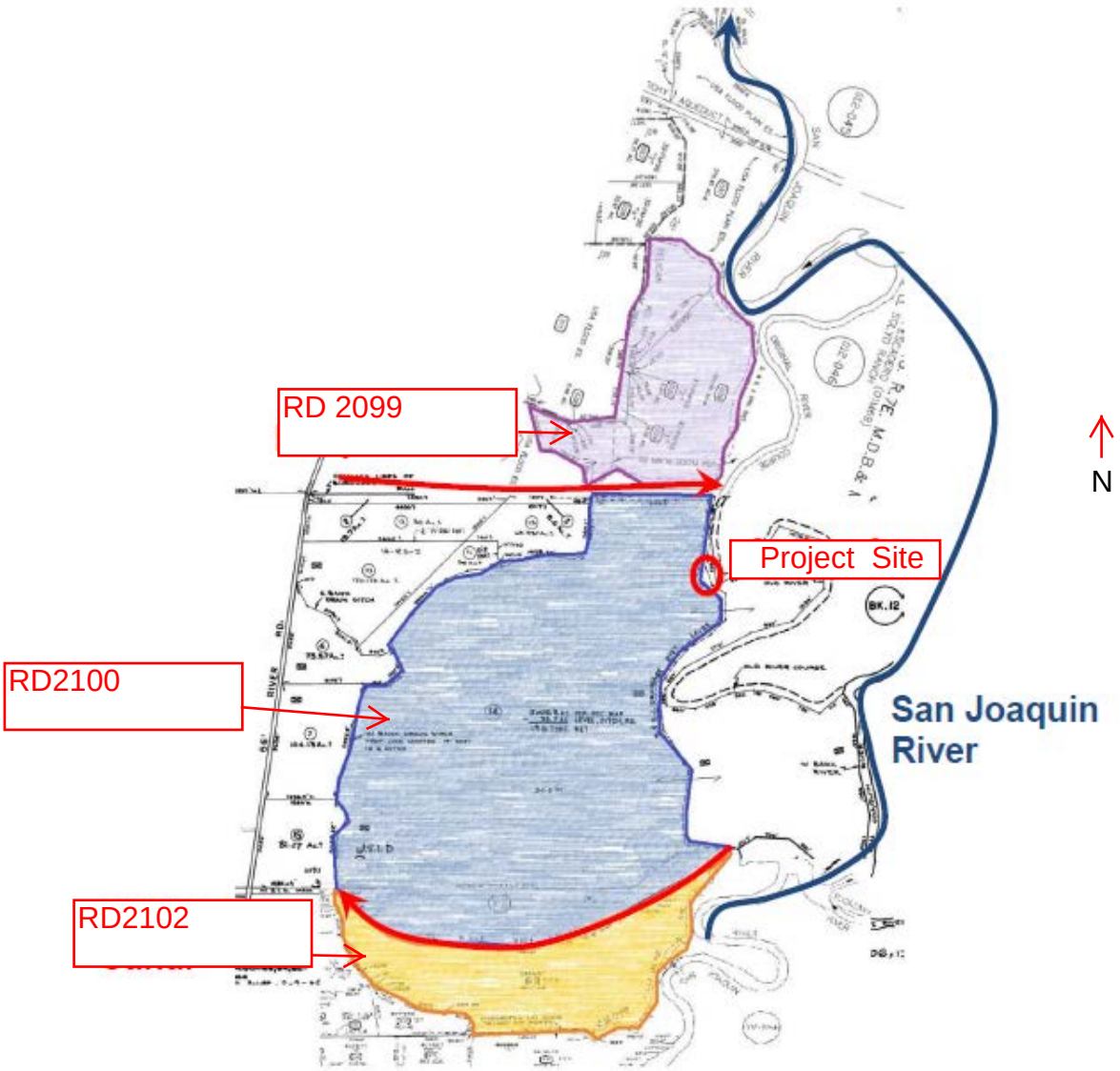
Prepared by:	Ali Porbaha
Environmental Review:	James Herota, Senior Environmental Scientist (Specialist)
Document Review:	Eric Butler PE, Projects and Environmental Branch Chief
Legal Review:	Nicole Rinke, Board Counsel
Final Review	Leslie Gallagher, Executive Officer

Hidden Valley Ranch



Attachment A2_Project Area Map

Project Area Map



Attachment B

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 19066 BD

This Permit is issued to:

US Fish and Wildlife Service
P.O. Box 2176
Los Banos, California 93635

To install three 48-inch gated pipes with manually operated slide gates, and to authorize one existing 36-inch gated pipe under the west (left bank) levee of the San Joaquin River on the San Joaquin River National Wildlife Refuge.

The project is located approximately 1.66 miles south of Maze Boulevard and 3.03 miles west of Paradise Road, along the west side of the San Joaquin River between its confluence with the Tuolumne River and State Highway 132 in Stanislaus County. (Section 4, T4S, R7E, MDB&M, San Joaquin River, Stanislaus County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____ _____
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

DWR 3784 (Rev. 9/85)

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 19066 BD

THIRTEEN: All work completed under this permit, as directed by the general and special conditions herein, shall be accomplished to ensure that the work is not injurious to adopted plans of flood control, regulated streams, and designated floodways under Central Valley Flood Protection Board (Board) jurisdiction, as defined in California Code of Regulations, Title 23. This permit only applies to the completion of work in the project description located within, or adjacent to and having bearing on Board jurisdiction, and which directly or indirectly affects the Board's jurisdiction. This special condition shall apply to all subsequent conditions herein.

LIABILITY AND INDEMNIFICATION

FOURTEEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the Board, the Department of Water Resources (DWR), the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, arising out of failure on the permittee's part to perform the obligations under this permit, the permittee shall defend and shall hold each of them harmless from each claim. This condition shall supersede condition TEN.

FIFTEEN: The permittee shall defend, indemnify, and hold the Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to

supplement or take over its defense, in its sole discretion.

SIXTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

SEVENTEEN: The Board and DWR shall not be held liable for any damages to the permitted project resulting from flood fight, operation, maintenance, inspection, or emergency repair.

BOARD CONTACTS

EIGHTEEN: The permittee shall contact the Board by telephone at (916) 574-0609 and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 20 working days prior to start of work may result in delay of the project.

PERMITTING AND AGENCY CONDITIONS

NINETEEN: The permittee shall comply with all conditions set forth in the letter from the U.S. Army Corps of Engineers District Engineer dated December XX, 2015, which is attached to this permit as Exhibit A and is incorporated by reference.

TWENTY: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

TWENTY-ONE: The permittee agrees to incur all costs for compliance with local, State, and federal permitting and resolve conflicts between any of the terms and conditions that agencies might impose under the laws and regulations it administers and enforces.

TWENTY-TWO: If the permittee does not comply with the conditions of this permit and enforcement by the Board is required, the permittee shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees.

PRE-CONSTRUCTION

TWENTY-THREE: The permittee shall provide construction supervision and inspection services acceptable to the Board.

TWENTY-FOUR: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions of project conditions. The photo record shall be submitted to the

Board within thirty (30) calendar days of beginning the project.

TWENTY-FIVE: Project construction is allowed during the flood season from November 1 to July15 contingent on conducive site and weather conditions. The permittee shall continuously monitor storm patterns, rainfall, and river flows to ensure the integrity of the federal flood project facilities. The Board may rescind this approval at any time based on weather, river, or field conditions.

CONSTRUCTION

TWENTY-SIX: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Board.

TWENTY-SEVEN: The stability of the levee shall be maintained at all times during construction.

TWENTY-EIGHT: All debris generated by this project shall be disposed outside of the San Joaquin River floodway (floodway).

TWENTY-NINE: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to July 15.

THIRTY: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the project levee right of way.

THIRTY-ONE: Backfill material for excavations within the levee section and within ten (10) feet of the levee toes shall be placed in four (4) to six (6) inch layers, moisture conditioned above optimum moisture content, and compacted to a minimum of 90 percent relative compaction as measured by ASTM Method D1557-91.

THIRTY-TWO: Backfill material for excavations within the levee section shall be free of stones or lumps that exceed three (3) inches in greatest dimension, organic matter, or other unsatisfactory material and shall be compacted to at least 90 percent relative compaction as measured by ASTM Method D1557-91.

THIRTY-THREE: Except with respect to the activities expressly allowed under this permit, the work area shall be restored to the condition that existed prior to start of work.

THIRTY-FOUR: Any damage to the levee crown roadway or access ramps that will be utilized for access for this project shall be promptly repaired to the condition that existed prior to this project.

THIRTY-FIVE: The pipes shall be installed below the levee section as perpendicular as possible to the levee centerline.

THIRTY-SIX: The permittee shall ensure that all pipe joints are watertight.

THIRTY-SEVEN: Pipes and joints shall be designed to withstand all anticipated loading conditions.

THIRTY-EIGHT: Pipes shall be inspected prior to installation to ensure no cracked, broken, or defective materials are used.

THIRTY-NINE: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

VEGETATION / ENVIRONMENTAL MITIGATION

FORTY: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to July 15.

FORTY-ONE: Trees, brush, sediment, and other debris shall be kept cleared from the project site and disposed of outside the floodway to maintain the design flow capacity and flowage area.

FORTY-TWO: The permittee shall be responsible for all installation and maintenance work to avoid existing established riparian vegetation to the extent possible to minimize vegetation impacts.

FORTY-THREE: No ground disturbing work will occur within the active channel of the San Joaquin River.

POST-CONSTRUCTION

FORTY-FOUR: The permittee shall be responsible for repair of any damages to the levee, channel and floodway due to construction, operation, or maintenance of the proposed project.

FORTY-FIVE: Within 120 days of completion of the project, the permittee shall submit to the Board as-built drawings and a certification report, stamped and signed by a professional civil engineer registered in the State of California, certifying the work was performed and inspected in accordance with the Board permit conditions and submitted drawings and specifications.

OPERATIONS AND MAINTENANCE

FORTY-SIX: The permittee shall maintain the permitted project in the manner required and as requested by authorized representative of the Board or DWR.

FORTY-SEVEN: If the permitted project results in any adverse hydraulic impact or scouring the permittee shall provide appropriate mitigation measures subject to review and approval of the Board.

FORTY-EIGHT: The permitted project shall not interfere with the flood conveyance capability of the federal project channel of the San Joaquin River. If the permitted project is determined by any agency responsible for operation or maintenance of the federal Lower San Joaquin River and Tributaries Project to interfere with channel conveyance, the permittee shall be required, at permittee's expense, to modify or remove the permitted project under direction of the Board. If the permittee does not comply, the Board may modify or remove the project at the permittee's expense.

PROJECT ABANDONMENT, CHANGE IN PLAN OF FLOOD CONTROL

FORTY-NINE: If the project, or any portion thereof, is to be abandoned in the future, the permittee shall abandon the project under direction of the Board, at the permittee's expense. A detailed abandonment plan shall be submitted to and approved by the Board prior to abandonment.

FIFTY: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted project if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Board may remove the project at the permittee's expense.

END OF CONDITIONS

DRAFT

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION AT THE SAN JOAQUIN RIVER NWR

HAGEMANN LOCATION 2 (H2) DRAIN

CONCEPTUAL DRAWINGS

NOVEMBER 2015

DRAWING INDEX

SHEET NO	DRAWING NO	DRAWING TITLE
1	G-1	GENERAL – TITLE, SHEET INDEX, LOCATION MAP, AND GENERAL NOTES
2	C-1	CIVIL – EXISTING SITE AND DEMOLITION PLAN
~~3~~	~~C-2~~	~~CIVIL – SITE GRADING AND COFFERDAM PLAN~~
4	C-3	CIVIL – PIPING PLAN
5	C-4	CIVIL – PIPING PROFILE
6	C-5	CIVIL – TYPICAL TRENCH SECTION
7	S-1	STRUCTURAL – DRAIN STRUCTURE PLAN
8	S-2	STRUCTURAL – DRAIN STRUCTURE SECTION
9	S-3	STRUCTURAL – DRAIN STRUCTURE ELEVATION

GENERAL NOTES:

1. ALL ELEVATIONS ARE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).
2. EXISTING FACILITIES SHOWN (I.E. STRUCTURES, UTILITIES PIPES) ARE APPROXIMATE ONLY AND ARE NOT SURVEYED LOCATIONS. LOCATIONS SHOWN WERE LOCATED BY AERIAL IMAGERY AND A SITE VISIT PERFORMED ON OCTOBER 6, 2015.
3. THE CONCEPT, ESPECIALLY THE FOUNDATION, IS BASED ON CONSERVATIVE ALLOWABLE BEARING PRESSURES AND LATERAL PRESSURES. A SITE SPECIFIC GEOTECHNICAL INVESTIGATION WILL BE REQUIRED TO DETERMINE FINAL STRUCTURAL DESIGN.
4. PIPE SIZES AND PIPE INVERT ELEVATIONS ARE FROM THE FOLLOWING REPORT: FINAL ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION, THREE AMIGOS AT THE SAN JOAQUIN RIVER NWR, WATER CONTROL STUDY, PREPARED FOR RIVER PARTNERS BY ESA PWA; MARCH 24, 2015.

LOCATION MAP
NOT TO SCALE

ATTENTION:
0 1"
IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

GENERAL

TITLE, SHEET INDEX, AND LOCATION MAP

DATE
DECEMBER, 2015

DRAWING NUMBER
G-1

CONCEPTUAL

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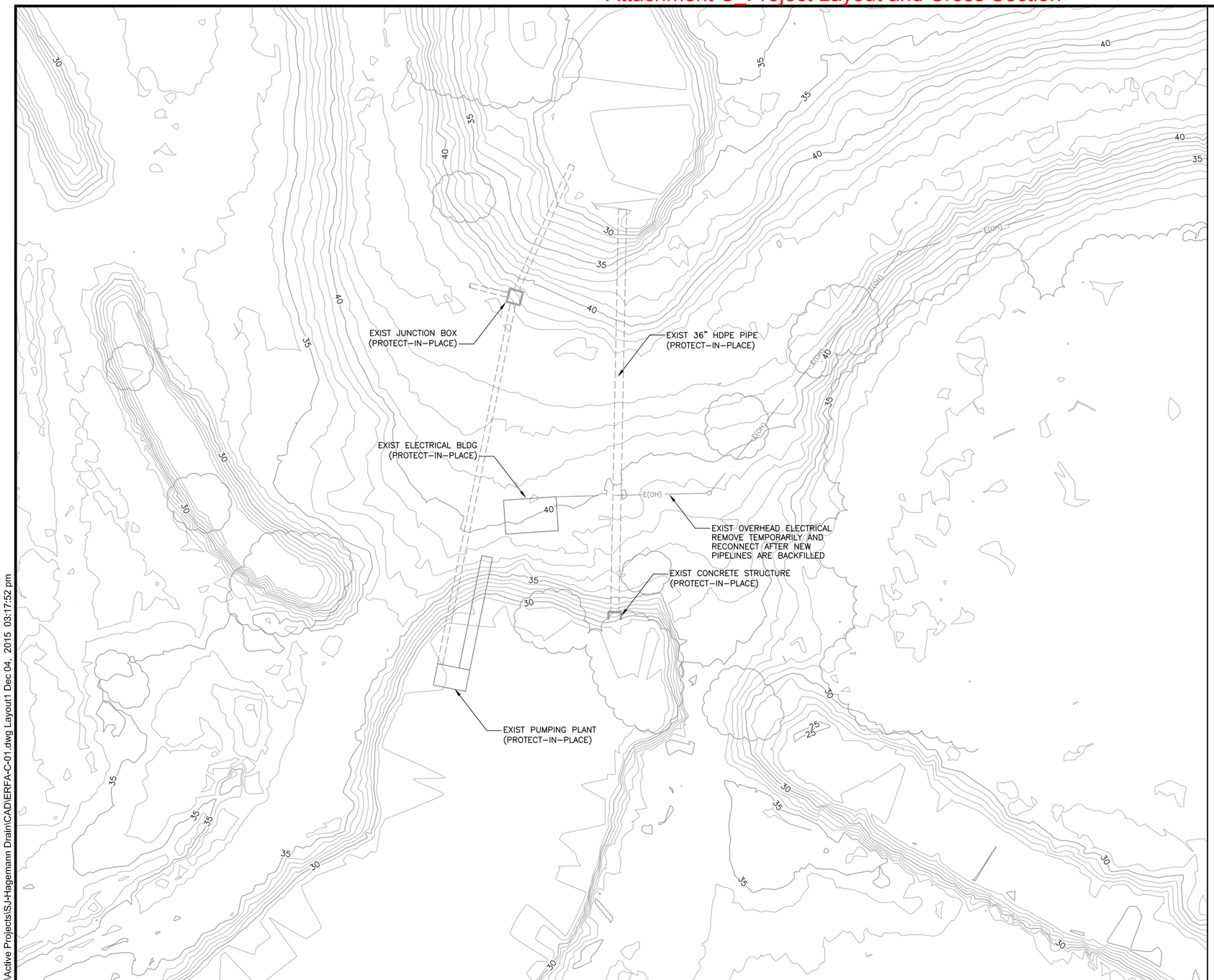
Attachment C_Project Layout and Cross Section



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SCALE: 1" = 20'

ATTENTION:

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FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

CIVIL

EXISTING SITE AND DEMOLITION PLAN

DATE
DECEMBER, 2015

DRAWING NUMBER
C-1

CONCEPTUAL

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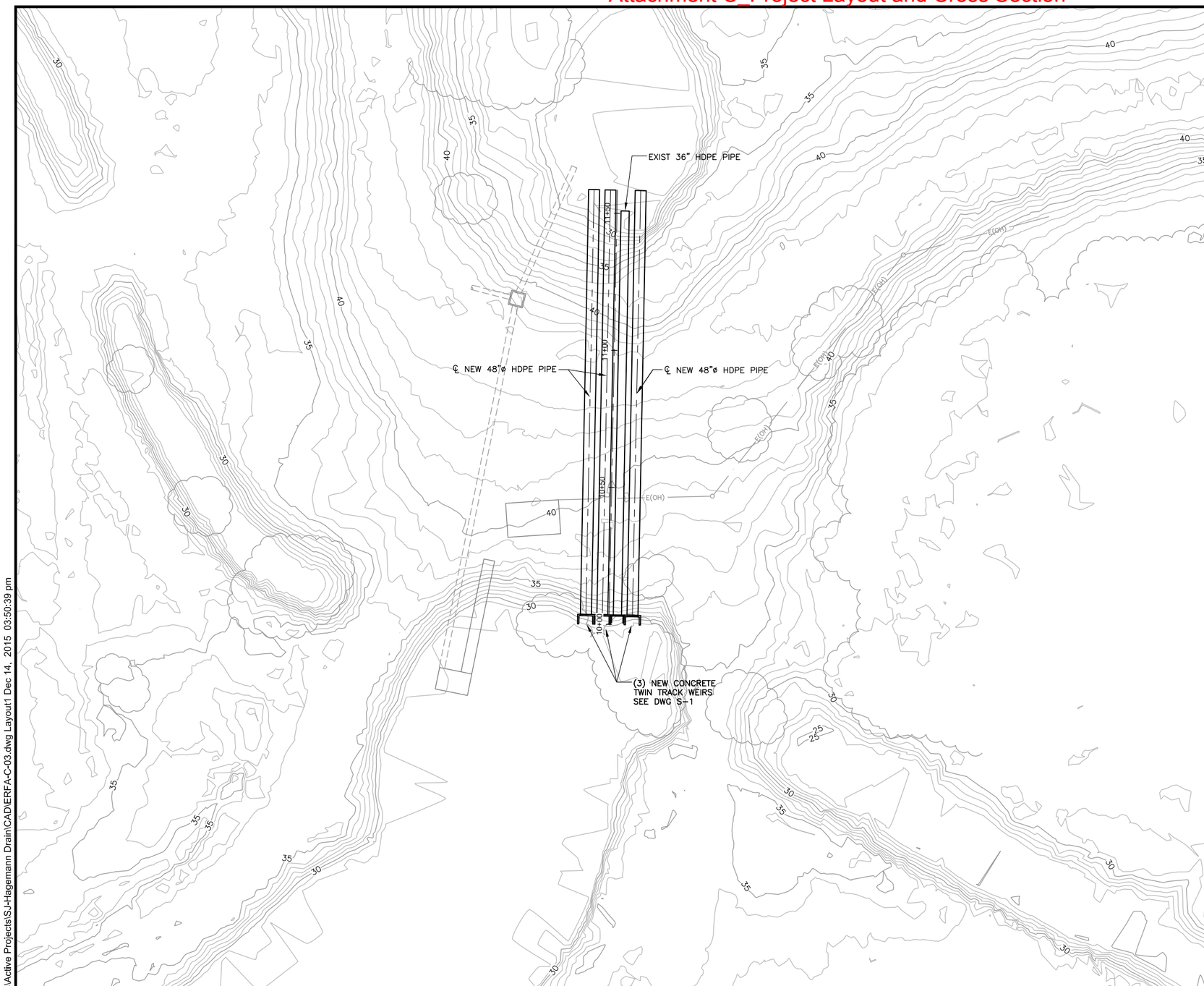
Attachment C_Project Layout and Cross Section



NOTES:

1. SEE DWG C-4 FOR PIPING PROFILE.
2. SEE DWG C-5 FOR TYPICAL TRENCH SECTION.

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CONCEPTUAL

ATTENTION:

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IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

CIVIL

PIPING PLAN

DATE
DECEMBER, 2015

DRAWING NUMBER
C-3

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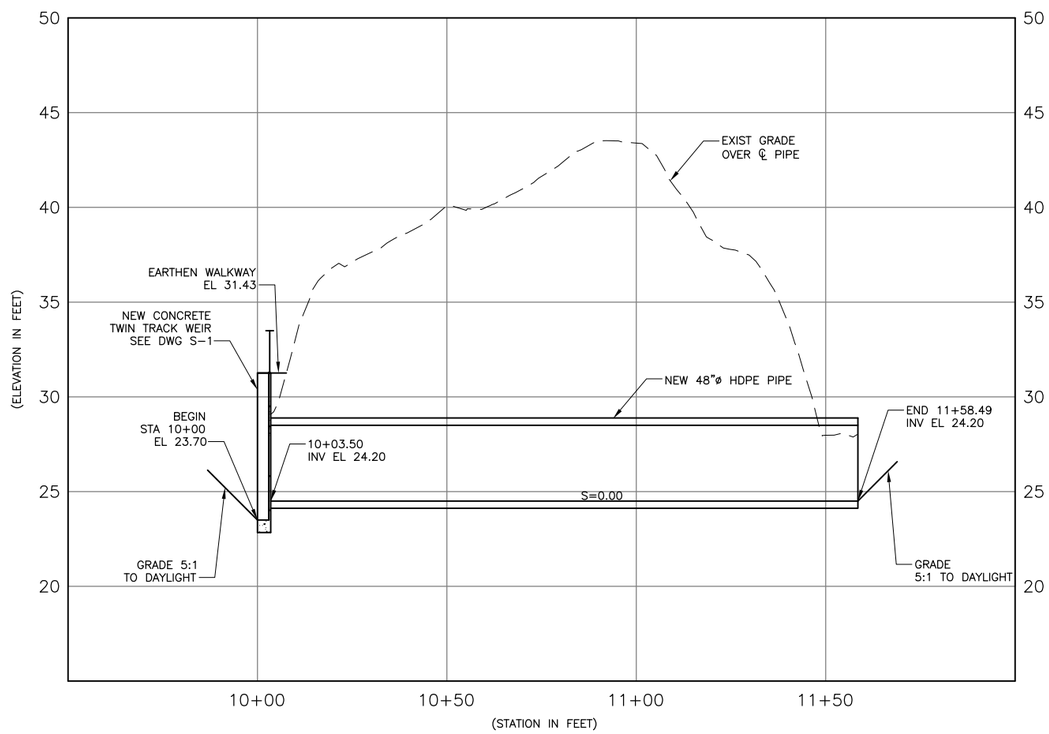

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HORIZ SCALE: 1" = 20'

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FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

CIVIL

PIPING PROFILE

DATE
DECEMBER, 2015

DRAWING NUMBER
C-4

CONCEPTUAL

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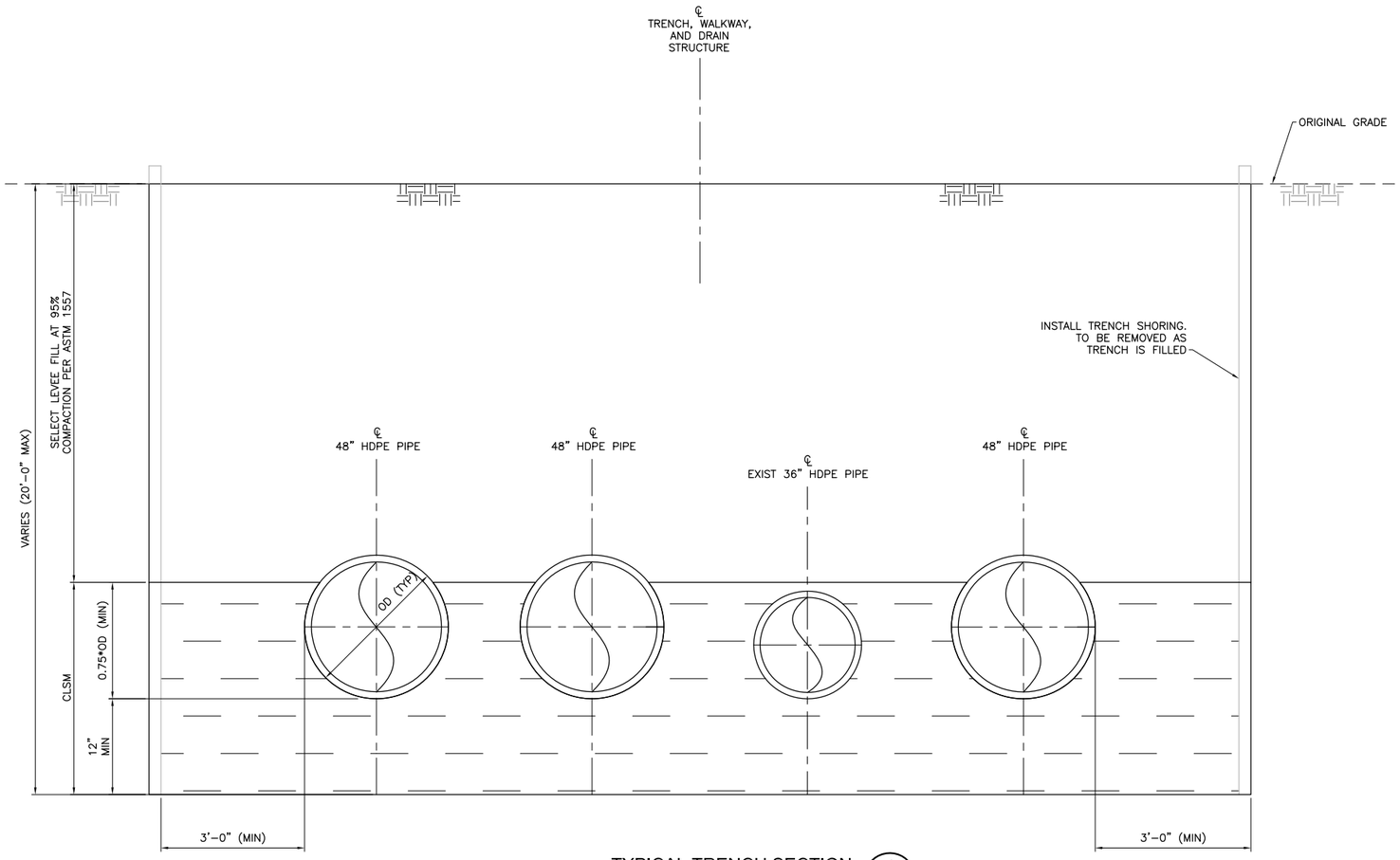
Attachment C_Project Layout and Cross Section



TYPICAL TRENCH SECTION (1 / VAR)

NOT TO SCALE

\\SERVER011\Bio\Projects\Active Projects\SJ-Hagemann Drain\CAD\ERFA-C-05.dwg Layout1 Dec 16, 2015 07:59:12 pm

ATTENTION:

0 1"

IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

CIVIL

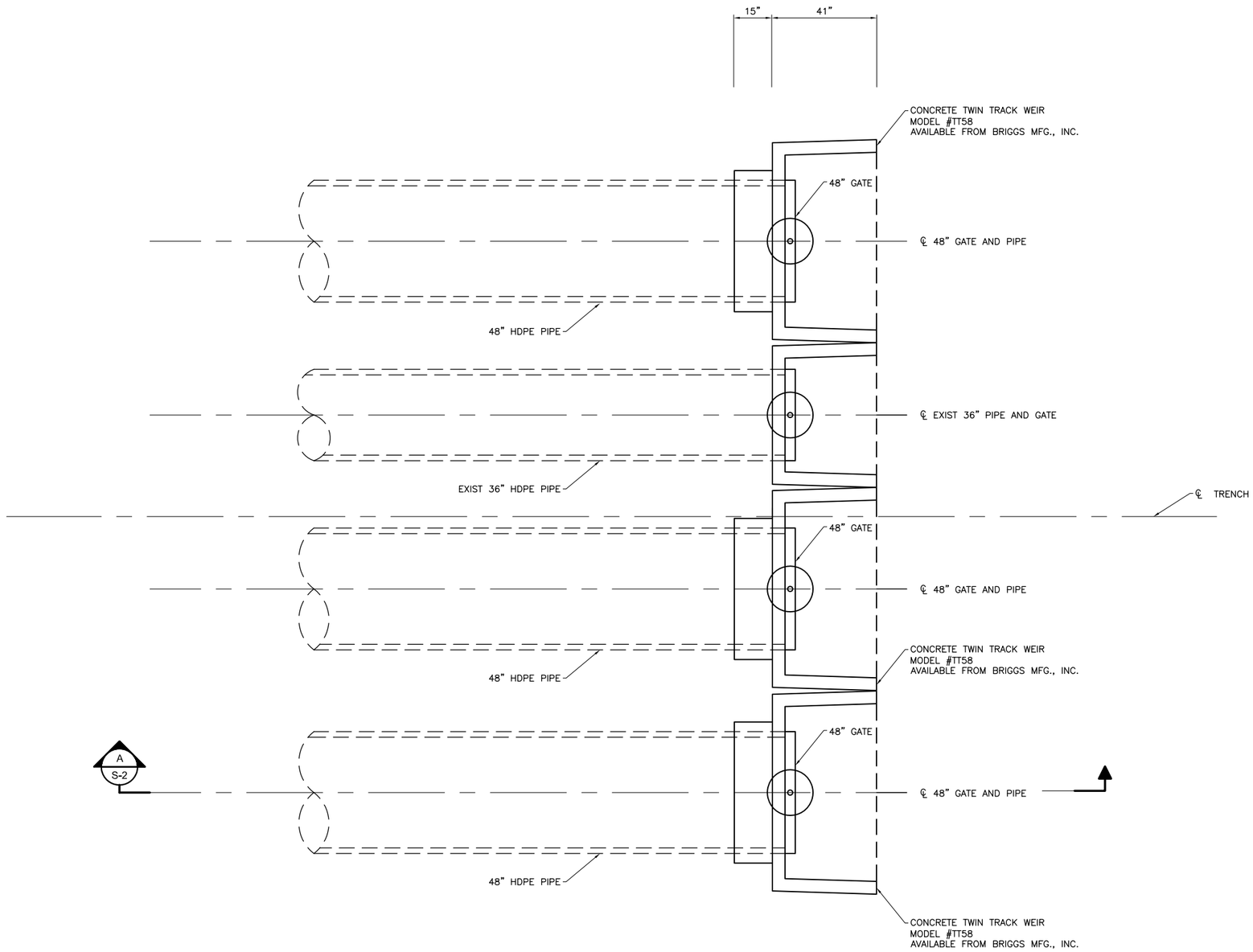
TYPICAL TRENCH SECTION

DATE
DECEMBER, 2015

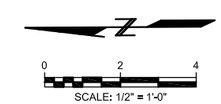
DRAWING NUMBER
C-5

CONCEPTUAL

Attachment C_Project Layout and Cross Section



PLAN



ATTENTION:

0 1"

IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

STRUCTURAL

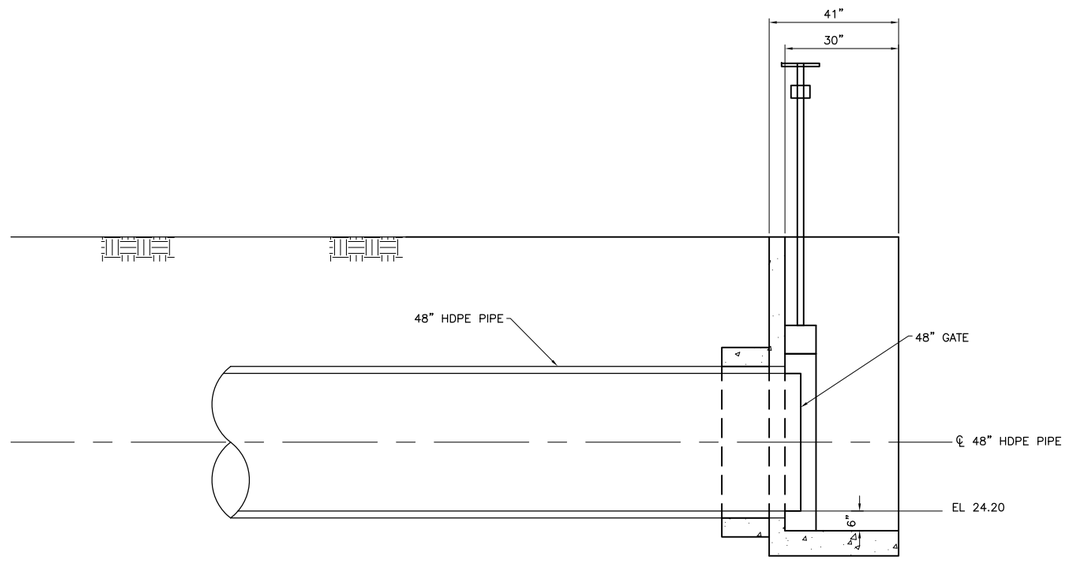
DRAIN STRUCTURE PLAN

DATE
DECEMBER, 2015

DRAWING NUMBER
S-1

CONCEPTUAL

\\SERVER01\Bio\Projects\Active Projects\SJ-Hagemann Drain\CAD\ERFA-S-01.dwg Layout1 Dec 14, 2015 04:41:57 pm



SECTION A / S-1

0 2 4
SCALE: 1/2" = 1'-0"

CONCEPTUAL

ATTENTION:
0 1"
IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

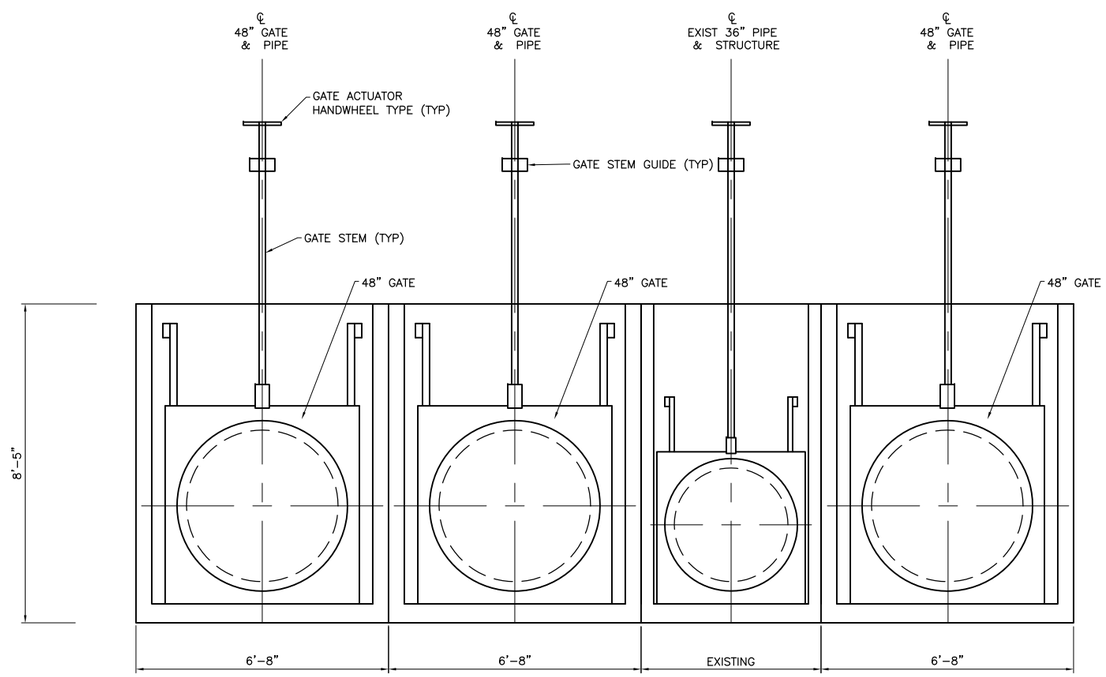
STRUCTURAL

DRAIN STRUCTURE SECTION

DATE
DECEMBER, 2015

DRAWING NUMBER
S-2

\\SERVER01\Bio\Projects\Active Projects\SJ-Hagemann Drain\CAD\ERFA-S-02.dwg Layout1 Dec 14, 2015 04:46:48 pm



ELEVATION VIEW
LOOKING NORTH

0 2 4
SCALE: 1/2" = 1'-0"

CONCEPTUAL

ATTENTION:

0 1"
IF THIS SCALE BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT ORIGINAL SCALE

FOR REVIEW PURPOSES ONLY
NOT FOR CONSTRUCTION

REV	DATE	DESCRIPTION	SUB	APP'D

APPROVED

RIVER PARTNERS

ECOSYSTEM RESTORATION AND FLOODWATER ATTENUATION
AT THE SAN JOAQUIN RIVER NWR
HAGEMANN LOCATION 2 (H2) DRAIN

STRUCTURAL

DRAIN STRUCTURE ELEVATION

DATE
DECEMBER, 2015

DRAWING NUMBER
S-3

\\SERVER01\Bio\Projects\Active Projects\SJ-Hagemann Drain\CAD\ERFA-S-03.dwg Layout1 Dec 14, 2015 04:49:49 pm