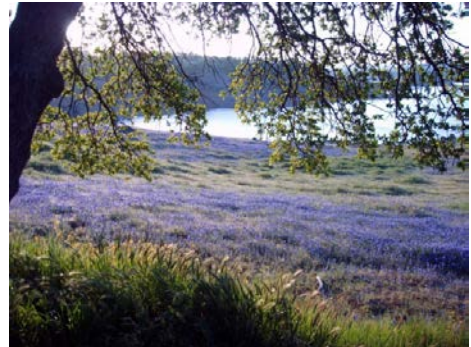


**WHITEWATER BOATING TAKE-OUT
IMPROVEMENT FEASIBILITY
STUDY REPORT
DON PEDRO PROJECT
FERC NO. 2299**



Prepared for:
Turlock Irrigation District – Turlock, California
Modesto Irrigation District – Modesto, California

Prepared by:
HDR Engineering, Inc.

December 2013

Whitewater Boating Take-Out Improvement Feasibility Study Report

TABLE OF CONTENTS

Section No.	Description	Page No.
1.0	INTRODUCTION.....	1-1
1.1	Background	1-1
1.2	Relicensing Process	1-3
1.3	Study Plan	1-4
2.0	STUDY GOALS AND OBJECTIVES.....	2-1
3.0	STUDY AREA.....	3-1
4.0	METHODOLOGY	4-1
5.0	RESULTS	5-1
5.1	Ward's Ferry Bridge Take-Out	5-1
5.2	Potential Alternative Take-Out Locations	5-2
5.2.1	Deer Flats	5-2
5.2.2	Buchanan Road Access	5-2
5.2.3	Moccasin Point Recreation Area	5-3
5.3	Focus Group.....	5-5
6.0	DISCUSSION AND FINDINGS.....	6-1
7.0	STUDY VARIANCES AND MODIFICATIONS.....	7-1
8.0	REFERENCES.....	8-1

List of Figures

Figure No.	Description	Page No.
Figure 1.1-1.	Don Pedro Project location.	1-2
Figure 3.0-1.	Whitewater Boating Take-Out Improvement Feasibility Study Area.	3-2
Figure 5.2-1.	Potential Buchanan road access vicinity.....	5-4
Figure 6.0-1.	Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Right Options.....	6-5
Figure 6.0-2.	Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Right Options - Typical Sections.	6-6
Figure 6.0-3.	Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Left Options.....	6-7

Figure 6.0-4. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Left Options - Typical Sections.....	6-8
Figure 6.0-5. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Left Options – Alternative Toilet Locations.	6-9

List of Attachments

Attachment A	Whitewater Boating Take-Out Improvement Feasibility Study Report 2013 Addendum
Attachment B	Photographs of the Ward's Ferry Bridge Take-Out Site
Attachment C	Whitewater Boating Take-Out Feasibility Study Focus Group Meeting Summary
Attachment D	Ward's Ferry Bridge Whitewater Boating Take-Out Conceptual Designs Preliminary Cost Estimates

List of Acronyms

ac	acres
ACEC	Area of Critical Environmental Concern
AF	acre-feet
ACOE	U.S. Army Corps of Engineers
ADA	Americans with Disabilities Act
ALJ	Administrative Law Judge
APE	Area of Potential Effect
ARMR	Archaeological Resource Management Report
BA	Biological Assessment
BDCP	Bay-Delta Conservation Plan
BLM	U.S. Department of the Interior, Bureau of Land Management
BLM-S	Bureau of Land Management – Sensitive Species
BMI	Benthic macroinvertebrates
BMP	Best Management Practices
BO	Biological Opinion
CalEPPC	California Exotic Pest Plant Council
CalSPA	California Sports Fisherman Association
CAS	California Academy of Sciences
CCC	Criterion Continuous Concentrations
CCIC	Central California Information Center
CCSF	City and County of San Francisco
CCVHJV	California Central Valley Habitat Joint Venture
CD	Compact Disc
CDBW	California Department of Boating and Waterways
CDEC	California Data Exchange Center
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game (as of January 2013, Department of Fish and Wildlife)
CDMG	California Division of Mines and Geology
CDOF	California Department of Finance
CDPH	California Department of Public Health

CDPR	California Department of Parks and Recreation
CDSOD	California Division of Safety of Dams
CDWR.....	California Department of Water Resources
CE	California Endangered Species
CEII.....	Critical Energy Infrastructure Information
CEQA.....	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CMAP	California Monitoring and Assessment Program
CMC.....	Criterion Maximum Concentrations
CNDDB.....	California Natural Diversity Database
CNPS.....	California Native Plant Society
CORP	California Outdoor Recreation Plan
CPUE	Catch Per Unit Effort
CRAM.....	California Rapid Assessment Method
CRLF.....	California Red-Legged Frog
CRRF	California Rivers Restoration Fund
CSAS.....	Central Sierra Audubon Society
CSBP.....	California Stream Bioassessment Procedure
CT	California Threatened Species
CTR.....	California Toxics Rule
CTS	California Tiger Salamander
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CWHR.....	California Wildlife Habitat Relationship
Districts	Turlock Irrigation District and Modesto Irrigation District
DLA	Draft License Application
DPRA.....	Don Pedro Recreation Agency
DPS	Distinct Population Segment
EA	Environmental Assessment
EC	Electrical Conductivity

EFH.....	Essential Fish Habitat
EIR	Environmental Impact Report
EIS.....	Environmental Impact Statement
EPA.....	U.S. Environmental Protection Agency
ESA.....	Federal Endangered Species Act
ESRCD.....	East Stanislaus Resource Conservation District
ESU	Evolutionary Significant Unit
EWUA.....	Effective Weighted Useable Area
FERC.....	Federal Energy Regulatory Commission
FFS	Foothills Fault System
FL.....	Fork length
FMU	Fire Management Unit
FOT	Friends of the Tuolumne
FPC	Federal Power Commission
ft/mi.....	feet per mile
FWCA.....	Fish and Wildlife Coordination Act
FYLF.....	Foothill Yellow-Legged Frog
g.....	grams
GIS	Geographic Information System
GLO	General Land Office
GPS	Global Positioning System
HCP.....	Habitat Conservation Plan
HHWP.....	Hetch Hetchy Water and Power
HORB	Head of Old River Barrier
HPMP.....	Historic Properties Management Plan
ILP.....	Integrated Licensing Process
ISR	Initial Study Report
ITA.....	Indian Trust Assets
kV.....	kilovolt
m	meters
M&I.....	Municipal and Industrial
MCL.....	Maximum Contaminant Level
mg/kg	milligrams/kilogram

mg/L	.....	milligrams per liter
mgd	.....	million gallons per day
mi	.....	miles
mi ²	.....	square miles
MID	.....	Modesto Irrigation District
MOU	.....	Memorandum of Understanding
MSCS	.....	Multi-Species Conservation Strategy
MSE	.....	Mechanically Stabilized Earthmsl mean sea level
MVA	.....	Megavolt Ampere
MW	.....	megawatt
MWh	.....	megawatt hour
mya	.....	million years ago
NAE	.....	National Academy of Engineering
NAHC	.....	Native American Heritage Commission
NAS	.....	National Academy of Sciences
NAVD 88	.....	North American Vertical Datum of 1988
NAWQA	.....	National Water Quality Assessment
NCCP	.....	Natural Community Conservation Plan
NEPA	.....	National Environmental Policy Act
ng/g	.....	nanograms per gram
NGOs	.....	Non-Governmental Organizations
NHI	.....	Natural Heritage Institute
NHPA	.....	National Historic Preservation Act
NISC	.....	National Invasive Species Council
NMFS	.....	National Marine Fisheries Service
NOAA	.....	National Oceanic and Atmospheric Administration
NOI	.....	Notice of Intent
NPS	.....	U.S. Department of the Interior, National Park Service
NRCS	.....	National Resource Conservation Service
NRHP	.....	National Register of Historic Places
NRI	.....	Nationwide Rivers Inventory
NTU	.....	Nephelometric Turbidity Unit
NWI	.....	National Wetland Inventory

NWIS	National Water Information System
NWR	National Wildlife Refuge
NGVD 29	National Geodetic Vertical Datum of 1929
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
ORV	Outstanding Remarkable Value
PAD	Pre-Application Document
PDO	Pacific Decadal Oscillation
PEIR	Program Environmental Impact Report
PGA	Peak Ground Acceleration
PHG	Public Health Goal
PM&E	Protection, Mitigation and Enhancement
PMF	Probable Maximum Flood
POAOR	Public Opinions and Attitudes in Outdoor Recreation
ppb	parts per billion
ppm	parts per million
PSP	Proposed Study Plan
QA	Quality Assurance
QC	Quality Control
RA	Recreation Area
RBP	Rapid Bioassessment Protocol
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RM	River Mile
RMP	Resource Management Plan
RP	Relicensing Participant
RSP	Revised Study Plan
RST	Rotary Screw Trap
RWF	Resource-Specific Work Groups
RWG	Resource Work Group
RWQCB	Regional Water Quality Control Board
SC	State candidate for listing under CESA
SCD	State candidate for delisting under CESA
SCE	State candidate for listing as endangered under CESA

SCT	State candidate for listing as threatened under CESA
SD1	Scoping Document 1
SD2	Scoping Document 2
SE	State Endangered Species under the CESA
SFP	State Fully Protected Species under CESA
SFPUC	San Francisco Public Utilities Commission
SHPO	State Historic Preservation Office
SJRA	San Joaquin River Agreement
SJRG	San Joaquin River Group Authority
SJTA	San Joaquin River Tributaries Authority
SPD	Study Plan Determination
SRA	State Recreation Area
SRMA	Special Recreation Management Area or Sierra Resource Management Area (as per use)
SRMP	Sierra Resource Management Plan
SRP	Special Run Pools
SSC	State species of special concern
ST	California Threatened Species under the CESA
STORET	Storage and Retrieval
SWAMP	Surface Water Ambient Monitoring Program
SWE	Snow-Water Equivalent
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TAF	thousand acre-feet
TCP	Traditional Cultural Properties
TDS	Total Dissolved Solids
TID	Turlock Irrigation District
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRT	Tuolumne River Trust
TRTAC	Tuolumne River Technical Advisory Committee
UC	University of California
USDA	U.S. Department of Agriculture

USDOC	U.S. Department of Commerce
USDOI	U.S. Department of the Interior
USFS	U.S. Department of Agriculture, Forest Service
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
USGS	U.S. Department of the Interior, Geological Survey
USR.....	Updated Study Report
UTM.....	Universal Transverse Mercator
VAMP	Vernalis Adaptive Management Plan
VELB	Valley Elderberry Longhorn Beetle
VRM	Visual Resource Management
WPT	Western Pond Turtle
WSA.....	Wilderness Study Area
WSIP	Water System Improvement Program
WWTP	Wastewater Treatment Plant
WY	water year
μS/cm	microSeimens per centimeter

1.0 INTRODUCTION

1.1 Background

Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts) are the co-licensees of the 168-megawatt (MW) Don Pedro Project (Project) located on the Tuolumne River in western Tuolumne County in the Central Valley region of California. The Don Pedro Dam is located at river mile (RM) 54.8 and the Don Pedro Reservoir has a normal maximum water surface elevation of 830 ft above mean sea level (msl; NGVD 29). At elevation 830 ft, the reservoir stores over 2,000,000 acre-feet (AF) of water and has a surface area slightly less than 13,000 acres (ac). The watershed above Don Pedro Dam is approximately 1,533 square miles (mi²). The Project is designated by the Federal Energy Regulatory Commission (FERC) as project no. 2299.

Both TID and MID are local public agencies authorized under the laws of the State of California to provide water supply for irrigation and municipal and industrial (M&I) uses and to provide retail electric service. The Project serves many purposes including providing water storage for the beneficial use of irrigation of over 200,000 ac of prime Central Valley farmland and for the use of M&I customers in the City of Modesto (population 210,000). Consistent with the requirements of the Raker Act passed by Congress in 1913 and agreements between the Districts and City and County of San Francisco (CCSF), the Project reservoir also includes a “water bank” of up to 570,000 AF of storage. CCSF may use the water bank to more efficiently manage the water supply from its Hetch Hetchy water system while meeting the senior water rights of the Districts. The “water bank” within Don Pedro Reservoir provides significant benefits for CCSF’s 2.6 million customers in the San Francisco Bay Area.

The Project also provides storage for flood management purposes in the Tuolumne and San Joaquin rivers in coordination with the U.S. Army Corps of Engineers (ACOE). Other important uses supported by the Project are recreation, protection of aquatic resources in the lower Tuolumne River, and hydropower generation.

The Project Boundary extends from RM 53.2, which is one mile below the Don Pedro powerhouse, upstream to RM 80.8 at an elevation corresponding to the 845 ft contour (31 FPC 510 [1964]). The Project Boundary encompasses approximately 18,370 ac with 78 percent of the lands owned jointly by the Districts and the remaining 22 percent (approximately 4,000 ac) owned by the United States and managed as a part of the U.S. Bureau of Land Management (BLM) Sierra Resource Management Area.

The primary Project facilities include the 580-foot-high Don Pedro Dam and Reservoir completed in 1971; a four-unit powerhouse situated at the base of the dam; related facilities including the Project spillway, outlet works, and switchyard; four dikes (Gasburg Creek Dike and Dikes A, B, and C); and three developed recreational facilities (Fleming Meadows, Blue Oaks, and Moccasin Point Recreation Areas). The location of the Project and its primary facilities is shown in Figure 1.1-1.

Figure 1.1-1. Don Pedro Project location.

1.2 Relicensing Process

The current FERC license for the Project expires on April 30, 2016, and the Districts will apply for a new license no later than April 30, 2014. The Districts began the relicensing process by filing a Notice of Intent and Pre-Application Document (PAD) with FERC on February 10, 2011, following the regulations governing the Integrated Licensing Process (ILP). The Districts' PAD included descriptions of the Project facilities, operations, license requirements, and Project lands as well as a summary of the extensive existing information available on Project area resources. The PAD also included ten draft study plans describing a subset of the Districts' proposed relicensing studies. The Districts then convened a series of Resource Work Group meetings, engaging agencies and other relicensing participants in a collaborative study plan development process culminating in the Districts' Proposed Study Plan (PSP) and Revised Study Plan (RSP) filings to FERC on July 25, 2011 and November 22, 2011, respectively.

On December 22, 2011, FERC issued its Study Plan Determination (SPD) for the Project, approving, or approving with modifications, 34 studies proposed in the RSP that addressed Cultural and Historical Resources, Recreational Resources, Terrestrial Resources, and Water and Aquatic Resources. In addition, as required by the SPD, the Districts filed three new study plans (W&AR-18, W&AR-19, and W&AR-20) on February 28, 2012 and one modified study plan (W&AR-12) on April 6, 2012. Prior to filing these plans with FERC, the Districts consulted with relicensing participants on drafts of the plans. FERC approved or approved with modifications these four studies on July 25, 2012.

Following the SPD, a total of seven studies (and associated study elements) that were either not adopted in the SPD, or were adopted with modifications, formed the basis of Study Dispute proceedings. In accordance with the ILP, FERC convened a Dispute Resolution Panel on April 17, 2012 and the Panel issued its findings on May 4, 2012. On May 24, 2012, the Director of FERC issued his Formal Study Dispute Determination, with additional clarifications related to the Formal Study Dispute Determination issued on August 17, 2012.

This study report describes the objectives, methods, and results of the Whitewater Boating Take-Out Improvement Feasibility Study (RR-02) as implemented by the Districts in accordance with FERC's SPD and subsequent study modifications and clarifications. On January 17, 2013, the Districts filed the Initial Study Report for the Don Pedro Project, which included the final draft study report for the RR-02: Whitewater Boating Take-Out Improvement Feasibility Study. On May 21, 2013, FERC issued its Determination on Requests for Study Modifications and New Studies for the Don Pedro Hydroelectric Project (May 2013 Determination). In response to comments on the study report received from several relicensing participants and a recommendation in the May 2013 Determination, the Districts have developed Attachment A.

Documents relating to the Project relicensing are publicly available on the Districts' relicensing website at www.donpedro-relicensing.com.

1.3 Study Plan

The Ward's Ferry Bridge site at approximately River Mile (RM) 78.5 on the upstream end of the Don Pedro reservoir is used as a take-out location by whitewater boaters who run the whitewater reach of the Wild and Scenic Tuolumne River above the Don Pedro Project. Land ownership at this location is federal, administered by the U.S. Department of the Interior, Bureau of Land Management (BLM). The Don Pedro Recreation Agency (DPRA) occasionally clears this reach of the reservoir of woody debris after periods of high flow and maintains a restroom at this location on the shoulder of Ward's Ferry Road above the reservoir to avoid improper waste disposal at this area of the reservoir.

The upper Tuolumne River watershed, the subbasin above about RM 80, covers approximately 1,300 square miles of drainage area and contains all the major tributaries of the Tuolumne River, including the North Fork, South Fork, Middle Tuolumne, Clavey River, Cherry Creek, and Eleanor Creek. The upper Tuolumne River extends from the confluence of the Dana and Lyell Forks to just below the confluence of the North Fork at approximate elevation 850 feet. The average gradient of the river is roughly 110 feet/mile, but local gradients vary greatly. The upper Tuolumne watershed is dominated by federal land ownership, primarily the Stanislaus National Forest and Yosemite National Park. From upstream of the Tuolumne River headwaters in Tuolumne Meadows in Yosemite National Park to about RM 80, a total of 83 miles of the Tuolumne River is designated as a National Wild and Scenic River (an 8-mile stretch at Hetch Hetchy Reservoir is excluded). Flows in the upper Tuolumne River are regulated and controlled by the City and County of San Francisco's (CCSF) Hetch Hetchy Water and Power system, including Hetch Hetchy Reservoir, Lake Eleanor and Cherry Lake, and CCSF's extensive infrastructure of water transmission and water power facilities. Portions of the upper Tuolumne River corridor are managed by federal agencies as administered under the agencies' resource management plans, including the 2011 Tuolumne Wild and Scenic River Comprehensive Management Plan Draft Environmental Impact Statement prepared by the U.S. Department of the Interior, National Park Service (NPS 2011) and related planning documents still under development; the Stanislaus National Forest: Forest Plan Direction (USFS 2010); the Tuolumne Wild and Scenic River Management Plan (USFS 1988); and the BLM's Sierra Resource Management Plan (SRMP) (BLM 2008).

This reach of the Tuolumne River is also a popular whitewater boating resource, with boater access managed by the U.S. Forest Service (USFS). Under current management guidelines, up to 52 boaters traveling as commercial fares and 96 private boaters are permitted on the upper Tuolumne River each day. The Ward's Ferry Bridge take-out site, located within the Don Pedro Project Boundary is an established take-out location for commercial and private individual whitewater boaters. Commercial outfitters guide over 3,000 whitewater boaters on Tuolumne River trips to take-out at the Ward's Ferry Bridge location annually. An estimated equal number of private boaters use the Ward's Ferry Bridge take-out site each year (Steve Welch, personal communication, August 24, 2011). Most of this use occurs April through September.

Currently, the Ward's Ferry Bridge take-out location presents challenges to safe and efficient take-out due to topography, condition of the access trails, and the frequency of vandalism at the site. BLM, National Park Service, and other relicensing participants requested that the Districts

research and identify potential improvements to whitewater boating take-out opportunities to enhance the boating experience.

2.0 STUDY GOALS AND OBJECTIVES

The primary goal of the Whitewater Boating Take-Out Improvement Feasibility Study was to assess the feasibility of improving the existing take-out location at the Ward's Ferry Bridge on the upstream end of the Don Pedro Project for continued use by whitewater boaters. The feasibility of physical improvements to the Ward's Ferry Bridge location was evaluated and the feasibility of alternative take-out locations was assessed.

3.0 STUDY AREA

The study area encompasses the upstream reaches of the Don Pedro Reservoir in the Tuolumne River and Moccasin Creek arms, and the Tuolumne River mainstem up to approximately RM 80 (Figure 3.0-1). The study area includes the existing Ward's Ferry Bridge take-out site as well as potential alternative take-out locations considered in this feasibility study.

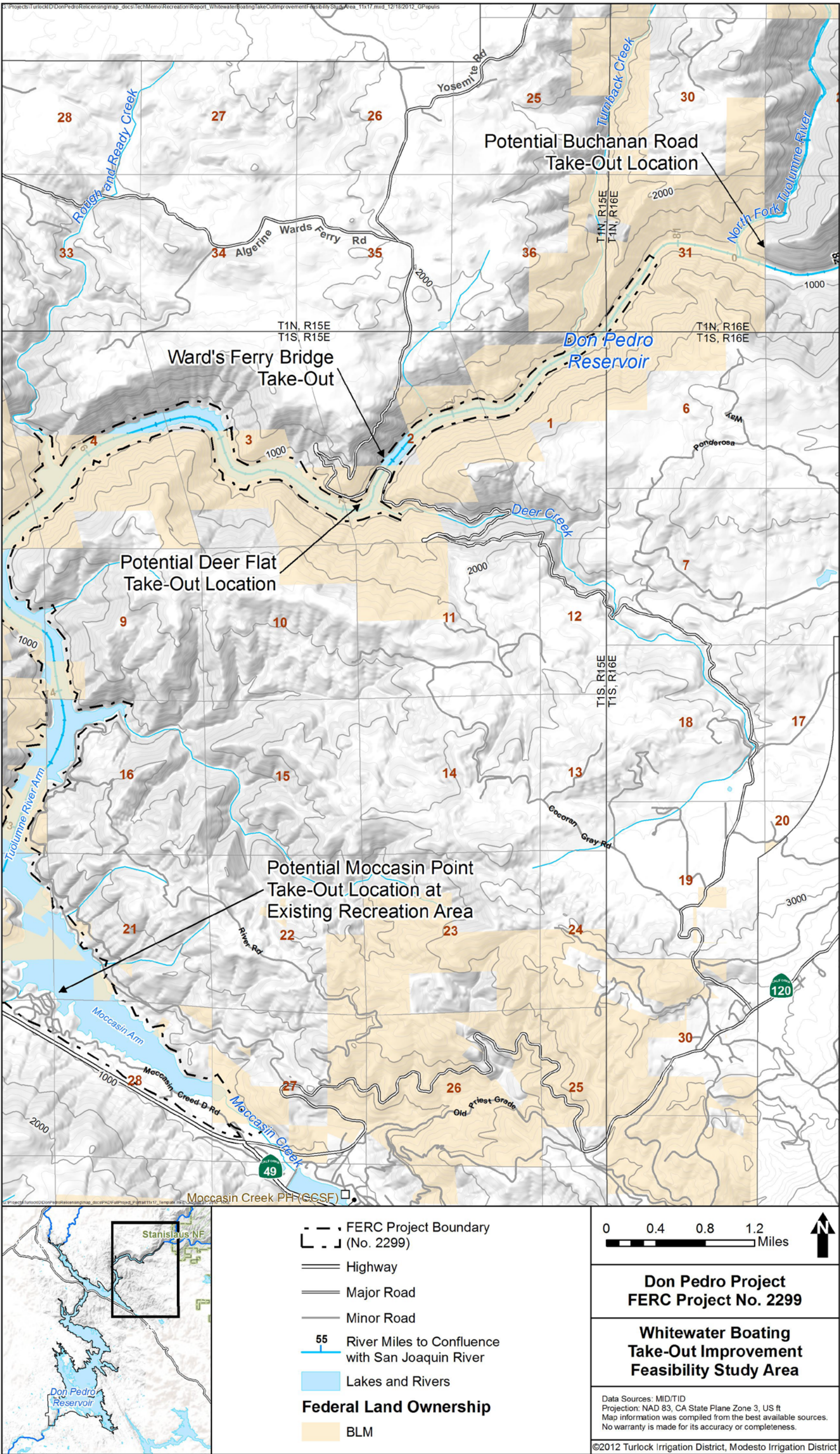


Figure 3.0-1. Whitewater Boating Take-Out Improvement Feasibility Study Area.

4.0 METHODOLOGY

Site characteristics at the existing take-out and alternative locations, including proximity to the terminus of the whitewater run, proximity to improved roads, site topography and bank slope, and presence of sensitive resources, were assessed. Assessment results are presented in this report quantitatively, narratively, and with photographs.

A focus group meeting was organized, announced, and conducted with guides and boaters familiar with the Tuolumne River and the Ward's Ferry Bridge take-out to elicit knowledge on use of the existing site, potential improvements, and alternative sites. Volunteers for the study team were identified through information provided by relicensing participants knowledgeable about Tuolumne River whitewater boating, agencies responsible for managing the Tuolumne River, professional guides, and other outfitter employees. Professional outfitters and recreational whitewater boaters were invited and participated.

Information from the site assessments and focus group meeting was used to examine proposed alternative take-out locations and assess the technical feasibility of potential improvements. The results of this study may be used in relicensing to develop a preferred alternative for a whitewater boating take-out site at the upstream end of the Don Pedro Project.

5.0 RESULTS

Site characteristics at the existing take-out and alternative locations, including proximity to the terminus of the whitewater run, proximity to improved roads, site topography and bank slope, and presence of sensitive resources, were assessed. A focus group was convened on April 17, 2012 to collect input from guides and boaters familiar with the Tuolumne River and the Ward's Ferry Bridge take-out about use of the existing site, potential improvements, and alternative sites.

5.1 Ward's Ferry Bridge Take-Out

The existing whitewater boating take-out is located just upstream of the Ward's Ferry Bridge at approximately RM 78.5 (Figure 3.0-1). Remnant abutments from an old bridge are located at this site (Attachment B, Photo 1) and the area was used as a laydown and construction access site during construction of the existing bridge in the early 1970s (Bechtel 1970). Under the terms of the current license, DPRA maintains a restroom on the shoulder of Ward's Ferry Road near the south end of the existing bridge, on river left (Attachment B, Photo 2).

Commercial and private whitewater boaters use this site as a take-out at the end of trips on the Upper Tuolumne River. Its location is favorable due in part to proximity to the terminus of the whitewater run, downstream of all rapids and upstream of significant slackwater at most water levels and river flows. As a general matter, the Project is operated to capture spring snowmelt and rain runoff, to provide water downstream for the remainder of the year, to carry over storage for future water years, and to guard against water shortages in dry years and successive dry years. In a typical year, Don Pedro Reservoir storage peaks in mid-summer around early July after the end of the snowmelt season. Annual reservoir level fluctuations are typically in the range of 30 to 80 vertical feet between 750 ft and 830 ft msl. For perspective on this water elevation range, the tops of the remnant bridge abutments in Photo 1 are approximately elevation 810 ft. msl. Low reservoir elevations are up to 40 feet below the tops of the bridge abutments (Attachment B, Photo 1) and high reservoir elevations are approximately 20 feet above the tops of the abutments (Attachment B, Photo 3).

The site is located on BLM-administered land and Districts-owned land immediately off Ward's Ferry Road, a public road which is paved and maintained by Tuolumne County. Access to the shoreline is available at all river flows and water levels, although low water levels present some challenges due to the steepness of the banks between approximately elevations 740 ft and 810 ft msl (Attachment B, Photo 4).

Challenges at this site include steep banks in a narrow canyon with unconsolidated surface below elevation 810 ft msl, and lack of vehicle access to the shoreline. Currently, vehicles are physically blocked from driving off the Ward's Ferry Road. The vault toilet blocks vehicle passage on river left and concrete bollards have been placed on river right to prevent vehicle travel off Ward's Ferry Road. Conflicts with other user groups are created at this site when anglers and other shoreline recreationists occupy the shoreline where whitewater boaters are attempting to remove boats and gear from the river. Faced with these challenges, some whitewater boaters, especially commercial rafters, position a truck with winch or hoist on the roadway on the bridge to lift rafts and equipment from the water (Attachment B, Photo 5).

5.2 Potential Alternative Take-Out Locations

In addition to the existing Ward's Ferry Bridge take-out site, consideration was given to alternative locations that could potentially serve as a take-out for the Upper Tuolumne River whitewater boaters. Ideal sites would be:

- located near the terminus of the whitewater runs, i.e., far enough downstream to include all of the whitewater upstream of the Don Pedro Reservoir and far enough upstream to minimize or eliminate flatwater paddling or towing on the reservoir;
- accessible via existing roads;
- usable at a range of river flows and reservoir levels; and
- located in a previously disturbed area or otherwise free of sensitive resources.

Three alternative sites were identified based on focus group input and desktop review of topography maps and aerial photography (Figure 3.0-1): Deer Flats at RM 82, Buchanan Road Access just upstream of the confluence of the North Fork Tuolumne River at RM 80, and Moccasin Point Recreation Area on the Moccasin Creek Arm of the Don Pedro Reservoir.

5.2.1 Deer Flats

Deer Flats is located on BLM-administered land on river right at approximately RM 78, one half-mile downstream from the Ward's Ferry Bridge (Figure 3.0-1). This site has similar topography and shoreline access as the Ward's Ferry Bridge site. There is currently no established path or roadway to the shoreline. Use of this location by whitewater boaters would require an additional half-mile paddle on flatwater under most reservoir level and river flow conditions. Due to the lack of existing access to the shoreline at this location, topography, and the increase in flatwater paddling that would be necessary when compared to the Ward's Ferry Bridge take-out, the Deer Flats is not considered a desirable take-out location.

No sensitive resource information is reported for Deer Flats because it did not emerge as a potential alternative based on other criteria.

5.2.2 Buchanan Road Access

Where the North Fork Tuolumne flows into the Tuolumne River (approximately RM 80), Forest Service Road 1N02 terminates approximately one mile from the river (Figure 5.2-1). An extremely rough road has been cut from FS Road 1N02 to the river's edge. Access to this site which is located on BLM and USFS-administered lands is remote with travel over approximately 10 miles of dirt road required (Figure 5.2-1 Potential Buchanan Road Access Vicinity). Take-out at this location would eliminate approximately 2 miles of the whitewater run. Due to the lack of existing access and elimination of whitewater run, Buchanan Road access is not considered a viable take-out location.

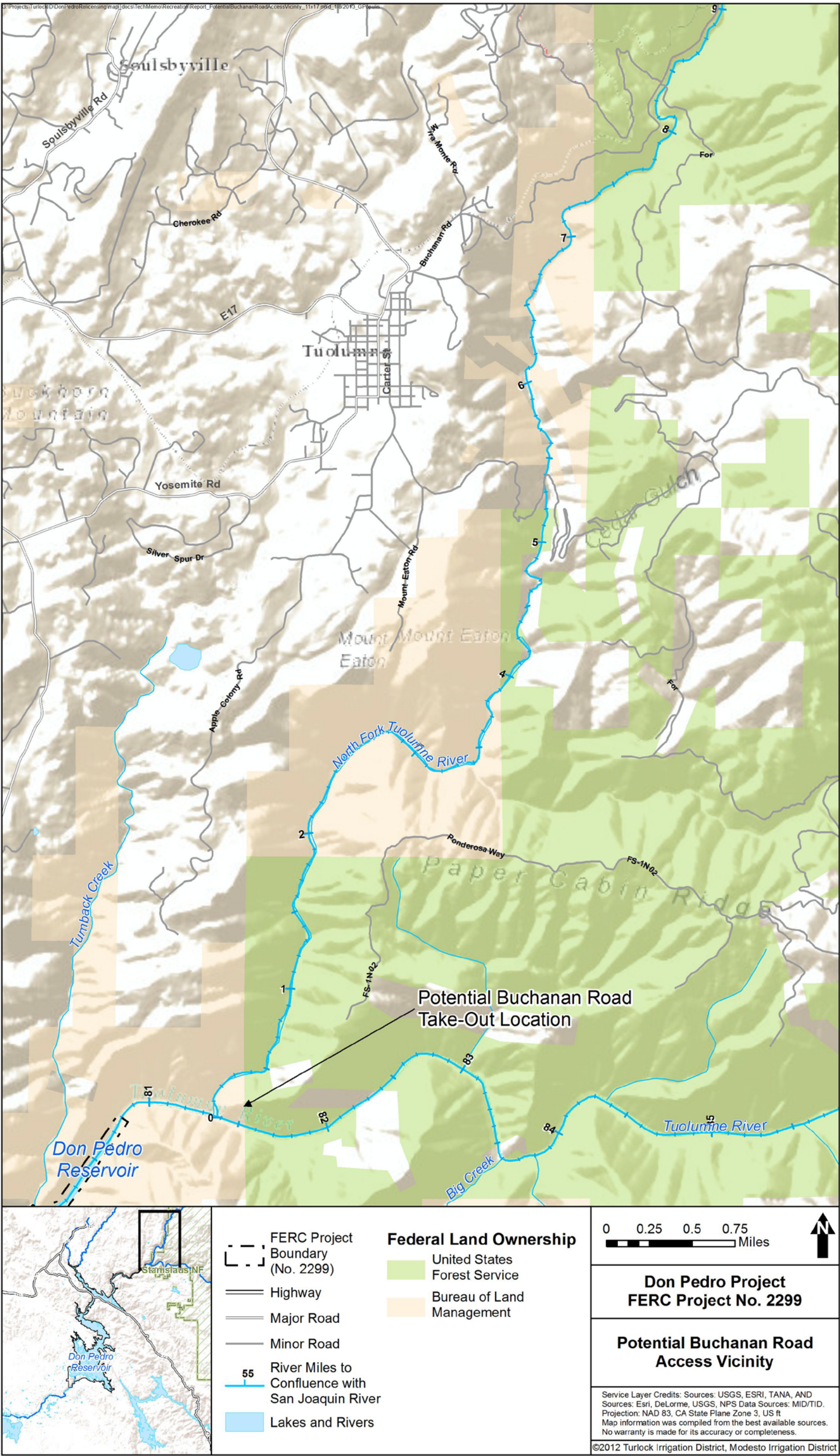
Buchanan Road access is located outside the study area for Don Pedro Project relicensing studies, so no information is available on sensitive resources at the Buchanan Road access

location. Buchanan Rose did not emerge as a potential alternative whitewater take-out location based on other criteria, however; an assessment of potential impacts to sensitive resources would have to be completed prior to ground disturbance in this area.

5.2.3 Moccasin Point Recreation Area

DPRA maintains the Moccasin Point Recreation Area on the Moccasin Creek Arm of the Don Pedro Reservoir approximately six miles by water from the Ward's Ferry Bridge (Figure 3.0-1) on lands owned by the Districts. Moccasin Point Recreation Area, located off California Highway 49 on Jacksonville Road, is a highly developed existing recreation area with paved roads; water, electric, and wastewater utilities; a marina; concrete boat launch; and numerous other amenities. Some whitewater boaters tow their boats from the terminus of the Upper Tuolumne River whitewater runs to the Moccasin Point Recreation Area. While the site has well developed and maintained access, whitewater boaters do not hold this take-out option in high regard due to the additional logistics of using a motorboat tow, the incongruity of towing over flatwater with the whitewater river experience, and the additional cost of user fees at the Moccasin Point Recreation Area.

Whitewater take-out use at Moccasin Point Recreation Area would occur at existing developed recreation facilities, including hardened parking lots and boat ramps. Therefore, no sensitive resource impacts would result from use of Moccasin Point Recreation Area as a whitewater take-out.



5.3 Focus Group

A focus group meeting facilitated by the Districts' consultant was conducted on April 17, 2012 at the Hetch-Hetchy Water and Power Facility in Moccasin, California to elicit knowledge on use of the Ward's Ferry Bridge take-out site, potential improvements, and alternative sites. Seventeen people attended the meeting, representing federal agencies, professional guides, individuals, and DPRA. The meeting summary is provided as Attachment C.

After discussion, focus group participants were asked to rank the improvements to the existing site that had been discussed by the group. The preferred improvement was a gated concrete ramp for access at all water levels, with access for multiple user types on both sides of the river identified as ideal. The next preferred improvement substituted the highly developed concrete material for more basic/rudimentary improvements to the existing road (grading/reinforcing the canyon walls) combined with the other access improvements (restroom relocation and parking expansion).

Regardless of the option chosen for improving direct access to low water, participants expressed support for the following improvements: (1) relocating the restroom, (2) providing additional parking opportunities; and (3) trail improvements to the river. Finally, participants emphasized the need for increased law enforcement presence at this location to protect and preserve any improved facilities and provide a safe environment, especially after investments are made in site improvements.

6.0 DISCUSSION AND FINDINGS

Based on the study results, improving access for whitewater boating take-out at the existing Ward's Ferry take-out location appears to be technically feasible and towing to Moccasin Point Recreation Area is a technically viable option.

Advantages of the Ward's Ferry Bridge location over other sites considered include:

- Maximizes the whitewater run and minimizes or eliminates necessity of any flatwater paddling or towing.
- Contains the footprint of site improvements to an existing disturbed area to avoid impacts at alternative sites that are not already disturbed.
- Minimizes maintenance and potential for damage due to vandalism by avoiding built facilities below high pool elevations, such as cable hoists or rails. Improvements below the high pool elevation are limited to native materials, reinforced-earth retaining walls, and rock revetments.
- Avoids need for land acquisition or exchange.

Two basic options appear to be feasible based on site assessment and preliminary engineering:

- River Right Option: Improvements on the right bank to facilitate vehicle and pedestrian access to the shoreline at a range of water levels.
- River Left Option: Improvements on the left bank to facilitate vehicle access to the shoreline at a range of water levels, combined with improvements on the right bank to facilitate pedestrian access.

For both options, the Districts examined the feasibility of a turnaround at some point along the improved or new access roads, with the location of the old bridge abutments offering the most promise. While both alternatives include a ten-foot wide access road, the steep and narrow configuration of the site restricts turn-around for vehicles, as discussed further in this section. Both alternatives would eliminate the need to winch and hoist rafts from the bridge deck.

Ward's Ferry River Right Option

The river right option consists of upgrades to the existing trail from Ward's Ferry Road on river right to approximately the old bridge abutment to a 15-foot wide road to accommodate vehicles and pedestrians (Figures 6.0-1 and 6.0-2). From the old bridge abutment, a new 10-foot wide access road could be constructed to descend from the old bridge abutment in an upstream direction. This new road would provide vehicle access to the shoreline at low reservoir elevation conditions. The new road would be designed and constructed to withstand inundation and high river flows that periodically occur at this location.

The existing user-defined pedestrian trail that descends in a downstream direction from the old bridge abutment could be upgraded to provide improved pedestrian access to the shoreline at low flow and low reservoir elevation conditions. As with the road described above, the trail would be constructed to withstand inundation and river flows that periodically occur at this location.

Under the river right option, rock cut or mechanically stabilized earth (MSE) wall construction may be used for road upgrade and construction. Wall construction is the preferred alternative to eliminate or minimize the need for blasting, considering the apparent instability of the existing slopes. As detailed in Attachment D, the preliminary estimated cost for final design and construction of the river right option is \$696,000 - \$749,000. This estimate does not include cost of construction permitting or any historic properties surveys that might be required.

Advantages of the river right option include:

- Vehicles (without trailers only) should be able to turn around in the area of the old abutment before backing down or after backing up the constructed road. However, the condition of the old abutment has not been fully assessed. Further assessment during final design will be necessary to confirm the feasibility of fortifying and modifying the old abutment.
- Pedestrian and vehicle access to the shoreline on river right would be accommodated with a 15-ft wide access way and separated at the old bridge abutment to reduce conflicts among users. Pedestrians could also continue to use the existing trails on river left to avoid conflicts with whitewater boaters.
- The existing toilet facility would remain in place, avoiding cost of relocation.

Ward's Ferry River Left Option

The river left option consists of upgrades to the existing trail from Ward's Ferry Road along river left to approximately the old bridge abutment to a 10-foot wide road (Figure 6.0-3 and 6.0-4). The road would be upgraded solely to provide vehicle access for rafting take-out (i.e., no dedicated pedestrian access on river left). From the old bridge abutment, a new 10-foot wide access road could be constructed to descend from the old bridge abutment in an upstream direction. This new road would provide vehicle access to the shoreline at low flow and low reservoir elevation conditions. The new road would be designed and constructed to withstand inundation and river flows that periodically occur at this location. There is no area for vehicle turn-around with the river left option; drivers would be required to back either down or up the entire length of the upgraded and newly constructed road from Ward's Ferry Road.

The river left option would include upgrades to the existing user-defined pedestrian trail that descends in a downstream direction from the old bridge abutment *on river right* to provide improved pedestrian access to the shoreline at low flow and low reservoir elevation conditions.

Under the river left option, rock cut or MSE wall construction may be used for road upgrade and construction. Wall construction is preferred to eliminate or minimize the need for blasting, considering the apparent instability of the existing slopes.

The river left option would require the relocation of the existing toilet facility to allow for vehicle access off of Ward's Ferry Road. Alternate placements of the relocated toilet are depicted in Figure 6.0-5. While relocating the toilet has the advantage of improving access to river left, the re-located toilet will necessarily be situated in an area that would otherwise be available for parking. This will reduce the available roadside parking at Ward's Ferry Bridge.

As detailed in Attachment D, the preliminary estimated cost for final design and construction of the river left option is \$739,000 - \$760,000. This estimate does not include cost of construction permitting or any historic properties surveys that might be required.

Advantages for the river left option include:

- Separation of rafting take-out and other uses of the site with vehicle access for rafting take-out on river left and upgraded pedestrian access on river right.

Moccasin Point Recreation Area

The Moccasin Point Recreation Area take-out option is viable, especially in the event that more detailed engineering analysis demonstrates barriers to improvements at Ward's Ferry Bridge. While it necessitates flatwater towing at the end of the whitewater trip, use of Moccasin Point Recreation Area as a whitewater take-out has the following advantages:

- Contains the footprint of site improvements to an existing disturbed area to avoid impacts at alternative sites that are not already disturbed.
- Eliminates safety concerns associated with winching and hoisting rafts from the bridge deck.
- Avoids need for maintenance and security at Ward's Ferry Bridge.
- Avoids need for land acquisition or exchange.

Conclusions

Whitewater take-out improvements at Ward's Ferry Bridge appear to be technically feasible based on preliminary engineering. No currently undeveloped sites were found to be desirable locations for Tuolumne River whitewater boating take-out based on siting criteria. The Moccasin Point Recreation Area take-out option is viable.

If any capital construction or maintenance of a whitewater boating take-out site are included as requirements in the new license for the Don Pedro Project, the Districts will seek to partner with state and federal agencies and private groups to share the cost of capital construction through grants, matching funds, or other mechanisms that are available. The Districts will also seek to share or recover any capital costs and any increased annual O&M costs through user fees as described in FERC's regulations at 18 CFR 2.7 which state:

- The Commission will not object to licensees and operators of recreational facilities within the boundaries of a project charging reasonable fees to users of such facilities in order to help defray the cost of constructing, operating, and maintaining such facilities.
- The Commission expects licensees to assume the following responsibilities...(d) Encourage governmental agencies and private interests, such as operators of user-fee facilities, to assist in carrying out plans for recreation, including operation and adequate maintenance of recreational areas and facilities. (e) To cooperate with local, State, and Federal Government agencies in planning, providing, operating, and maintaining facilities for recreational use of public lands administered by those agencies adjacent to the project area.

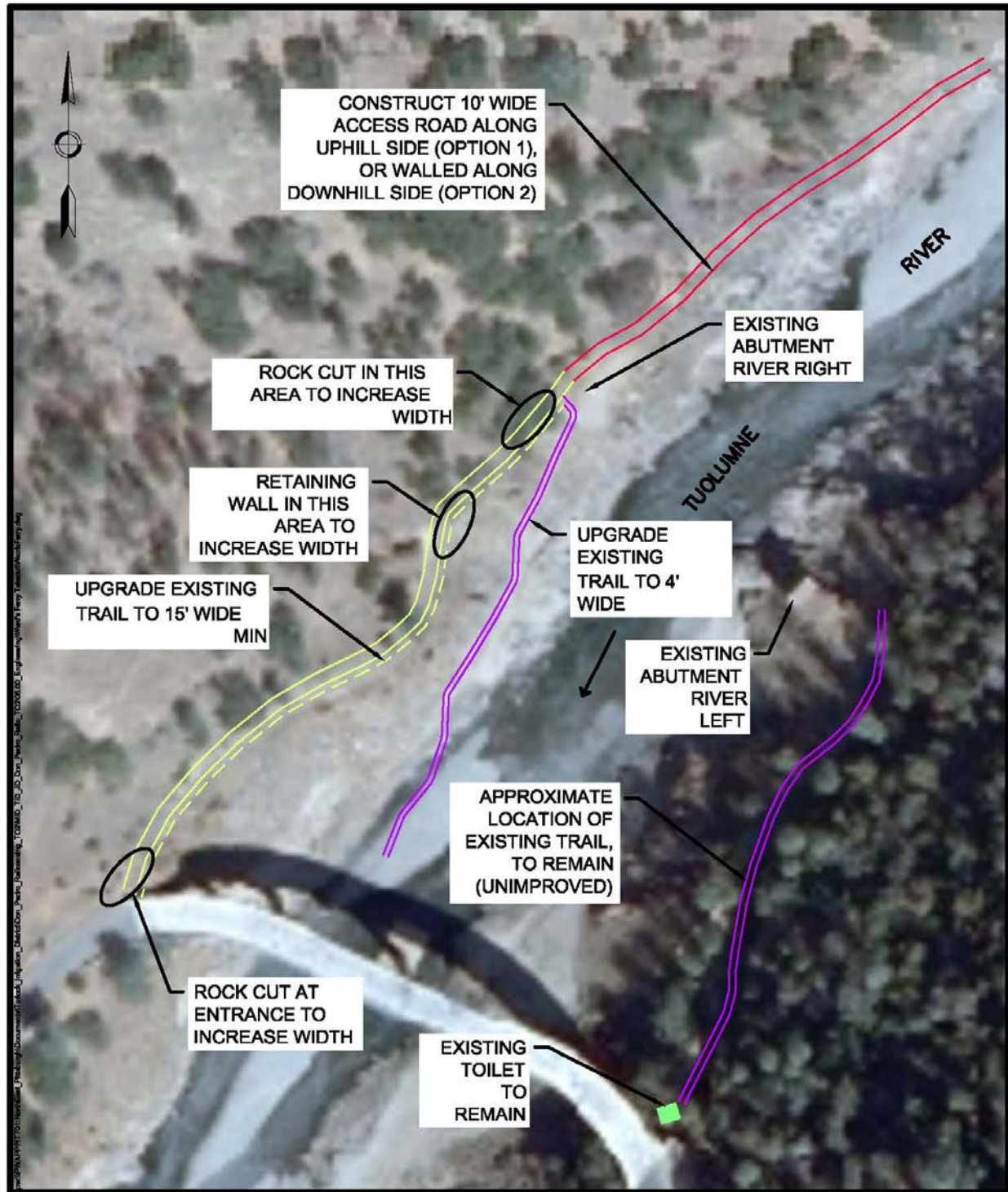


Figure 6.0-1. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Right Options.

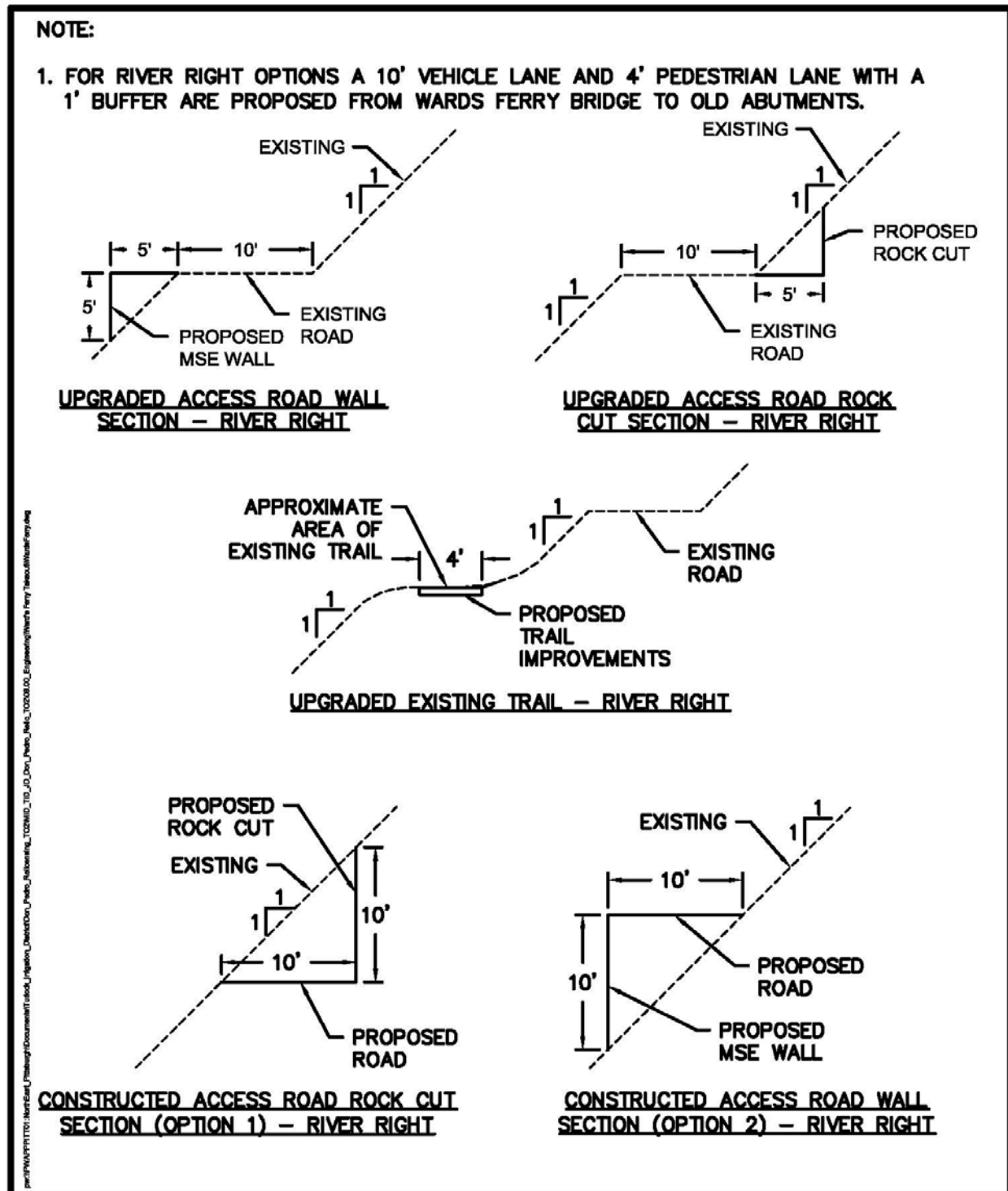


Figure 6.0-2. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Right Options - Typical Sections.



Figure 6.0-3. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Left Options.

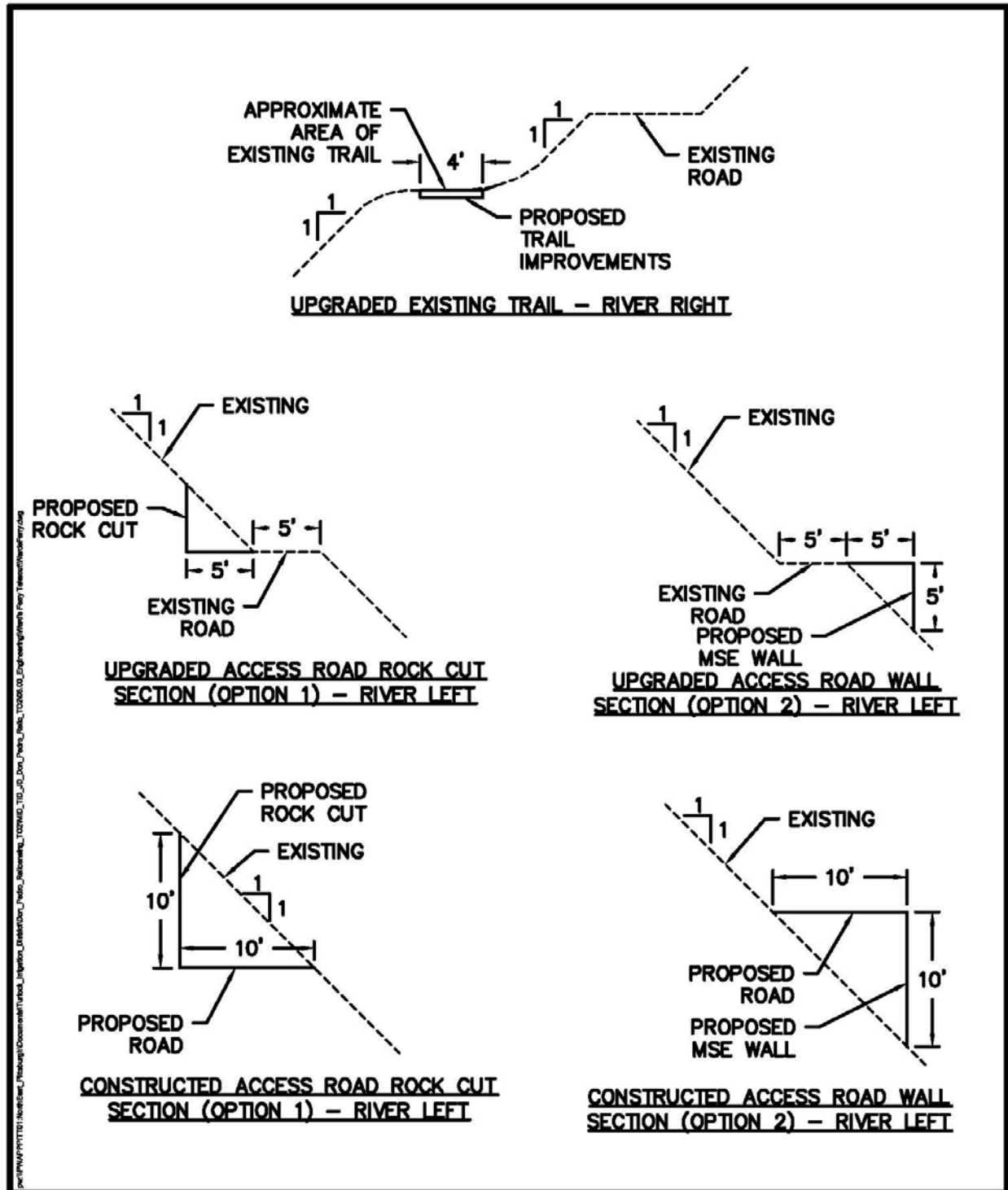


Figure 6.0-4. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Left Options - Typical Sections.

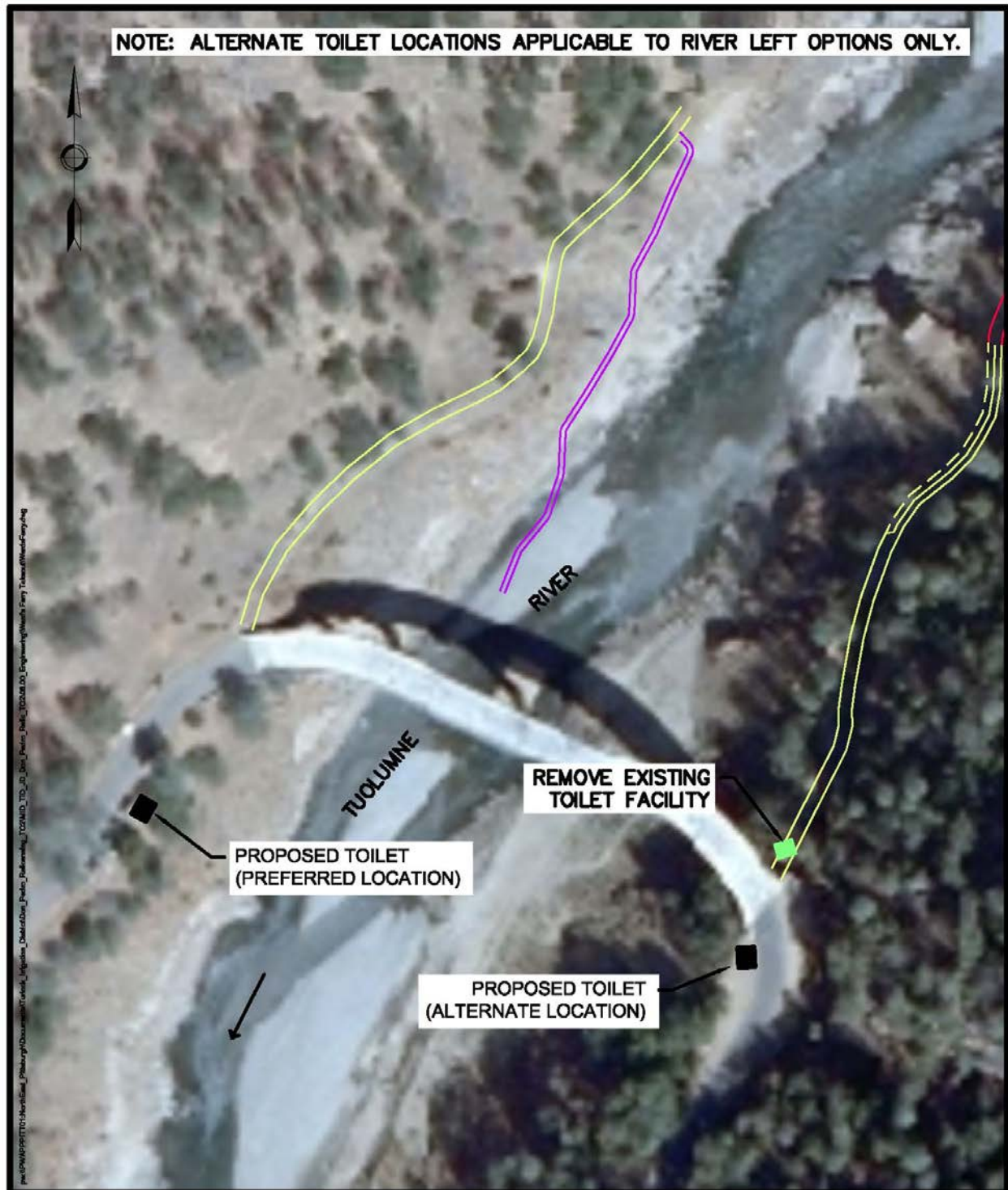


Figure 6.0-5. Ward's Ferry Bridge Whitewater Boating Take-out Improvements Conceptual Design, River Left Options – Alternative Toilet Locations.

7.0 STUDY VARIANCES AND MODIFICATIONS

The study area was expanded approximately two miles upstream along the Tuolumne River to accommodate a feasibility assessment of the potential Buchanan Road access take-out location identified near the confluence of the North Fork Tuolumne River (Figure 3.0-1).

The whitewater boating take-out improvement feasibility study is complete and the study goals have been achieved.

8.0 REFERENCES

- Bechtel Corporation. 1970. New Don Pedro Project, Relocated County Road and Bridges, Ward's Ferry Bridge, Location and Vicinity Map. Drawing No 7352-3-00. Bechtel Corporation, San Francisco.
- U.S. Department of Interior, Bureau of Land Management (BLM). 2008. Sierra Resource Management Plan and Record of Decision. U.S. Department of the Interior, Bureau of Land Management Mother Lode Field office, El Dorado Hills, California. http://www.blm.gov/ca/st/en/fo/folsom/rmp_index_page.html.
- U.S. Department of Interior, National Park Service, Yosemite National Park (NPS). 2011. Tuolumne Wild and Scenic River Comprehensive Management Plan Draft Environmental Impact Statement: Tuolumne River Values and Baseline Conditions Discussion. www.nps.gov/yose/parkmgmt/upload/trpbaselinechapter.pdf.
- U.S. Forest Service (USFS). 2010. Stanislaus National Forest: Forest Plan Direction. Produced by Pacific Southwest Region, Stanislaus National Forest. April 2010. www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5154788.pdf.
- _____. 1988. Tuolumne Wild and Scenic River Management Plan. Produced by Pacific Southwest Region, Stanislaus National Forest. Reprinted 2002. Available at http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_AI8zPwhQoY6BdkOyoCAPkATIA!/?ss=110516&navtype=BROWSEBYSUBJECT&cid=FSE_003756&navid=1301000000000000&pnavid=1300000000000000&ttype=main&pname=Forest%20Service%20-%20Planning.

**STUDY REPORT RR-02
WHITEWATER BOATING TAKE-OUT IMPROVEMENT FEASIBILITY**

ATTACHMENT A

**WHITEWATER BOATING TAKE-OUT IMPROVEMENT FEASIBILITY
STUDY REPORT 2013 ADDENDUM**

TABLE OF CONTENTS

Section No.	Description	Page No.
1.0	INTRODUCTION.....	1-1
2.0	METHODOLOGY	2-1
3.0	RESULTS	3-1
3.1	Deer Flats Alternative	3-1
3.2	Deer Creek Alternative	3-8
3.3	Additional Parking for the Ward's Ferry Bridge Take-Out.....	3-11
3.4	Facility Capacity	3-13
3.5	Bathroom Re-Location and Road Width at the Existing Ward's Ferry Bridge Take-Out	3-14
4.0	CONCLUSION	4-1
5.0	REFERENCES.....	5-1

List of Figures

Figure No.	Description	Page No.
Figure 3.1-1.	Deer Creek and Deer Flats location.	3-2
Figure 3.1-2.	Deer Flats: Steep grade immediately off Ward's Ferry Road.....	3-3
Figure 3.1-3.	Deer Flats: Low gradient terrain along potential access route.....	3-4
Figure 3.1-4.	Deer Flats: Steep grade from high water level to river channel.	3-5
Figure 3.1-5.	Deer Flats whitewater boating take-out improvements conceptual design.	3-7
Figure 3.2-1.	Deer Creek: Site gradient.....	3-9
Figure 3.2-2.	Deer Creek whitewater boating take-out improvements conceptual design.....	3-10
Figure 3.3-1.	Tuolumne River whitewater boating take-out potential additional parking site.	3-12

List of Tables

Table No.	Description	Page No.
Table 4.0-1	Comparison of Potential Whitewater Boating Take-Out Locations	4-1

List of Appendices

Appendix A	Deer Flats and Deer Creek Whitewater Boating Take-Out Conceptual Designs Preliminary Cost Estimates
------------	--

1.0 INTRODUCTION

On January 17, 2013, the Districts filed the Initial Study Report (ISR) for the Don Pedro Project, which included the final draft study report for the RR-02: Whitewater Boating Take-Out Improvement Feasibility Study. The Districts received comments on the RR-02 Study Report from the following relicensing participants: Bureau of Land Management (BLM), National Park Service (NPS), All-Outdoors California, ARTA River Trips, private boater Bob Hackamack, Conservation Groups¹, O.A.R.S., Restore Hetch Hetchy, Sierra Mac River Trips, and Tuolumne River Trust (TRT). In their April 9, 2013 letter to FERC, in response to these comments, the Districts agreed to expand their analysis to provide more details on the Ward's Ferry alternatives such as parking, bathroom location, and road width, more details on the constraints of developing take-out sites at Deer Flats and Deer Creek, and to provide a discussion of the capacity of proposed facilities compared to current facilities and projected use.

In addition to relicensing participant requests for additional take-out site analyses, FERC's May 21, 2013 Determination on Requests for Study Modifications and New Studies for the Don Pedro Hydroelectric Project (May 2013 Determination) recommended that the Districts amend the RR-02 study report to include more details on the benefits and constraints associated with the Ward's Ferry Bridge take-out site and the development of take-out sites at Deer Creek and Deer Flats. In response to both relicensing participant comments and the May 2013 Determination, the Districts have developed this Attachment A to the final study report.

¹ The "Conservation Groups" consists of American Rivers, American Whitewater, California Sportfishing Protection Alliance, California Trout, Central Sierra Environmental Resource Center, Friends of the River, Golden West Women Flyfishers, Northern California Council Federation of Fly Fishers, Trout Unlimited, and the Tuolumne River Trust.

2.0 METHODOLOGY

To address the ISR comments and FERC's recommendation, the Districts conducted two site visits in the vicinity of the Ward's Ferry Bridge take-out site (which is located within the Project Boundary) to discuss take-out options with relicensing participants. During the first site visit, which occurred on August 6, 2013, the Districts' consultants and representatives from Tuolumne County met with rafters who had just completed a whitewater rafting trip organized by NPS and United States Forest Service (USFS), and which took out at Ward's Ferry Bridge. During this site visit, the rafters said any proposed take-out improvements would ideally include two-lane vehicle access to the river at all water levels. In addition, the rafters said that any relicensing proposal to construct and maintain a whitewater boating take-out in this vicinity should address safety, security, and user conflicts.

The Districts conducted a second site visit on September 13, 2013 to assess the potential for developing the Deer Creek and Deer Flats sites to accommodate whitewater boating take-out. Representatives from NPS, TRT, American Whitewater, and O.A.R.S., as well as private boater Bob Hackmack, attended. During this site visit, a representative from Don Pedro Recreation Agency (DPRA) explained the sediment accumulation that occurs at these two sites and DPRA's operational use of the Deer Creek site to corral floating debris off the main river channel to eliminate the navigational hazard of floating debris. Relicensing participants commented that few advantages over the Ward's Ferry Bridge site were evident at the Deer Creek and Deer Flats sites, especially due to the steep terrain at both locations. Relicensing participants reiterated concern for security, parking, and site capacity issues.

Per the RR-02: Whitewater Boating Take-Out Improvement Feasibility Study Plan and FERC's recommendation, Attachment A analyzes the existing take-out, Deer Flats, and Deer Creek by assessing each location's proximity to the terminus of the whitewater run, proximity to improved roads, topography and bank slope, and sensitive resources.

3.0 RESULTS

3.1 Deer Flats Alternative

The potential Deer Flats whitewater boating take-out site is located within the Project Boundary on BLM-administered land on river right (north side) of the Tuolumne River, approximately ½ mile downstream from the Ward's Ferry Bridge take-out site (Figure 3.1-1). The site, which has similar topography to the existing Ward's Ferry Bridge take-out site, is composed of unconsolidated substrates. Vegetation is dominated by oaks (*Quercus spp.*) and pines (*Pinus spp.*). With the exception of oak trees, which in some circumstances are protected by Tuolumne County², the Deer Flats site contains no sensitive natural resources. No historic properties have been identified. Natural resources at Deer Flats are largely intact; an undeveloped, user-defined walking trail is the site's only existing disturbance. The trail's impact to the site's natural resources is minimal.

² Tuolumne County Ordinance 2903, chapter 9.24 (Tuolumne County Board of Supervisors 2013) discourages the removal of oak trees by establishing procedures and penalties for the removal of 10 percent or more of the native oak canopy cover, the removal of any old growth oak tree, and the removal of any valley oak (*Quercus lobata*) measuring five inches or greater in diameter at breast height.

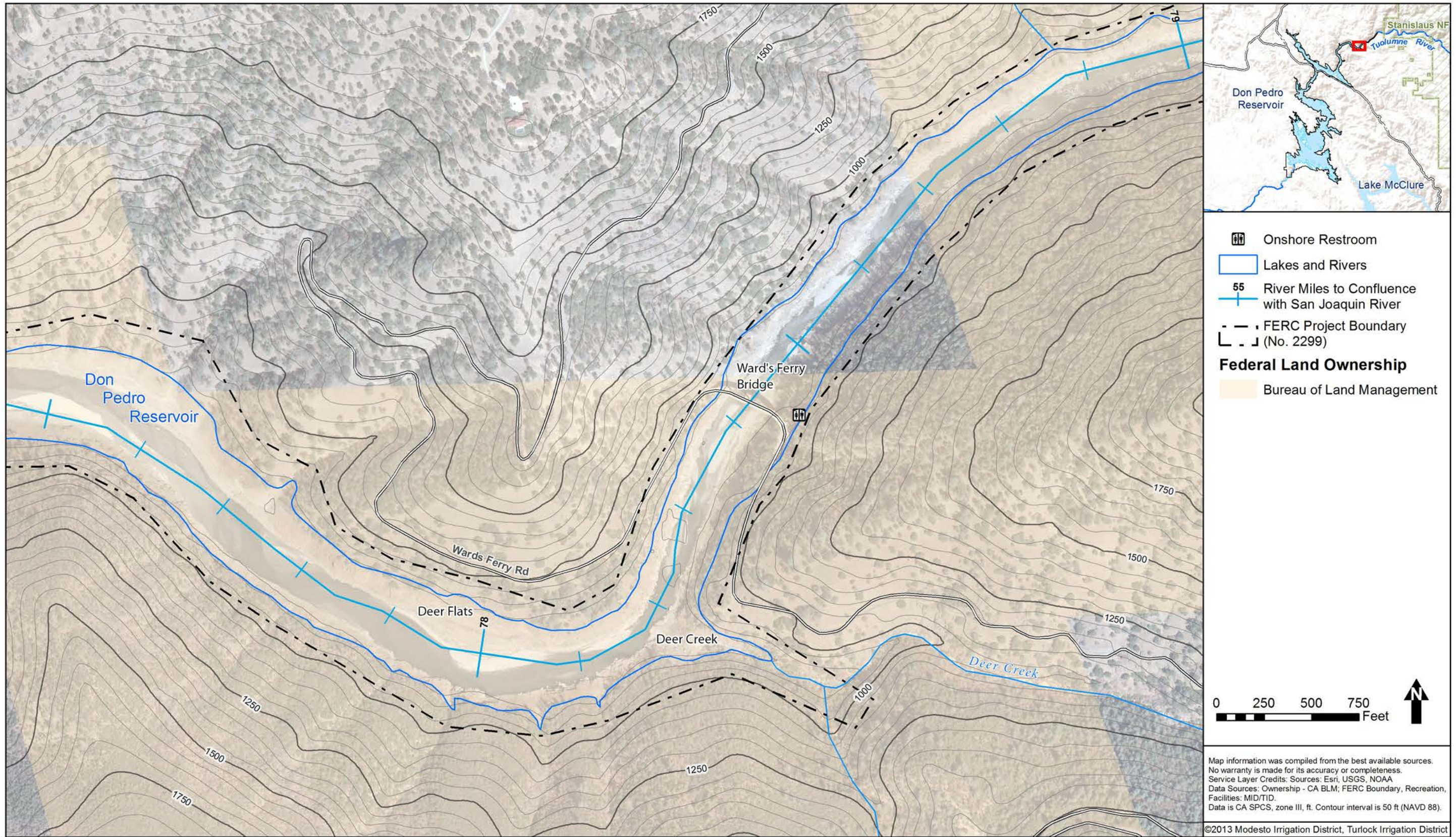


Figure 3.1-1. Deer Creek and Deer Flats location.

A whitewater boating take-out site at Deer Flats could potentially be developed beginning along the route of the existing user-defined walking trail from Ward's Ferry Road, a paved public road maintained by Tuolumne County. Beginning at a turnout on the south side of Ward's Ferry Road, the trail is initially steep but still walkable (Figure 3.1-2) and then flattens out at the high water mark, about the half way point of the trail (Figure 3.1-3). The remainder of the route, from the high water level down to the river channel, is too steep and unconsolidated to be walkable (Figure 3.1-4).



Figure 3.1-2. Deer Flats: Steep grade immediately off Ward's Ferry Road.



Figure 3.1-3. Deer Flats: Low gradient terrain along potential access route.



Figure 3.1-4. Deer Flats: Steep grade from high water level to river channel.

If Deer Flats were developed into a take-out location, river access would be located on an existing sandbar on the inside of a natural river curve (Figure 3.1-1). Most of the material in the sandbar was deposited during a high flow event in the winter of 1997; during this event, an estimated 50-foot-depth of material was deposited. Since that time, the sandbar has gradually been eroding. This cycle of deposition and erosion renders the site unstable for permanent construction and presents challenges for ongoing maintenance of any built facilities.

Due to the elevation difference between the ingress/egress point on the Ward's Ferry Road shoulder (900 ft msl) and the river channel where take-out would occur under low water level conditions (750 ft msl), site development at Deer Flats would require construction of a new 1,500-foot-long³ access road⁴ that would accommodate vehicle and pedestrian traffic (Figure 3.1-5). A vehicle turnaround could be accommodated at the road's approximate half-way point. As detailed in Appendix A, the estimated cost for final design and construction of the Deer Flats alternative is \$1,581,000 to \$2,616,000. This estimate does not include the cost of construction permitting or historic properties surveys that may be required.

Construction of a permanent whitewater boating take-out site at Deer Flats would be difficult. The change in elevation from the shoulder of Ward's Ferry Road to the river channel at this location is 150 feet, requiring construction of 1,500 linear feet of new road where currently only an unimproved walking trail over portions of the site exists. Also, slope instability along the steep part of the potential road route, as well as a lack of flat spots to stage construction equipment, may inhibit road construction. Construction of a permanent access ramp would require a solid foundation; however, the depth to rock at the site is unknown. Geologic instability may limit the site's suitability for a permanent take-out facility. Construction at this location may result in impacts to oak trees protected by Tuolumne County. Lastly, ongoing maintenance may become an issue as sediment accumulates during high flow events.

Based on the criteria established in the RR-02 Study Plan, Deer Flats is not a feasible alternative to the existing Ward's Ferry Bridge site. Located approximately ½ mile down river from the Ward's Ferry Bridge take-out, Deer Flats is farther downstream from the terminus of the whitewater run than the existing take-out location. Despite proximity to Ward's Ferry Road, developing Deer Flats as a take-out would require construction of a new 1,500-foot road. The site's steep topography, especially the bank slope below the high water level, and the potential need to avoid sensitive resources, would result in extensive construction under challenging physical conditions, likely resulting in high construction costs. Any required mitigation for impacts to sensitive resources would add to these construction costs.

³ This road length estimate assumes a 10 percent maximum road grade, or 100 feet of road construction for every 10 feet of elevation difference.

⁴ Conceptual designs in this document assume a road width of 15 feet to accommodate vehicle and pedestrian traffic.

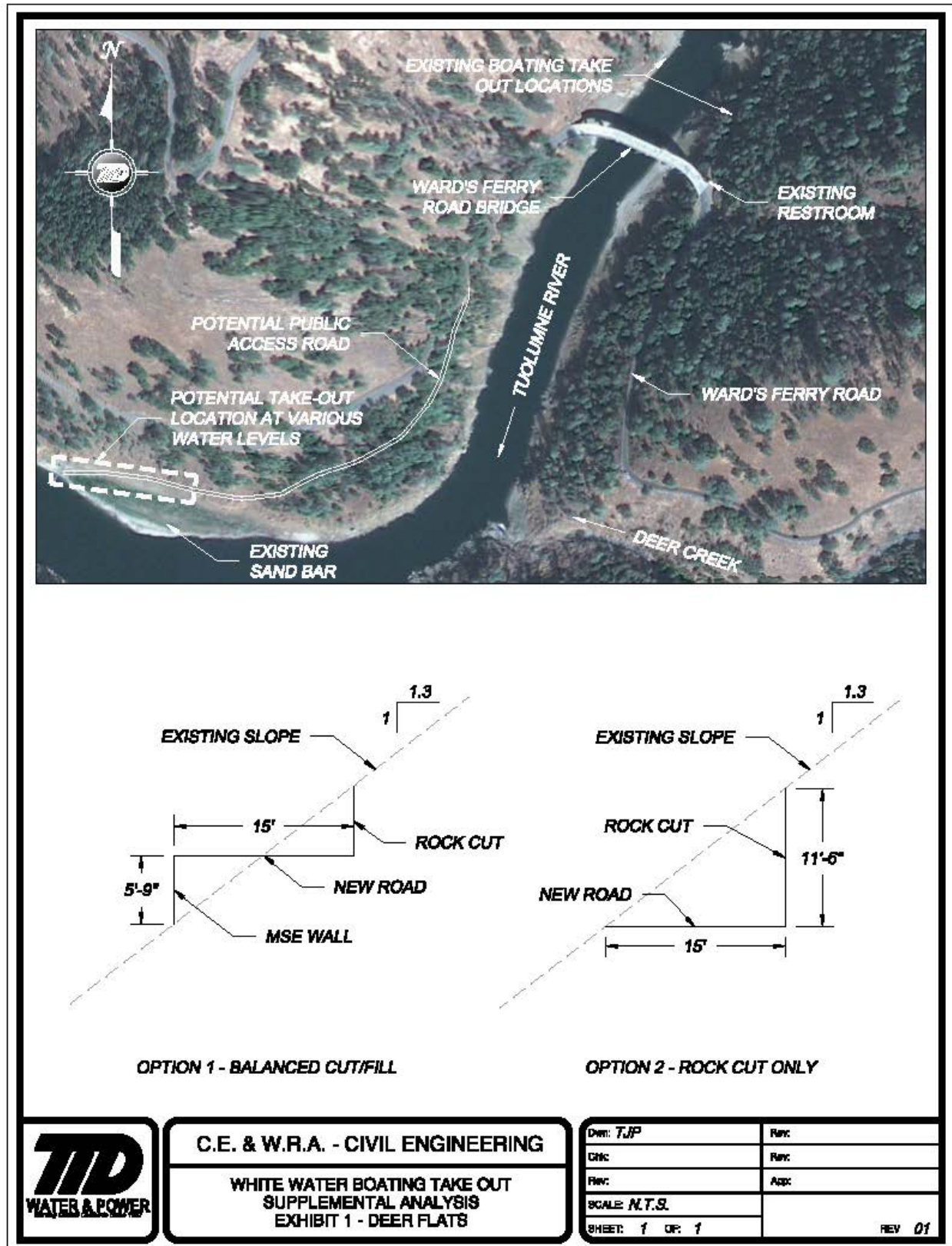


Figure 3.1-5. Deer Flats whitewater boating take-out improvements conceptual design.

3.2 Deer Creek Alternative

The potential Deer Creek whitewater boating take-out site is located within the Project Boundary on BLM-administered land at the confluence of Deer Creek and the Tuolumne River on river left (south side) of the Tuolumne River, approximately ¼ mile downstream of the Ward's Ferry Bridge. The site has similar topography to the existing Ward's Ferry Bridge take-out location and is comprised of unconsolidated substrates. Following the high flow event in the winter of 1997, a large amount of sediment was deposited at Deer Creek. Since that time, sediment at the site has been eroding gradually.

Current disturbances to the natural resources at Deer Creek are minimal and no sensitive natural resources are known to be present. An undeveloped, user-defined trail creates a minimal disturbance, as do the presence of noxious weeds such as Klamathweed (*Hypericum perforatum*) and yellow star thistle (*Centaurea solstitialis*). Remnants of an old road, a segment of a pedestrian/pack animal trail dating to between 1851 and 1878, are evident (Napton 1992). At this time, this cultural resource has not been evaluated for its eligibility for inclusion on the National Register of Historic Places.

DPRA utilizes Deer Creek to collect floating woody debris from the Tuolumne River. When Don Pedro Reservoir water levels are high, floating woody debris can accumulate and completely block the upper reach of the Tuolumne River arm of the reservoir. DPRA uses floating log booms at the mouth of Deer Creek to capture this floating debris to minimize navigational hazards to vessels and to keep the upper river channel above the Ward's Ferry Bridge clear of debris during the whitewater boating season. Deer Creek is the only suitable area in the Tuolumne River arm where DPRA can pull floating debris out of the main channel.

Similar to the Deer Flats location, Deer Creek is accessible from Ward's Ferry Road (Figure 3.1-1). The shoreline is accessible via the route of the existing undeveloped user-defined walking trail, which begins at the south side of Ward's Ferry Road (Figure 3.2-1). From Ward's Ferry Road to the river channel, the hillside is very steep with an elevation change of 250 feet; topographical maps indicate that slopes along much of the potential access route range from 1.3:1 to 1.5:1. Due to the steep slopes, development of a take-out at Deer Creek would require construction of a new 2,500-foot⁵ access road that would accommodate vehicle and pedestrian traffic. Cut and fill or rock cut of an estimated 4,000 – 8,000 cubic yards would be necessary to ensure stability, resulting in a large footprint of disturbed area. A conceptual design is presented in Figure 3.2-2. There is no suitable location for vehicle turnaround or parking at the potential Deer Creek site. As detailed in Appendix A, the estimated cost for final design and construction of the Deer Creek alternative is \$2,571,000 to \$4,296,000. This estimate does not include the cost of construction permitting or historic properties surveys that may be required.

⁵ This road length estimate assumes a 10 percent maximum road grade.



Figure 3.2-1. Deer Creek: Site gradient.

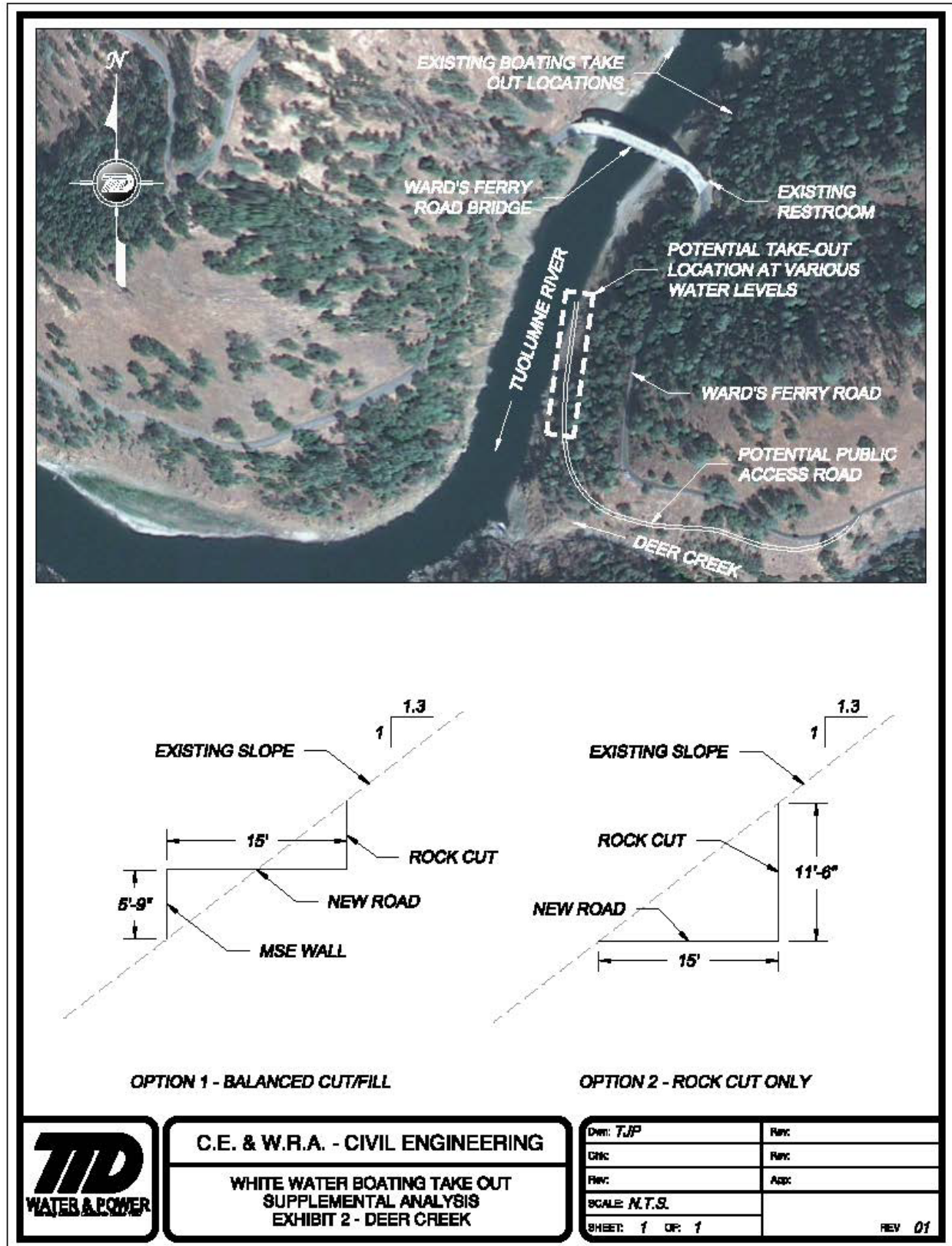


Figure 3.2-2. Deer Creek whitewater boating take-out improvements conceptual design.

Construction and operation of a permanent whitewater boating take-out site at Deer Creek would be difficult. Similar to Deer Flats, continually changing sediment conditions limit the site's suitability as a permanent take-out site. Depending on the areas to be used for construction activities, measures to address potential impacts to oak trees may be required. In addition to impacts to terrestrial resources in the area, construction and operation activities could result in the increased spread of noxious weeds, including Klamathweed and yellow star thistle. Lastly, DPRA's floating wood debris collection activities would have to be relocated if whitewater take-out activities were to occur at Deer Creek.

Based on the criteria established in the RR-02 Study Plan, Deer Creek is not a feasible alternative to the existing Ward's Ferry Bridge take-out site. Deer Creek is nearly ¼ mile farther away from the terminus of the whitewater run than the current take-out. Although located adjacent to Ward's Ferry Road, development of a take-out site at Deer Creek would necessitate construction of a new 2,500-foot road. Among the three sites assessed, Deer Creek's topography, with a vertical difference of approximately 250 feet between elevation at the shoulder of Ward's Ferry Road and the river channel, is the steepest. Therefore, the potential for construction at this site would be limited.

3.3 Additional Parking for the Ward's Ferry Bridge Take-Out

Parking in the vicinity of the Ward's Ferry Bridge is extremely constrained by steep topography. One potential new parking area on BLM land in the vicinity of Deer Flats was identified and evaluated in 2013.

As described in the RR-02 Study Report, all parking construction options at the Ward's Ferry Bridge take-out, even for linear road features, require cut and/or fill to create horizontal space.

The semi-flat area near the upper end of the potential Deer Flats access route, located roughly 1,000 feet from the Ward's Ferry Bridge, could potentially be developed into a parking area for boaters using the existing take-out location (Figure 3.3-1). Developing a parking area at this location would require clearing the area and constructing a new road from Ward's Ferry Road to the new parking area. The estimated construction costs for developing the parking area total approximately half of the costs estimated to build a take-out at Deer Flats. This estimate does not include the cost of improvements to the Ward's Ferry Road that may be required to accommodate pedestrian use along the public road.



Figure 3.3-1. Tuolumne River whitewater boating take-out potential additional parking site.

User safety would be a concern if the parking area were developed for use by whitewater boaters at the existing Ward's Ferry Bridge take-out. The location of the parking area would necessitate pedestrian travel along Ward's Ferry Road to get between the parking area and the Ward's Ferry Bridge take-out. Safety measures related to vehicle and pedestrian traffic would likely be warranted.

Increased potential for user conflicts is another concern of developing the parking area. It is likely that development of a parking facility such as this for whitewater boaters would attract other river users and general outdoor recreationists. Use of the parking area by individuals other than whitewater boaters may prevent use of the parking area by boaters, creating the potential for user conflicts at the take-out location.

3.4 Facility Capacity

Current and future demand for whitewater boating take-out and appurtenant visitor facilities, such as restrooms, at Ward's Ferry Bridge and its vicinity is driven mostly by river flow, which varies from year to year. The timing and amount of flows during the whitewater boating season (April through August) are established each spring by the City and County of San Francisco. The maximum number of whitewater boaters on the river at any one time and during any one year is managed by the USFS via a private and commercial permitting system.

Typical current use of the Ward's Ferry Bridge take-out site by whitewater boaters occurs in the afternoon when guided rafting trips are concluding. Some guides currently carry the boats and equipment by hand from the river to the Ward's Ferry Road; others hoist the rafts to the bridge deck using a truck-mounted winch. Crowding sometimes occurs if several professional guide groups arrive at the take-out at the same time. However, trip management is designed to provide a sense of solitude for each group during the whitewater trip and to prevent crowding at key rapids and beach locations. This results in staggered arrivals of commercially-guided groups to the take-out location.

From 1977 to 2012, there was an overall downward trend in use levels at the Ward's Ferry Bridge take-out. Use estimates indicate an annual average of 5,063 boaters from 1977 to 1992⁶, 5,606 boaters from 1993 to 2002, and 4,225 boaters from 2003 to 2012 (USDA 2013).

There are several important considerations in designing take-out improvements or new facilities. Based on the demand for a whitewater boating take-out in this vicinity and the presence of recreation facilities to serve other recreation needs at different locations at the Project, the facility at this location should be developed for safe and efficient whitewater boating take-out and not for general recreation use. Whitewater boating take-out use is "peaky" by nature within the day, week, and year. Peak use occurs on summer weekend afternoons, with virtually no use in the winter months or early in the day, even on summer weekends. For this reason, it is not prudent to design a facility to accommodate peak use. In addition, take-out improvements or new facilities that add capacity may attract additional users, including non-whitewater boaters, who, if present at take-out time would usurp capacity and increase any crowding that might occur during the summer weekend daily peak of whitewater take-out.

⁶ This average does not include 1977 and 1987 when no boating occurred on the river due to water conditions.

Given these considerations, projected future use alone cannot guide decisions about Tuolumne River whitewater boating take-out site development.

3.5 Bathroom Re-Location and Road Width at the Existing Ward's Ferry Bridge Take-Out

Bathroom re-location and road width are addressed in the RR-02 Study Report.

4.0 CONCLUSION

This attachment addresses FERC staff and relicensing participants' requests for additional information on the feasibility of new whitewater boating take-out locations on the Tuolumne River at the upstream end of the Don Pedro Project. The conclusions presented in the Study Report are supported by this additional information.

There are no apparent benefits of the potential Deer Flats or Deer Creek sites over the existing Ward's Ferry Bridge take-out location. Both new sites are farther from existing restroom and parking facilities and would require more flatwater paddling at both high and low reservoir levels. Compared with improvements to the existing take-out location, design and construction at both new sites would be more constrained, result in greater resource impacts, and cost substantially more due to increases in the length of new road to be constructed, amount of excavation and fill required to stabilize the road, and resulting area of new disturbance (Table 4.0-1). Developing take-out sites in these two locations would result in impacts to largely undisturbed areas and facilities that would require intensive maintenance due to the sediment and debris depositions that occur at these locations. In contrast, the Ward's Ferry Bridge take-out location has the lowest elevation access point of the three alternatives and is already disturbed. Therefore, the Districts have concluded that no further consideration of the Deer Flats and Deer Creek alternatives is warranted.

Table 4.0-1 Comparison of Potential Whitewater Boating Take-Out Locations

Potential Take-Out Site	Area of new disturbance (acres)	Change in elevation (feet) ¹	Estimated excavation ² (cubic yards)	Estimated fill (cubic yards)	Length of newly constructed road	Estimated cost
Ward's Ferry Bridge, river right, Option 1	0.43	100 ft.	881	1,022	400	\$749,142
Ward's Ferry Bridge, river right, Option 2	0.43	100 ft.	52	1,763	400	\$695,798
Ward's Ferry Bridge, river left, Option 1	0.37	100 ft.	916	716	400	\$760,165
Ward's Ferry Bridge, river left, Option 2	0.37	100 ft.	0	1,534	400	\$738,540
Deer Flats, Option 1	0.52	150 ft.	1,200	1,200	1,500	\$1,581,842
Deer Flats, Option 2	0.52	150 ft.	4,800	0	1,500	\$2,616,232
Deer Creek, Option 1	0.86	250 ft.	2,000	2,000	2,500	\$2,571,818
Deer Creek, Option 2	0.86	250 ft.	8,000	0	2,500	\$4,295,803

¹ Change in elevation between the shoulder of Ward's Ferry Road at ingress/egress location and the river channel at the boating take-out location.

² Includes rock excavation.

5.0 REFERENCES

- Napton, L. K. (with contributions from Carlo De Ferrari). 1992. *Clavey River Project (License Application No. 10081) Cultural Resources Reconnaissance of the Proposed 230 KV Transmission Line Corridor Preferred Route, Stanislaus and Tuolumne Counties, California*. Report on file, Central California Information Center, Turlock, California.
- Tuolumne County Board of Supervisors. 2013. Tuolumne County Ordinance Code 2903, Chapter 9.24: Premature Removal of Oak Trees. Available online: <<http://www.co.tuolumne.ca.us/index.aspx?NID=190>>. Accessed October 1, 2013. Last updated 2013. Tuolumne County, CA.
- U.S. Department of Agriculture (USDA). 2013. 1977-2012 Tuolumne Wild & Scenic River Use. (Summary data provided to the Districts January 31, 2013)

**STUDY REPORT RR-02
WHITEWATER BOATING TAKE-OUT
IMPROVEMENT FEASIBILITY**

ATTACHMENT A: APPENDIX A

**DEER FLATS AND DEER CREEK WHITEWATER BOATING
TAKE-OUT CONCEPTUAL DESIGNS PRELIMINARY
COST ESTIMATES**

Don Pedro Hydroelectric Project (FERC No. 2299)
White Water Boating Takeout Improvements - Additional Analysis
Preliminary Opinion of Probable Construction Costs
DEER FLATS OPTION 1 - BALANCED CUT/FILL

No.	Description	Qty	Units	Material	Labor	Equipment	Total Rate Plus O&P	Direct Total	Total \$
General									\$ 57,500.00
1	Mobilization	1	LS				\$ 35,000	\$ 35,000	
2	Temporary Services	1	LS				\$ 5,000	\$ 5,000	
3	Site Management	1	LS				\$ 15,000	\$ 15,000	
4	Site Access	1	LS				\$ 2,500	\$ 2,500	
Construct New Road (Balanced Cut/Fill)									\$ 1,033,425
1	Rock Blasting	1,200	CY	\$ 3.03	\$ 123.22	\$ 126.60	\$ 252.85	\$ 303,420	
2	Rock Removal	-	CY	\$ -	\$ 34.52	\$ 32.44	\$ 66.96	\$ -	
3	Common Borrow/Road Buildup	1,200	CY	\$ 19.41	\$ 16.52	\$ 22.62	\$ 58.55	\$ 70,260	
4	Wall	8,625	SF	\$ 21.27	\$ 15.63	\$ 1.74	\$ 38.64	\$ 333,270	
5	Wall Footing	1,500	CF	\$ 25.21	\$ 48.94	\$ 2.36	\$ 76.51	\$ 114,765	
6	Select Road Materials	1,200	CY	\$ 21.22	\$ 16.28	\$ 22.34	\$ 59.84	\$ 71,808	
7	Pavement	15,000	SF	\$ 2.40	\$ 0.68	\$ 0.54	\$ 3.62	\$ 54,300	
8	Pavement Hauling	370	TN	\$ -	\$ 13.98	\$ 19.58	\$ 33.56	\$ 12,417	
9	Guardrail	1,500	LF	\$ 40.43	\$ 5.18	\$ 3.18	\$ 48.79	\$ 73,185	
								Subtotal	\$ 1,090,925
								Engineering (15%)	\$ 163,639
								Contingency (30%)	\$ 327,278
								Total	\$ 1,581,842

Notes/Assumptions:

- Unit Prices based on HDR 2013 RR03 Study.
- Access consists of a single 15-ft road to the river (10-ft designated for vehicles and 5-ft for pedestrians)
- Access elevation = 900 ft, and river elevation = 750 ft.

Don Pedro Hydroelectric Project (FERC No. 2299)
White Water Boating Takeout Improvements - Additional Analysis
Preliminary Opinion of Probable Construction Costs
DEER FLATS OPTION 2 - ROCK CUT ONLY

No.	Description	Qty	Units	Material	Labor	Equipment	Total Rate Plus O&P	Direct Total	Total \$
General									\$ 57,500
1	Mobilization	1	LS				\$ 35,000	\$ 35,000	
2	Temporary Services	1	LS				\$ 5,000	\$ 5,000	
3	Site Management	1	LS				\$ 15,000	\$ 15,000	
4	Site Access	1	LS				\$ 2,500	\$ 2,500	
Construct New Road (Rock Cut Only)									\$ 1,746,798
1	Rock Blasting	4,800	CY	\$ 3.03	\$ 123.22	\$ 126.60	\$ 252.85	\$ 1,213,680	
2	Rock Removal	4,800	CY	\$ -	\$ 34.52	\$ 32.44	\$ 66.96	\$ 321,408	
3	Select Road Materials	1,200	CY	\$ 21.22	\$ 16.28	\$ 22.34	\$ 59.84	\$ 71,808	
4	Pavement	15,000	SF	\$ 2.40	\$ 0.68	\$ 0.54	\$ 3.62	\$ 54,300	
5	Pavement Hauling	370	TN	\$ -	\$ 13.98	\$ 19.58	\$ 33.56	\$ 12,417	
6	Guardrail	1,500	LF	\$ 40.43	\$ 5.18	\$ 3.18	\$ 48.79	\$ 73,185	
								Subtotal	\$ 1,804,298
								Engineering (15%)	\$ 270,645
								Contingency (30%)	\$ 541,289
								Total	\$ 2,616,232

Notes/Assumptions:

- Unit Prices based on HDR 2013 RR03 Study.
- Access consists of a single 15-ft road to the river (10-ft designated for vehicles and 5-ft for pedestrians)
- Access elevation = 900 ft, and river elevation = 750 ft.

Don Pedro Hydroelectric Project (FERC No. 2299)
White Water Boating Takeout Improvements - Additional Analysis
Preliminary Opinion of Probable Construction Costs
DEER CREEK OPTION 1 - BALANCED CUT/FILL

No.	Description	Qty	Units	Material	Labor	Equipment	Total Rate Plus O&P	Direct Total	Total \$
General									\$ 57,500
1	Mobilization	1	LS				\$ 35,000	\$ 35,000	
2	Temporary Services	1	LS				\$ 5,000	\$ 5,000	
3	Site Management	1	LS				\$ 15,000	\$ 15,000	
4	Site Access	1	LS				\$ 2,500	\$ 2,500	
Construct New Road (Balanced Cut/Fill)									\$ 1,716,168
1	Rock Blasting	2,000	CY	\$ 3.03	\$ 123.22	\$ 126.60	\$ 252.85	\$ 505,700	
2	Rock Removal	-	CY	\$ -	\$ 34.52	\$ 32.44	\$ 66.96	\$ -	
3	Common Borrow/Road Buildup	2,000	CY	\$ 19.41	\$ 16.52	\$ 22.62	\$ 58.55	\$ 117,100	
4	Wall	14,375	SF	\$ 21.27	\$ 15.63	\$ 1.74	\$ 38.64	\$ 555,450	
5	Wall Footing	2,500	CF	\$ 25.21	\$ 48.94	\$ 2.36	\$ 76.51	\$ 191,275	
6	Select Road Materials	1,900	CY	\$ 21.22	\$ 16.28	\$ 22.34	\$ 59.84	\$ 113,696	
7	Pavement	25,000	SF	\$ 2.40	\$ 0.68	\$ 0.54	\$ 3.62	\$ 90,500	
8	Pavement Hauling	610	TN	\$ -	\$ 13.98	\$ 19.58	\$ 33.56	\$ 20,472	
9	Guardrail	2,500	LF	\$ 40.43	\$ 5.18	\$ 3.18	\$ 48.79	\$ 121,975	
								Subtotal	\$ 1,773,668
								Engineering (15%)	\$ 266,050
								Contingency (30%)	\$ 532,100
								Total	\$ 2,571,818

Notes/Assumptions:

- Unit Prices based on HDR 2013 RR03 Study.
- Access consists of a single 15-ft road to the river (10-ft designated for vehicles and 5-ft for pedestrians)
- Access elevation = 1,000 ft, and river elevation = 750 ft.

Don Pedro Hydroelectric Project (FERC No. 2299)
White Water Boating Takeout Improvements - Additional Analysis
Preliminary Opinion of Probable Construction Costs
DEER CREEK OPTION 2 - ROCK CUT ONLY

No.	Description	Qty	Units	Material	Labor	Equipment	Total Rate Plus O&P	Direct Total	Total \$
General									\$ 57,500
1	Mobilization	1	LS				\$ 35,000	\$ 35,000	
2	Temporary Services	1	LS				\$ 5,000	\$ 5,000	
3	Site Management	1	LS				\$ 15,000	\$ 15,000	
4	Site Access	1	LS				\$ 2,500	\$ 2,500	
Construct New Road (Rock Cut Only)									\$ 2,905,123
1	Rock Blasting	8,000	CY	\$ 3.03	\$ 123.22	\$ 126.60	\$ 252.85	\$ 2,022,800	
2	Rock Removal	8,000	CY	\$ -	\$ 34.52	\$ 32.44	\$ 66.96	\$ 535,680	
3	Select Road Materials	1,900	CY	\$ 21.22	\$ 16.28	\$ 22.34	\$ 59.84	\$ 113,696	
4	Pavement	25,000	SF	\$ 2.40	\$ 0.68	\$ 0.54	\$ 3.62	\$ 90,500	
5	Pavement Hauling	610	TN	\$ -	\$ 13.98	\$ 19.58	\$ 33.56	\$ 20,472	
6	Guardrail	2,500	LF	\$ 40.43	\$ 5.18	\$ 3.18	\$ 48.79	\$ 121,975	
								Subtotal	\$ 2,962,623
								Engineering (15%)	\$ 444,393
								Contingency (30%)	\$ 888,787
								Total	\$ 4,295,803

Notes/Assumptions:

- Unit Prices based on HDR 2013 RR03 Study.
- Access consists of a single 15-ft road to the river (10-ft designated for vehicles and 5-ft for pedestrians)
- Access elevation = 1,000 ft, and river elevation = 750 ft.

**STUDY REPORT RR-02
WHITEWATER BOATING TAKE-OUT
IMPROVEMENT FEASIBILITY**

ATTACHMENT B

PHOTOGRAPHS OF THE WARD'S FERRY BRIDGE TAKE-OUT SITE

List of Photos

Photo No.	Description	Page No.
Photo 1.	Ward's Ferry Bridge Take-Out Site, Looking Upstream from Existing Bridge. Note Old Bridge Abutments and User-Defined Access Trail. (Water Elevation 759 ft msl at Don Pedro Dam.).....	1
Photo 2.	Ward's Ferry Bridge Take-Out Site, Vault Toilet on River Left at South End of the Existing Bridge.....	1
Photo 3.	Ward's Ferry Bridge Take-Out Site River Left and River Right Under High Water Elevation Conditions. (Water Elevation 827 ft msl at Don Pedro Dam.)	2
Photo 4.	Ward's Ferry Bridge Take-Out Site Depicting Steep Banks, River Left and River Right.....	2
Photo 5.	Ward's Ferry Bridge Take-Out Site, Showing Height from River to Bridge Deck and Outfitter Hoisting Rafts from River to Bridge Deck.	3



Photo 1. Ward's Ferry Bridge Take-Out Site, Looking Upstream from Existing Bridge. Note Old Bridge Abutments and User-Defined Access Trail. (Water Elevation 759 ft msl at Don Pedro Dam.)



Photo 2. Ward's Ferry Bridge Take-Out Site, Vault Toilet on River Left at South End of the Existing Bridge.



Photo 3. Ward's Ferry Bridge Take-Out Site River Left and River Right Under High Water Elevation Conditions. (Water Elevation 827 ft msl at Don Pedro Dam.)



Photo 4. Ward's Ferry Bridge Take-Out Site Depicting Steep Banks, River Left and River Right.

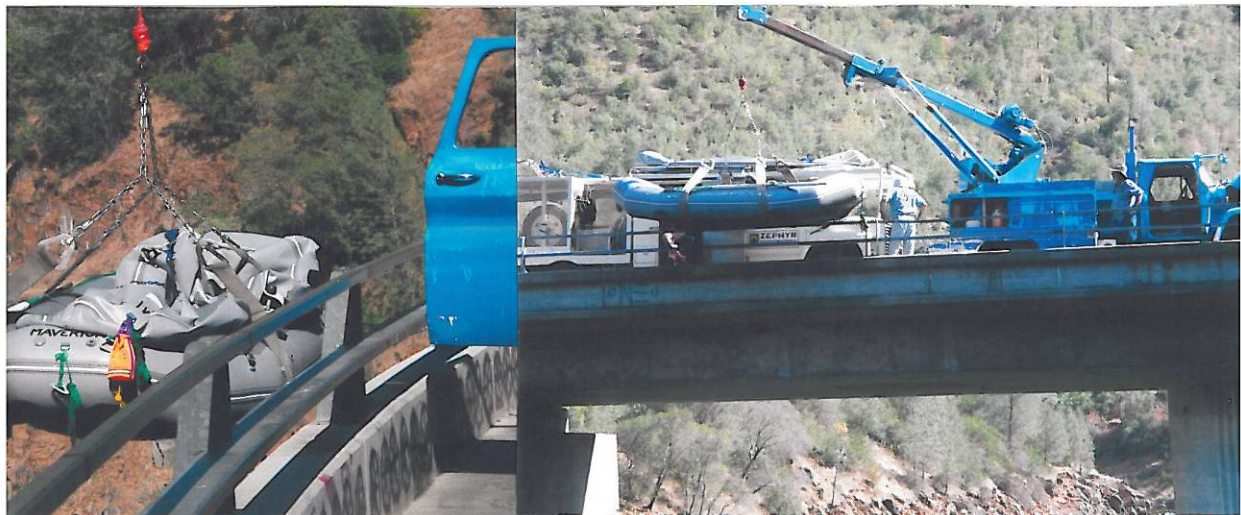


Photo 5. Ward's Ferry Bridge Take-Out Site, Showing Height from River to Bridge Deck and Outfitter Hoisting Rafts from River to Bridge Deck.

**STUDY REPORT RR-02
WHITEWATER BOATING TAKE-OUT
IMPROVEMENT FEASIBILITY**

ATTACHMENT C

**WHITEWATER BOATING TAKE-OUT FEASIBILITY
STUDY FOCUS GROUP MEETING SUMMARY**

TABLE OF CONTENTS

Section No.	Description	Page No.
1.0	EXISTING TAKE-OUT SITUATION	1-1
1.1	Types of User Groups	1-1
1.2	How the Take-Out is Currently Used	1-1
1.3	Challenges at Ward’s Ferry Bridge Take-Out	1-1
1.3.1	Difficult Terrain	1-1
1.3.2	User Conflicts at Take-Out Sites	1-2
1.3.3	Lawlessness.....	1-2
1.3.4	Traffic Congestion	1-3
1.3.5	Conflict with Motorized Boaters	1-4
1.4	Perception of User Group Disparity	1-4
2.0	ALTERNATIVES DISCUSSED	2-1
2.1	Take-Out at Moccasin Point Recreation Area	2-1
2.2	Take-Out at Ward’s Ferry Bridge	2-1
2.2.1	Boat Ramp(s) to Low Water	2-1
2.2.2	Widening the Ward’s Ferry Bridge.....	2-2
2.2.3	Constructing a Dedicated Boater Crane Platform.....	2-2
2.3	Alternatives at New Locations.....	2-3
2.3.1	Deer Creek Road.....	2-3
2.3.2	Mohican Mine Road	2-3
2.3.3	Land Swap for New Take-Out.....	2-3
2.4	Ranking the Alternatives.....	2-4
3.0	DPRA’S THOUGHTS ON THE TAKE-OUT	3-1
4.0	FINAL THOUGHTS	4-1

Whitewater Boating Take-Out Improvement Feasibility Study

Focus Group with Whitewater Boating Outfitters and River Boaters

Location: Hetch-Hetchy Water and Power, Moccasin, CA

Date: April 17, 2012

Time: 2:30-4:30 pm

Attendees

- Tom McDonnell – Sierra Mac River Trips
- Darrel Roman – Tuolumne River Shuttles
- Jeff Horn – BLM
- Marty McDonnell – Sierra
- Steve Bowes – National Park Service
- Dusty Vaughn – USDA Forest Service
- Vern Shumway – USDA Forest Service
- Dave Jigour – Don Pedro Recreation Agency
- Cooper Freeman – White Water Voyages
- Bob Ferguson – Zehpyr Whitewater
- James Rodger – OARS
- Jody Rowlands – OARS
- Carol Russell – Don Pedro Recreation Agency
- Bob Hackamack – Retired Canoeist/Tuolumne River Trust
- Jean Hackamack – “Along for the ride...”
- Steve Welch – ARTA River Trips
- Adam Maeurkiewicz – Hetch Hetchy
- Kelly Bricker, HDR
- Matt Paquette, HDR
- Jeremy Schultz, HDR

The following is a summary of comments and discussion at a meeting conducted per the Whitewater Boating Take-Out Improvement Feasibility Study Plan as approved in FERC’s Study Plan Determination issued December 22, 2011.

The purpose of the meeting was to elicit knowledge on use of the Ward’s Ferry Bridge take-out site from guides and boaters familiar with the Tuolumne River and take-out site. The meeting results will be used to understand the existing site, potential improvements, and alternative sites.

1.0 EXISTING TAKE-OUT SITUATION

1.1 Types of User Groups

The Ward's Ferry Access is used by 1) commercial whitewater boaters; 2) private whitewater boaters; and 3) general day use recreationists who picnic, fish, and occasionally launch a canoe/flat-water kayak in the reservoir.

1.2 How the Take-Out is Currently Used

Commercial boaters typically use one side of the river (river left) and the private boaters will use the other side (river right). The old, stone bridge abutments just upstream of the concrete bridge are currently the main point of access. The lay-down areas and construction access routes created during construction of the existing bridge are used as a walking path to get down water level at a range of elevations. At high pool, the old bridge abutments are under water. As the pool drops below the bridge abutments, various kinds of user-created trails go up the bridge abutments, and are used for carrying equipment. The commercial outfitters park truck-mounted cranes on Ward's Ferry Bridge to lift their gear up to the bridge.

According to the focus group participants, the trails below the high water elevation are considered less than adequate and the Outfitters worry about a twisted ankle by guests and staff; moving heavy equipment up the trail; and even users slipping off the trail carrying boats.

Presently, the commercial boaters use trucks with cranes on them. We pull the boats out of the reservoir and load our trucks. This has issues, using the bridge as a crane platform. And the county and the California Highway Patrol and other authorities have said 'well, until there's a better solution, we're going to look the other way.' It's not really legitimate in some ways what we're doing, but it's the best alternative.¹

Overall, river right receives more use due to it being a slightly shorter trail, less of an incline, and clear access to the Ward's Ferry road (i.e., no toilet blocking the trail). The trail on river right needs work, especially below the elevation of the top of the old bridge pilings.

It's just a gnarly little walk. It doesn't really work to carry equipment up it.

Several people have fallen into the reservoir off the old Ward's Ferry road because you're holding a big wide boat. The guys on the left sort of drop into the canyon.

1.3 Challenges at Ward's Ferry Bridge Take-Out

1.3.1 Difficult Terrain

The terrain at Ward's Ferry presents some challenges depending on water level. These include rock/boulder fields, eroding trail, incline to the road, limited space/access on the road, traffic, the

¹ Italicized indented text in this summary present more or less direct quotes from focus group participants.

restroom blocks the access on river left, and traffic and operational concerns when using a boom truck.

I would say that the risk of harm to my employees or my clients is greatest from the time they step off the boat to the time they step on the bus to leave Ward's Ferry. That area is very dangerous with sliding rock, people up above dropping rocks down on you down below, and just carrying equipment on steep slopes with no horizontal trail is a prime [situation] for workmen's comp claims or for people spraining ankles. This is a very dangerous place. The take-out is way more dangerous than the rapids.

There was some concern over the concrete piling used to block traffic going down the trail on river right. Some said the trail eroded over the years because of the concrete blocks.

When they put that block in, all the water that comes off the bridge hits that and careens off into the reservoir, but as it does, it cuts all this soil away. The original road bed is shrinking.

1.3.2 User Conflicts at Take-Out Sites

There appears to be some user conflict at the take-out. Part of the issue is limited access to the water surface at various elevations. Another aspect is limited parking on Ward's Ferry Road, with vehicles often blocking the areas where boaters must move rafts on to trailers, etc. One user described a typical situation at take-out:

We did a 2 day trip, 16 of us, 4 boats, took out on river right. The reservoir level was below the bridge abutments so you actually pass the bridge abutments and then there's a switchback that goes up to the old Ward's Ferry road. There were 3 fishermen right at the bottom of the trail where it hits the reservoir with their fishing rods in the water and they didn't really want to move their fishing rods so we ended up sort of scaling the reservoir cliff side up. They eventually did move after we had made a few trips and they recognized somebody that was on our trip who they knew. We chose the river right side, because the river left side is blocked by the vault toilet and it's really hard and it gets really narrow because the toilet is close to the cliff and it's hard to get boats through there. So that's why the right side is usually the preferable side for carrying rafts up.

1.3.3 Lawlessness

Another aspect of user conflict is the continual lawlessness at the bridge. The lawlessness is impacting use at Ward's Ferry. Participants said law enforcement typically does not patrol this area due primarily to the lack of radio communication in the canyon. Further, most non-boaters know this and recognize that the area has limited law enforcement, which leads to unsafe conditions and rampant vandalism (painting on the bridge and restroom, breaking into vehicles, and general vandalism).

[Years ago...] there were a fair amount of private boaters who did overnight trips and I think the combination of the take-out getting worse and the security going completely

down, I mean it's not even safe to leave your stuff there unattended sometimes. And I think that has a big impact because as a private entity, there isn't the infrastructure for you to get your car down there and if you park it you're playing with fire. Which is unfortunate, this is one of the nicest rivers in the state if not the nation.

That's one of the things that disturbs me is that we are sort of accepting the fact that this is just a lawless area and we just can't do anything about it. Well you can do things about it. You can contract for a deputy. And you pay them enough money and get some communication down there and things would change.

Don Pedro project could station an officer down there since it is in the project as a public service person. And that would help a lot of things, but it would certainly make it easier for the rafters to take-out because the person could direct traffic; and as an official his presence would be felt by everybody and they'd be more courteous. And he could open the toilet to anybody while he's there. That's one little thing that could be done right away to help.

If you're going to put facilities in there, it's going to have to be secure. And it isn't now. And it would be crazy to leave your car there overnight. It wouldn't be there when you got back. Someone drilled into our gas tank and when we got a mile up it poured out on the ground. It's a problem. I don't know if this is the venue, but that's a law enforcement issue. That could be pretty easily solved if it's a communications issue. Put in a temporary repeater; those are pretty easy to come by.

To address security, the Forest Service River Rangers go down every week during the summer time. But leaving your vehicle there for any length of time is not advisable because it can be vandalized. That's another challenge with security. And the Forest Service River Rangers have the authority to write citations on the upper stretches of the river but not a Ward's Ferry because it's not Forest Service land. They deal with users conflicts with private boaters or with the fishermen or picnickers or whoever is blocking the take-out. They try and get them to move; that's an ongoing issue that Forest Service river rangers to help with.

1.3.4 Traffic Congestion

There is also considerable concern regarding traffic at the bridge.

I would say that the likelihood of one of my clients or guides being killed by a car on Ward's Ferry Bridge far exceeds anything else that we do.

In summary, the lack of a designated take-out area or assigned area for boaters presents issues among boaters and other shoreline users, particularly related to vehicles. For example, as one boater explained:

You have the spots where the vehicles are parked, but this year even the private trips are bringing the rafts and equipment up onto the road because there's no space on either

side to park or a designated loading area. The commercial users know to keep the road open, but somebody there for the first time, they just explode into the space and they don't care whether somebody has to wait while they deflate their boat.

The turn-around radius: And sometimes, I drive the bus, and I need a pretty good turnaround and to tow the trailer, they have to go all the way, almost a mile, to turn their trailer around. But there is a place where I turn my bus, but a lot of times, fishermen park right in the area.

While improvements are needed for the reasons discussed at the meeting, they could result in more constraints on use if not carefully considered:

Currently we can have 3 boom trucks and a couple private trips all taking out at one time. So if there is a ramp or access that goes down, it needs to be sized big enough that you can have 2 or 3, I don't know what that size is, but something to think about.

1.3.5 Conflict with Motorized Boaters

At present, motorized boaters can present a hazard and nuisance to whitewater boaters taking out at the bridge, primarily due to high speeds and lack of etiquette.

You also have to realize we're interfacing with reservoir users - jetskis and houseboats. It's not necessarily a big problem, but if you have your boat tied up to the side and the guy speeds by, and your boat goes up and down, the sharp rocks slash through the boat; this has been kind of a common problem for us when we're trying to take-out there.

One option is to designate this arm of the reservoir as non-motorized or motorized by with a speed limit by installing buoys at the bridge. Don Pedro Recreation Agency (DPRA) noted that this approach may impact the outfitters and boaters who choose to pull the rafts and kayaks behind a motorized boat to Moccasin Point Recreation Area.

DPRA noted that the current county code requires a 5-mph speed limit within 200 yards of the Ward's Ferry Bridge, but it is not marked/signed and not enforced/patrolled. DPRA said painting this speed limit on the bridge pilings is an option (which would require county approval), but DPRA needs another high water year to access and work on the pilings above the high water line. DPRA can get permission from the county to actually stencil signs on the bridge abutments or the pilings.

1.4 Perception of User Group Disparity

Respondents noted some disparity between facilities provided for motorized craft and those provided for non-motorized craft.

There's a disparity between the public facilities that are at the DPRA recreation sites on the reservoir and the facilities for the whitewater boaters. I know how it happened, because whitewater boating wasn't very prevalent when the project was built. There's

this disparity how one group of people of treated and the other group. So I think I'd focus on some improvement in how the whitewater boaters are treated. Patrols could be there at least in the day time to talk to the fishermen so that the conflicts don't come up; and there could be a secure parking area for private boaters who want to leave cars overnight.

2.0 ALTERNATIVES DISCUSSED

2.1 Take-Out at Moccasin Point Recreation Area

The Forest Service takes-out at Moccasin Point Recreation Area from time to time, but that has its own logistics problems. Once you pass the Ward's Ferry Bridge, you are in flat water and it is a long way to anything. The take-out time can be too long for commercial and most likely most private boaters—at 1.5 hours.

One positive is that DPRA does a great job of removing the logs that drift down the river; the route to Moccasin Point is clear for boating.

2.2 Take-Out at Ward's Ferry Bridge

2.2.1 Boat Ramp(s) to Low Water

Participants said that a ramp (preferably concrete but at least an improved/reinforced surface) to the water's edge at low water would be the best alternative. At a minimum, at least one side of the river should have a concrete ramp. However, the participants noted that given the multiple uses of this site and the crowding that can occur with multiple commercial outfitters taking out at the same time and/or private boaters taking out, the ideal scenario would include a concrete ramp to low water on both river left and river right. Several participants stated that the Graves Creek site on the Rogue River in Oregon is a good example (see attached photographs). Participants also said the pedestrian trails would need improvement. Many participants said that the ramp could be a back-down style designated as a non-motorized ramp with commercial and private boater access via a key permit system. Vehicle access needs to be limited to non-motorized boat take-out to prevent the site from being overwhelmed by anglers and other shoreline users.

So what about a ramp that was only open by permit to rafters or private rafters who got a permit and got a key to a padlock.

One of the challenges of building a boat ramp upstream from Ward's Ferry when we looked at this before, was cutting into the bank rather than building a bridge down to the water. And the landscape architects and engineers that looked at that; both sides felt that retaining walls were astronomical. That is was conceivable, but that is was somewhat a big stumbling block.

I've seen in Colorado's boat ramps in similar situations that were amazing; full on 4 lane bridge freeway type construction that goes right down into the water. And I think if you were to do something like that at Ward's Ferry, you know that's a big construction thing, but you need to have a boat ramp that goes down to the water's edge so the person can drive their vehicles right to the water, that's what needs to happen at Ward's Ferry. Some sort of access, probably geographically upstream, going upstream from the bridge, is the most reasonable approach. Both sides would be ideal.

If you can do it on Grave's Creek on the Rogue River, you can certainly do it at Ward's Ferry. It's a very similar canyon, very steep, very similar to this in terms of scale and distance from the road, distance from the bridge, all those things. So, I mean if it's done there, you can certainly do it here. That being said is that the best site for it. I don't know.

Grave's Creek is actually a put in, southern Oregon; it's the start of a wild and scenic boundary. The road turns off and they have a beautiful boat put in, it's very functional. It's not super big, it just goes down a hill, it has a little turnaround, a bathroom you know. A different scenario in terms of raising of the river, but that river gets up there to the 100,000 cfs range often so it would inundate that parking lot and it seems to have been fine.

In my world, in my ideal eco-friendly world, my vision for Ward's Ferry is...and I'm looking 50 years ahead: no motorized craft upstream of the bridge, 2 lane road and access all the way into the reservoir on whichever side of the road that you could drive right to the reservoir's edge, meaning that but no further so that you wouldn't be able to back a trailer in or launch a motorized boat. And there's parking up at bridge level for day use, but I can't imagine it being safe over night ever.

2.2.2 Widening the Ward's Ferry Bridge

Another suggestion was to widen the bridge, primarily to increase the parking opportunities at the site, which are otherwise greatly limited by the terrain (steep canyon walls near the river's edge).

Widening the bridge itself, I'm not sure if that's feasible. I know that at Don Pedro they left a little bit of concrete on the side, so at some point down the road I know they were planning on putting a whole other landing in here. But if the Ward's Ferry Bridge were feasible to be widened, that would be a real big improvement.

2.2.3 Constructing a Dedicated Boater Crane Platform

Another idea presented was to look into a permanent, dedicated crane platform, but most participants indicated this would not be the preferred method. However, if cost was prohibitive with the other more preferred options, then participants indicated this could be a workable, but less desirable option. Participants indicate some challenges with this option, as follows.

If other options are not feasible, it might be worth it to build a crane platform...you know it's something I wouldn't do, but that could be a solution to the problem...that might be more economically feasible than building a lane all the way down to the water and less environmental impact.

Private boaters never really have access to the boom truck and winch. And that might be something that we could consider spelling out how to coordinate and license – how the private boaters could use a winch from the bridge.

2.3 Alternatives at New Locations

2.3.1 Deer Creek Road

Deer Creek downstream of Ward's Ferry was another area mentioned as a potential site. This site would require pioneering a road longer than the Ward's Ferry site and would still require roughly 0.25-mile paddle below Ward's Ferry on flat-water.

Right across from Deer Creek there's actually a trail that goes down that people use to get firewood. It goes all the way to the water. That was talked about being the best new access, but then that takes you farther downstream of Ward's Ferry bridge and has the same issues.

Just downstream of where Deer Creek comes out on the north side of the river.

It's a pretty good walking grade to walk into. It's not as steep.

You start up a little higher because the road winds, but for a long time they thought of it as the preferred place. But if you were to build a cement road that went upstream, you'd have more feasible, cheaper, and likely to use. It takes you to the top of the ridge rather than a couple hundred yards.

2.3.2 Mohican Mine Road

Another new location suggested was the Mohican Mine Road, located approximately 3 miles upstream of the Ward's Ferry location. The existing road is a very rough, four-wheel drive road that would require major improvements to make it passable, particularly for outfitter vehicles (buses and vans with trailers). Participants indicated the numerous problems exist with this option, including the loss of river miles (3 mi) and quality whitewater; archeological sites in the area; private land.

2.3.3 Land Swap for New Take-Out

A suggestion was to look at access and other potential road developments that may or may not be on private property, with the idea the Forest Service or BLM could facilitate a land swap.

I think along those lines though, that's thinking outside of the box and is there another way, is there a road that is close that we could pioneer a road into a site that doesn't have issues of steep canyon walls. There's some Federal land down that butts up against the reservoir, so there are opportunities potentially and that is something I think we really need to study because if we can do flat roads, that might balance out cost wise. If there is currently federal land or there is an opportunity for swapping something that is beneficial to the project, then that is something we could look at, you know to accommodate a take-out or put in.

2.4 Ranking the Alternatives

The preferred alternative was a gated concrete ramp for access at all water levels, with access for multiple user types on both sides of the river identified as ideal. The next preferred alternative substituted the highly developed concrete material for more basic/rudimentary improvements to the existing road (grading/reinforcing the canyon walls) combined with the other access improvements (restroom relocation and parking expansion).

Regardless of the option chosen for improving direct access to low water, participants expressed strong support for the following improvements: 1) relocating the restroom, 2) providing additional parking opportunities; and 3) trail improvements to the river.

Finally, participants emphasized the need for increased law enforcement presence at this location to protect and preserve any improved facilities and provide a safe environment, especially after investments are made in site improvements.

3.0 DPRA'S THOUGHTS ON THE TAKE-OUT

DPRA representatives offered the following:

There may be a simple solution: Move the restroom, so it does not occupy the turnout, gating the road on river left, building a road down to the high water mark with a switchback, and a ramp to low water. This would require building up the road with gravel and rip-rap and rock wall.

4.0 FINAL THOUGHTS

Participants identified the overall importance of the Tuolumne River as a whitewater resource and its premier status not only in the state of California, but in the United States as well.

One of the things that I want to stress, I mean this is the gem in terms of whitewater rivers in our state. It's off the charts in terms of importance, and yet it has the crappiest take-out that there is. So that needs to change, it really does.

Respondents also said “something” rather than “nothing” needs to occur in the way of improvements to the take-out situation.

Also, we've been talking a lot about the ideal scenario, but I hope you are going to look at different grades of what we can do. Because you know cost is going to come up, and if all we look at is the ideal scenario and its going to cost a lot, then you need to have something else to look at whether it's just an improved trail, or surface hardening to just make the haul out easier from basically cheapest solution to a dream solution.

Respondents were in agreement overall as to the challenges and opportunities for an improved take-out at Ward's Ferry Bridge.

And for all of the challenges that we've identified, there is very little dissention in the room. I mean I think you're working...it's not like he wants blue and I want red, so I think that's a positive thing that we all...and the other thing is that anything you do is going to be an improvement.

**STUDY REPORT RR-02
WHITEWATER BOATING TAKE-OUT
IMPROVEMENT FEASIBILITY**

ATTACHMENT D

**WARD'S FERRY BRIDGE WHITEWATER BOATING TAKE-OUT
CONCEPTUAL DESIGNS PRELIMINARY COST ESTIMATES**

Don Pedro Hydroelectric Project (FERC No. 2299) - Ward's Ferry Bridge Whitewater Boating Take-Out
Conceptual Design Preliminary Cost Estimate - River Right Upgrade Option

EST. AS OF: December-12
PREPARED BY: CR MacDonald
REVIEWED BY: J Gagnon / G Hickman

CODE	DESCRIPTION	QUANTITY	MATERIAL UNIT	PRICE	QUANTITY	LABOR UNIT	RATE	QUANTITY	EQUIPMENT UNIT	RATE	Total Rate Plus O&P	DIRECT TOTAL \$	TOTAL \$	COMMENTS
100	GENERAL												\$57,500	
110	Mobilization										\$35,000	\$35,000		Assumed for adverse site location, narrow roads, remote location
120	Temporary Services										\$5,000	\$5,000		Assumed for power, data, and water
130	Site Management										\$15,000	\$15,000		Assumed, includes stockpile and surplus management, traffic control, trailer / office facilities and general oversight
140	Site Access										\$2,500	\$2,500		Assumed travel costs for inspection and supervision
1000	UPGRADE EXISTING ACCESS ROAD ON RIVER RIGHT												\$127,748	Note: Costs provided are in Q2 2012 Dollars based in Modesto Ca. Values for labor and equipment have been increased by an additional factor of 2 over means values and notes below due to the remote nature of the site.
1100	Road Restoration (Widen to 15' total to Old Abutment)													
1110	Rock Blasting	52	cuyd	\$3.03	52	cuyd	\$123.22	52	cuyd	\$126.60	\$252.85	\$13,111		Average of: Means ID: 312316300020 Drilling and blasting rock, open face, under 1500 C.Y. and Means ID: 312316301900 Drilling and blasting rock, restricted areas, up to 1500 C.Y.
1120	Rock Removal	52	cuyd	\$0.00	52	cuyd	\$34.52	52	cuyd	\$32.44	\$66.96	\$3,472		Means ID: 312316305000 Drilling and blasting rock, less than 0.5 C.Y., excavate and load boulders & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
1130	Wall Construction	250	sqft	\$21.27	250	sqft	\$15.63	250	sqft	\$1.74	\$38.64	\$9,660		Means ID: 323231371150 Segmental retaining walls, unit masonry interlocking wall system, straight split, 8" high x 18" wide x 20" deep, includes pins, and void fill, excludes base. Multiplied by a factor of 1.5, as Means does not provide an appropriate line item for this wall system. Assume 5 feet tall by length.
1140	Wall Footing	50	cult	\$25.21	50	cult	\$48.94	50	cult	\$2.36	\$76.51	\$3,826		Assuming a 1' wide x 1' tall footing along the length of wall: Means ID: 031113450020 C.I.P. concrete forms, footing, continuous wall, plywood, 1 use, includes erecting, bracing, stripping and cleaning & Means ID: 033105250150 Concrete, hand mix, for small quantities or remote areas, 5000 psi, using gas powered cement mixer, includes local bulk aggregate & sand, bagged Portland cement, excludes, forms, reinforcing, placing & finishing
1150	Common Borrow / Road Build Up	23	cuyd	\$19.41	23	cuyd	\$16.52	23	cuyd	\$22.62	\$58.55	\$1,355		Means ID: 312323154000 Borrow, common earth, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
1160	Select Road Materials	589	cuyd	\$21.22	589	cuyd	\$16.28	589	cuyd	\$22.34	\$59.84	\$35,239		Means ID: 312323155000 Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
1170	Pavement	7,950	sqft	\$2.40	7,950	sqft	\$0.68	7,950	sqft	\$0.54	\$3.62	\$28,779		Means ID: 321216140025 Asphaltic concrete, parking lots & driveways, 6" stone base, 2" binder course, 2" topping, no asphalt hauling included
1180	Pavement Hauling	192	ton	\$0.00	192	ton	\$13.98	192	ton	\$19.58	\$33.56	\$6,448		Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip. Assumed as a more appropriate delivery charge given the presumed travel distance.
1190	Guardrail	530	lf	\$40.43	530	\$530.00	\$5.18	530	lf	\$3.18	\$48.79	\$25,859		RS Means 2012 4 th Quarter Update, Modified to Modesto, Ca rates with Contractor O&P, Sales Tax and Insurance.
2000	UPGRADE RIVER RIGHT EXISTING TRAIL TO RIVER												\$11,107	
2100	Widen Trail to 4'													
2110	Grade Existing Trail	1,540	sqft	\$0.00	1,540	sqft	\$2.48	1,540	sqft	\$0.30	\$2.78	\$4,281		Means ID: 312216101200 Fine grading, fine grade granular base for sidewalks and bikeways
2110	Select Trail Materials	114	cuyd	\$21.22	114	cuyd	\$16.28	114	cuyd	\$22.34	\$59.84	\$6,826		Means ID: 312323155000 Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3000	CONSTRUCT NEW ROAD TO RIVER ON RIVER RIGHT												Varies	
3100	Rock Cut Option - Option 1												\$265,324	
3110	Rock Blasting	830	cuyd	\$3.03	830	cuyd	\$123.22	830	cuyd	\$126.60	\$252.85	\$209,771.85		Average of: Means ID: 312316300020 Drilling and blasting rock, open face, under 1500 C.Y. and Means ID: 312316301900 Drilling and blasting rock, restricted areas, up to 1500 C.Y.
3120	Rock Removal	830	cuyd	\$0.00	830	cuyd	\$34.52	830	cuyd	\$32.44	\$66.96	\$55,552.00		Means ID: 312316305000 Drilling and blasting rock, less than 0.5 C.Y., excavate and load boulders & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3200	MSE Wall - Option 2												\$228,534	
3210	Common Borrow / Road Build Up	741	cuyd	\$19.41	741	cuyd	\$16.52	741	cuyd	\$22.62	\$58.55	\$43,370.37		Means ID: 312323154000 Borrow, common earth, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3220	Wall	4,000	sqft	\$21.27	4,000	sqft	\$15.63	4,000	sqft	\$1.74	\$38.64	\$154,560.00		Means ID: 323231371150 Segmental retaining walls, unit masonry interlocking wall system, straight split, 8" high x 18" wide x 20" deep, includes pins, and void fill, excludes base. Multiplied by a factor of 1.5, as Means does not provide an appropriate line item for this wall system. Assume 10 feet tall by length.
3230	Wall Footing	400	cult	\$25.21	400	cult	\$48.94	400	cult	\$2.36	\$76.51	\$30,804.00		Assuming a 1' wide x 1' tall footing along the length of wall: Means ID: 031113450020 C.I.P. concrete forms, footing, continuous wall, plywood, 1 use, includes erecting, bracing, stripping and cleaning (units x3 to yield sqft per LF) & Means ID: 033105250150 Concrete, hand mix, for small quantities or remote areas, 5000 psi, using gas powered cement mixer, includes local bulk aggregate & sand, bagged Portland cement, excludes, forms, reinforcing, placing & finishing
3300	General Road Construction												\$54,971	
3310	Select Road Materials	296	cuyd	\$21.22	296	cuyd	\$16.28	296	cuyd	\$22.34	\$59.84	\$17,730.37		Means ID: 312323155000 Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3320	Pavement	4,000	sqft	\$2.40	4,000	sqft	\$0.68	4,000	sqft	\$0.54	\$3.62	\$14,480.00		Means ID: 321216140025 Asphaltic concrete, parking lots & driveways, 6" stone base, 2" binder course, 2" topping, no asphalt hauling included
3330	Pavement Hauling	97	ton	\$0.00	97	ton	\$13.98	97	ton	\$19.58	\$33.56	\$3,244.13		Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip. Assumed as a more appropriate delivery charge given the presumed travel distance.
3340	Guardrail	400	lf	\$40.43	400	lf	\$5.18	400	lf	\$3.18	\$48.79	\$19,516.00		RS Means 2012 4 th Quarter Update, Modified to Modesto, Ca rates with Contractor O&P, Sales Tax and Insurance.

CONSTRUCTION COST ROCK CUT		SUBTOTAL	\$516,650
CONSTRUCTION COST MSE WALL		SUBTOTAL	\$479,860
OPTION 1 - CONSTRUCTION COST ROCK CUT	ENGINEERING	15%	\$77,497
	CONTINGENCY	30%	\$154,995
OPTION 1 - CONSTRUCTION COST ROCK CUT		TOTAL	\$749,142
OPTION 2 - CONSTRUCTION COST MSE WALL	ENGINEERING	15%	\$71,979
	CONTINGENCY	30%	\$143,958
OPTION 2 - CONSTRUCTION COST MSE WALL		TOTAL	\$695,798

Don Pedro Hydroelectric Project (FERC No. 2299) - Ward's Ferry Bridge Whitewater Boating Take-Out
Conceptual Design Preliminary Cost Estimate - River Left Upgrade Option

EST. AS OF: December-12
PREPARED BY: CR MacDonald
REVIEWED BY: J Gagnon / G Hickman

CODE	DESCRIPTION	QUANTITY	MATERIAL UNIT	PRICE	QUANTITY	LABOR UNIT	RATE	QUANTITY	EQUIPMENT UNIT	RATE	Total Rate Plus O&P	DIRECT TOTAL \$	TOTAL \$	COMMENTS
100	GENERAL												\$57,500	
110	Mobilization										\$35,000	\$35,000		Assumed for adverse site location, narrow roads, remote location
120	Temporary Services										\$5,000	\$5,000		Assumed for cover, data, and water
130	Site Management										\$15,000	\$15,000		Assumed, includes stockpile and surplus management, traffic control, trailer / office facilities and general oversight
140	Site Access										\$2,500	\$2,500		Assumed travel costs for inspection and supervision
1000	UPGRADE EXISTING ACCESS ROAD ON RIVER LEFT												Varies \$27,693	Note: Costs provided are in Q2 2012 Dollars based in Modesto Ca. Values for labor and equipment have been increased by an additional factor of 2 over means values and notes below due to the remote nature of the site.
1100	Road Restoration Rock Cut - Option 1													
1110	Rock Blasting	87	cuyd	\$3.03	87	cuyd	\$123.22	87	cuyd	\$126.60	\$252.85	\$21,895		Average of: Means ID: 312316300020 Drilling and blasting rock, open face, under 1500 C.Y. and Means ID: 312316301900 Drilling and blasting rock, restricted areas, up to 1500 C.Y.
1120	Rock Removal	87	cuyd	\$0.00	87	cuyd	\$34.52	87	cuyd	\$32.44	\$66.96	\$5,799		Means ID: 312316305000 Drilling and blasting rock, less than 0.5 C.Y., excavate and load boulders & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
1200	Road Restoration MSE Wall - Option 2												\$49,568	
1210	Wall Construction	835	sqft	\$21.27	835	sqft	\$15.63	835	sqft	\$1.74	\$38.64	\$32,264		Means ID: 323223137150 Segmental retaining walls, unit masonry interlocking wall system, straight split, 8" high x 18" wide x 20" deep, includes pins, and void fill, excludes base. Multiplied by a factor of 1.5, as Means does not provide an appropriate line item for this wall system. Assume 5 feet tall by length.
1220	Wall Footing	167	cuft	\$25.21	167	cuft	\$48.94	167	cuft	\$2.36	\$76.51	\$12,777		Assuming a 1' wide x 1' tall footing along the length of wall: Means ID: 031113450020 C.I.P. concrete forms, footing, continuous wall, plywood, 1 use, includes erecting, bracing, stripping and cleaning & Means ID: 033106200150 Concrete, hand mix, for small quantities or remote areas, 5000 psi, using gas powered cement mixer, includes local bulk aggregate & sand, bagged Portland cement, excludes, forms, reinforcing, placing & finishing
1230	Common Borrow / Road Build Up	77	cuyd	\$19.41	77	cuyd	\$16.52	77	cuyd	\$22.62	\$58.55	\$4,527		Means ID: 312323154000 Borrow, common earth, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
1300	General Road Construction (To Old Abutment)												\$56,757	
1310	Select Road Materials	306	cuyd	\$21.22	306	cuyd	\$16.28	306	cuyd	\$22.34	\$59.84	\$18,307		Means ID: 312323155000 Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
1320	Pavement	4,130	sqft	\$2.40	4,130	sqft	\$0.68	4,130	sqft	\$0.54	\$3.62	\$14,951		Means ID: 321216140025 Asphaltic concrete, parking lots & driveways, 6" stone base, 2" binder course, 2" topping, no asphalt hauling included
1330	Pavement Hauling	100	ton	\$0.00	100	ton	\$13.98	100	ton	\$19.58	\$33.56	\$3,350		Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip. Assumed as a more appropriate delivery charge given the presumed travel distance.
1440	Guardrail	413	lf	\$40.43	413	lf	\$5.18	413	lf	\$3.18	\$48.79	\$20,150		RS Means 2012 4" Quarter Update, Modified to Modesto, Ca rates with Contractor OH&P, Sales Tax and Insurance.
2000	UPGRADE RIVER RIGHT EXISTING TRAIL TO RIVER ON RIVER RIGHT												\$11,107	
2100	Widen Trail to 4'													
2110	Grade Existing Trail	1,540	sqft	\$0.00	1,540	sqft	\$2.48	1,540	sqft	\$0.30	\$2.78	\$4,281		Means ID: 312216101200 Fine grading, fine grade granular base for sidewalks and bikeways
2110	Select Trail Materials	114	cuyd	\$21.22	114	cuyd	\$16.28	114	cuyd	\$22.34	\$59.84	\$6,826		Means ID: 312323155000 Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3000	CONSTRUCT NEW ROAD TO RIVER ON RIVER LEFT												Varies	
3100	Rock Cut Option - Option 1												\$265,324	
3110	Rock Blasting	830	cuyd	\$3.03	830	cuyd	\$123.22	830	cuyd	\$126.60	\$252.85	\$209,771.85		Average of: Means ID: 312316300020 Drilling and blasting rock, open face, under 1500 C.Y. and Means ID: 312316301900 Drilling and blasting rock, restricted areas, up to 1500 C.Y.
3120	Rock Removal	830	cuyd	\$0.00	830	cuyd	\$34.52	830	cuyd	\$32.44	\$66.96	\$65,552.00		Means ID: 312316305000 Drilling and blasting rock, less than 0.5 C.Y., excavate and load boulders & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3200	MSE Wall - Option 2												\$228,534	
3210	Common Borrow / Road Build Up	741	cuyd	\$19.41	741	cuyd	\$16.52	741	cuyd	\$22.62	\$58.55	\$43,370.37		Means ID: 312323154000 Borrow, common earth, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3220	Wall	4,000	sqft	\$21.27	4,000	sqft	\$15.63	4,000	sqft	\$1.74	\$38.64	\$154,560.00		Means ID: 323223137150 Segmental retaining walls, unit masonry interlocking wall system, straight split, 8" high x 18" wide x 20" deep, includes pins, and void fill, excludes base. Multiplied by a factor of 1.5, as Means does not provide an appropriate line item for this wall system. Assume 10 feet tall by length.
3230	Wall Footing	400	cuft	\$25.21	400	cuft	\$48.94	400	cuft	\$2.36	\$76.51	\$30,604.00		Assuming a 1' wide x 1' tall footing along the length of wall: Means ID: 031113450020 C.I.P. concrete forms, footing, continuous wall, plywood, 1 use, includes erecting, bracing, stripping and cleaning (units x3 to yield sqft per LF) & Means ID: 033106200150 Concrete, hand mix, for small quantities or remote areas, 5000 psi, using gas powered cement mixer, includes local bulk aggregate & sand, bagged Portland cement, excludes, forms, reinforcing, placing & finishing
3300	General Road Construction												\$54,971	
3310	Select Road Materials	296	cuyd	\$21.22	296	cuyd	\$16.28	296	cuyd	\$22.34	\$59.84	\$17,730.37		Means ID: 312323155000 Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel & Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip
3320	Pavement	4,000	sqft	\$2.40	4,000	sqft	\$0.68	4,000	sqft	\$0.54	\$3.62	\$14,480.00		Means ID: 321216140025 Asphaltic concrete, parking lots & driveways, 6" stone base, 2" binder course, 2" topping, no asphalt hauling included
3330	Pavement Hauling	97	ton	\$0.00	97	ton	\$13.98	97	ton	\$19.58	\$33.56	\$3,344.13		Means ID: 312323151840 Borrow, delivery charge, minimum 20 tons, 2 hour round trip. Assumed as a more appropriate delivery charge given the presumed travel distance.
3340	Guardrail	400	lf	\$40.43	400	lf	\$5.18	400	lf	\$3.18	\$48.79	\$19,516.00		RS Means 2012 4" Quarter Update, Modified to Modesto, Ca rates with Contractor OH&P, Sales Tax and Insurance.
4000	REPLACE EXISTING STRUCTURES												\$50,900	
4100	Replace Toilet Facility													
4110	Demolish Existing Structure										\$3,000.00	\$3,000.00		Assumed price based on other concrete structures of similar size and construction. Looked at Means IDs: 024113440700, 024113430200 and 024113340200 for approximate equal (similar sized concrete structures)
4120	Construct Replacement Structure										\$47,900.00	\$47,900.00		Quoted price from CXT Precast for delivery and installation for a project in the Mountain West with similar remote access issues

CONSTRUCTION COST ROCK CUT		SUBTOTAL	\$524,252	
CONSTRUCTION COST MSE WALL		SUBTOTAL	\$509,338	
OPTION 1 - CONSTRUCTION COST ROCK CUT	ENGINEERING CONTINGENCY	15%	\$78,638	
		30%	\$157,276	
OPTION 1 - CONSTRUCTION COST ROCK CUT		TOTAL	\$760,165	
OPTION 2 - CONSTRUCTION COST MSE WALL		ENGINEERING CONTINGENCY	15%	\$76,401
		30%	\$152,801	
OPTION 2 - CONSTRUCTION COST MSE WALL		TOTAL	\$738,540	