Merced Wild and Scenic River Section 7 (a) Advanced Summary of Effects to River Values Ferguson Slide Permanent Restoration Project

Prepared by:

Teresa A. Drivas (Sierra National Forest, Forest Recreation Officer; Team Leader)
Susan Burkindine (Sierra National Forest, Asst. Forest Recreation Officer)
K. Andrew Stone (Sierra National Forest, District Hydrologist)
Joanna Clines (Sierra National Forest, Forest Botanist)
Alan Gallegos (Sierra National Forest, Geologist)
Phillip Strand (Sierra National Forest, Forest Aquatics Biologist)
Doug McKay (Sierra National Forest, Forest Archaeologist)
Judith Tapia (Sierra National Forest, Environmental Coordinator)
Christina Boston (R5 Regional Office, Wilderness and Wild and Scenic River Specialist)

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INTRODUCTION

On November 2, 1987, at the request of the Governor of California, the Secretary of the Interior added the Merced River to the National Wild and Scenic Rivers System (National System) through section 2(a)ii) of the Wild and Scenic Rivers Act (WSRA). On October 23, 1992, it was designated by Congress when P.L. 102-432 was signed into law. The designation originates from its source (including Red Peak Fork, Merced Peak Fork, Triple Peak Fork, and Lyle Fork) in Yosemite National Park and terminates at the normal maximum operating pool (water surface level) of Lake McClure (elevation 867 feet mean sea level). The designation also includes the South Fork from its source in Yosemite National Park to the confluence with the main stem. Eleven and one-half miles of the river is the responsibility of the Sierra National Forest (SNF) and designated as a Wild and Scenic River (WSR). The SNF section begins at the boundary of the SNF and El Portal Administrative Site (Yosemite National Park) to a point 300 feet upstream of the confluence with Bear Creek.

In April 2006, a major landslide occurred on Highway 140 (SR 140) along the Merced WSR, within the boundary of the SNF, and obstructed access to Yosemite National Park from the Mariposa area. The slide is located on the Merced WSR between El Portal and Briceberg, California. Unusually heavy rainfall in March and April of 2006 destabilized a steep hillside above the river and rockslide activity began in the area on April 29, 2006. The state highway was closed to traffic periodically until concrete barriers and protective fencing were erected in late May. One lane of the highway was reopened to vehicles on the morning of May 25, but later that day another landslide damaged the barrier and the highway was closed again. On May 28, a major landslide covered approximately 183 meters (600 feet) of the highway. As a result, SR 140 was closed to traffic from 5.1 kilometers (3.2 miles) east of Briceburg to approximately 9.7 kilometers (6.0 miles) west of El Portal.

Caltrans proposed to restore access temporarily with two temporary bridges. A WSRA Section 7(a) determination was completed and found that the two temporary bridges across the Merced, designed to facilitate single-lane traffic on SR 140, would not have permanent direct or adverse effects to the WSR based on their temporary use and their subsequent removal upon construction of a permanent solution. The Ferguson Rockslide (the "slide") and the detour project are located within Segment 8 the Merced WSR which extends from the confluence of the South Fork Merced to the northwest boundary of the Sierra and the south east boundary of the Stanislaus National Forests, and is classified as "recreational". The length is approximately 5.5 miles.

In November 2010, Caltrans published a draft environmental analysis, The Ferguson Slide Permanent Restoration Project Draft Environmental Impact Statement/Environmental Impact Report (DEIS/DEIR), which analyzes several alternatives to restore permanent access along

State Highway 140. The USFS provided comments in January 2011 that the analysis in the 2010 DEIR/DEIS did not include enough information from which the Forest Service could make its determination and included a detailed list of the additional information needed. In February 2011, CalTrans, the USFS, and several other interested government agencies met to review the project and discuss the additional actions needed to complete the environmental analysis, conduct necessary studies, and identify appropriate alternatives for a permanent solution. Between January 2011 and November 2012, the Forest Service has worked closely with Caltrans to obtain the additional information and analysis needed to make a WSRA Section 7(a) determination on the alternatives outlined in the 2010 DEIS/DEIR. This document is not a determination, but rather a description of expected effects to free flow, water quality and outstandingly remarkable values based on the information contained in the 2012 DEIS/DEIR as well as additional information, both formal and informal, received between January 2010 and November 2012. A formal determination will be made responsive to the planned revised DEIS to be released by CalTrans in 2013.

This document identifies WSRA requirements, evaluates the effects of the 2010 DEIS/DEIR seven action alternatives to provide continued vehicular access along a landslide-impacted portion of California State Route 140 ("SR 140"), and the no action alternative, on the identified WSR values. It also includes an evaluation under the appropriate standard of Section 7(a) of the WSR Act for the Merced River WSR. Specifically, this document evaluates the potential effects to the free-flowing condition, water quality and outstandingly remarkable values (ORVs) of the river. There are five ORVs within this segment: geology, vegetation, wildlife, recreation, and cultural and historical resources.

PROPOSED ACTION

The California Department of Transportation (Caltrans) proposes to restore full highway access between Mariposa and El Portal via State Route 140 in Mariposa County, California by repairing or permanently bypassing the portion of State Route 140 that was blocked and damaged by the Ferguson rockslide. The total length of the project is 0.7 mile. The following build alternatives are being proposed.

Alternative C (Open-cut Realignment)
This alternative would realign the highway to the northeast of its current alignment, spanning the Merced River and bypassing the rockslide. State Route 140 would cut through the mountain across the Merced River from the rockslide and then span back across the river where it would meet the existing alignment. Two bridges would be built across the river. Staging areas may be expanded into upland slopes.

Alternative T (Tunnel Realignment)
This alternative would realign the highway to the northeast of its current alignment, spanning the Merced River and bypassing the rockslide. State Route 140 would tunnel 700 feet through the mountain across the Merced River from the rockslide and then span back across the river where it would meet the existing alignment. Two bridges would be built across the river.

Alternative T-3 (Tunnel under Slide Realignment)
This alternative would realign the highway by constructing a 2,200-foot-long tunnel under the area of the slide. Staging areas may be expanded into upland slopes.

Alternative S (Viaduct Realignment)
This alternative would realign the highway to the northeast of its current alignment, spanning the Merced River with two bridges and bypassing the rockslide with a hillside viaduct and retaining wall.

Alternative S-2 (Modified Viaduct Realignment)
This alternative is similar to Alternative S and would realign the highway to the northeast of its current alignment, spanning the Merced River with two bridges and bypassing the rockslide with a hillside viaduct and retaining wall. This alternative differs from Alternative S in that it proposes two bridge type variations along with their own specific roadway alignments. The first (S2-V1) would construct two tied-arch bridges, which use an arch structure with cables above the bridge deck for support. The second (S2-V2) would construct two slant-leg bridges, which use "V"-shaped columns to support the bridge deck.

Alternative R (Rockshed/Tunnel)
This alternative would follow the existing highway corridor by constructing a rockshed (cut-and-cover tunnel) through the talus (foundation layer) of the slide along the existing State Route 140 alignment.

No-build Alternative

The No-build Alternative would leave State Route 140 damaged and blocked by the Ferguson rockslide. As a result of the No-build Alternative, the temporary detour would continue to function as State Route 140. Either general wear or damage from flooding in a high water year will eventually require the removal of the bridges, supporting structures, and the detour pavement, leading to the permanent closure of State Route 140 at the section damaged by the rockslide. General wear of both the temporary bridges and the structures that support them determines the varying lengths of their service lives. The actual steel bridges themselves may have a useful life of between 20 and 25 years. This estimate is based on normal wear, fatigue, and corrosion of the steel components. The structures supporting the temporary bridges have a service life of 5 to 10 years. These support structures are actually what determine the useful age of the detour route.

The temporary detour was constructed during a declared emergency and was designed as a temporary solution to the closure of State Route 140 after Caltrans reached an agreement with the USFS that the pavement and structures used for the detour would be removed once a permanent solution could be constructed. The No-build Alternative requires the same environmental analysis as the proposed build alternatives.

DESCRIPTION OF GENERAL CONSTRUCTION ACTIVITIES

There are multiple construction practices common to bridge and road construction that could be employed for the alternatives identified. These construction practices include the use of trestles, crane platforms, falsework, cofferdams, temporary access roads, and flat gravel surfaces. Any of these construction practices could have short-term impacts to both the free-flowing condition and water quality of the Merced WSR. Each construction practice will be described below and will tie into the construction practice for each alternative. The terms "river-right" and "river-left" refer to the right or left side of the river as seen looking downstream.

Temporary Roads

Temporary roads will be used to access work areas to build trestles, falsework, and other construction elements. Roads will be constructed and graded from existing road alignments (e.g., Route 140, Incline Road), or be built as clean earthen fill ramps. Location of proposed temporary roads will be discussed for each alternative.

Falsework

Bridge design alternatives call for the bridges to be dominantly made of concrete, and as such, a falsework will need to be constructed in order to support the concrete forms. Falsework is a temporary structure used to support a permanent structure while under construction. The falsework will consist of vertical members supporting horizontal members with a flat wooden platform spanning the vertical members. The flat wooden platform will be a little wider than the width of the permanent bridge. The falsework will essentially be a temporary "support" bridge, and provide a flat surface on which the concrete forms will be constructed, and will support the weight of the wet concrete while it is being poured and cures. The falsework also provides access for construction and inspection personnel during the construction of the permanent structure.

There are multiple methods that could be used to construct the falsework in the channel the most probable method chosen by the contractor would be the construction of a flat gravel surface "platform" (described below). This flat gravel surface provides a substrate on which concrete footings can be founded for the vertical members of the falsework and the trestles, but can also be used for other construction elements to create working areas for equipment.

Trestles

A construction trestle is a temporary platform that resembles the falsework. It will have vertical steel members supporting horizontal members. The spacing of the vertical members will be the same as that of the falsework vertical members located in the channel. The trestle will have a flat wooden platform at the top of the vertical members and be about 40 feet wide. The trestle is needed to provide construction equipment access to the work zones not accessible from the channel banks. Since cranes will be required to erect falsework, they will need to be within 60 feet of the location, and trestles provided this access. Trestles are constructed in the same fashion as falsework.

Flat Gravel Surfaces

A flat gravel surface is used for equipment access (e.g., cranes), construction of falsework, crane pads, and/or trestles. In order to provide a safe working area for equipment close to the river, flat gravel surfaces can also be constructed in areas on the river bank or floodplain where the terrain is uneven. The flat gravel surface is constructed by placing large rocks (in the channel or floodplain) to create a perimeter around the proposed area of the gravel surface. The area enclosed by the large rocks would be filled with cleaned (washed) gravel to create the flat gravel surface (note: a flat gravel surface is also referred to in this document as a "jetty")

Cofferdam

A cofferdam is a temporary wall or system of walls that are used to create a barrier around a work area that is in a waterway. The system will be water tight or virtually water tight and will keep water out of the area the system surrounds. Pumps are installed as necessary to manage seepage. Cofferdams also help to mitigate an increase in turbidity and to prevent concrete contamination during concrete placement in the river. Coffer dams could be used to found the vertical members into the stream bed without creating a jetty. They are more costly and therefore less desirable to a contractor. After the vertical members are founded in the channel bottom, the cofferdam could be removed.

Crane Platforms

Crane platforms will be level surfaces used to support construction cranes. Two types of surfaces will be constructed. One of the surfaces will consist of a gravel roadbed about 25-feet wide and various lengths depending on the location within the project. The other surface will be the top of the construction trestle or a surface created by backfilling behind a temporary retaining wall. Crane platforms are needed to provide access to locations required by the cranes to construct the bridges, temporary construction structures, perform excavations, or other construction activities.

Description of Construction Activities Specific to Bridge Alternatives

Alternative C (Open-Cut Realignment) and T (Tunnel Realignment)

Alternative C would realign Route 140 to the northeast and include two bridges crossing the Merced River. A cut slope would be installed on the hill directly across from the rockslide (north of the river) and would include a 22-foot-wide terrace on either side of the Route to catch rock fall from the hill slope. The bridge segments that cross the Merced River would be supported by columns constructed within the active bankfull channel. The northwest bridge would be 550-feet-long and have two support columns; the southeast bridge would be 650-feet-long and also have two support columns.

To accommodate traffic during construction, the current one-lane detour along Incline Road would be extended and a third temporary bridge would be constructed upstream. This bridge would be constructed using concrete abutments and columns on each side of the river. The newly formed embankment slopes would be protected with the placement of rocks. This temporary bridge would be removed and the river channel restored to its original state once the final bridge is complete.

Alternative T would be the same as Alternative C except for a 700-foot long tunnel that would be constructed through the hillside opposite the rockslide north of the river. The tunnel would be used instead of the cut slope and terrace.

Construction Activities by Location:

Downstream Bridge River-Left

In order to build the falsework for the downstream bridge alternatives C and T, a temporary access road will need to be built down from the abandoned section of Route 140 to the bankfull bench located on river-left. The temporary road would either be cut down from the abandoned section of Route 140 or clean construction-grade fill will be brought in to create a ramp. On the bankfull bench, large rocks would be moved and a 100 foot wide "flat-gravel-fill surface" would be constructed from Route 140 and would be roughly 50 feet either side of the bridge centerline and extend all the way to the water's edge.

The flat-gravel-fill surface provides a substrate on which footings can be poured to support the vertical members for the falsework. It also provides a flat working surface for large construction equipment such as excavators and cranes. The flat-gravel-fill surface would be roughly three to four feet higher than the bankfull bench.

A trestle and falsework would be constructed across the river, parallel to the alignment of the bridge. The trestle would be on-grade with the flat gravel fill surface constructed on the bankfull bench on river-left. The trestle and falsework would require drilled holes in the channel (to support the vertical members) in the river near the edge of water. This is done by "diverting" water to drill the holes. The diversion is constructed by creating a flat-gravel-fill surface that extends into the actively flowing part of the river with large boulders back-filled by clean gravel. The gravel displaces the water and allows for the footings to be drilled through the flat-gravel-fill surface. Once the vertical members are founded in the channel, the flat-gravel-fill surface is removed. The trestle will allow heavy equipment to construct the falseworks and bridge segments over the river.

Downstream Bridge River-Right

For Alternatives C and T, the trestle from the river-left bank would extend to the river-right bank and tie into a temporary access road constructed down from Incline Road. For Alternatives C and T, vertical members supporting the trestle and falsework would be founded in the bedrock on the river-right bank. This trestle would provide the work platform for the equipment on this side of the river.

Upstream Bridge River-Right

Alternatives C and T would cross the river farther upstream from where Alternatives S and S2-V2 are planned. This area is easily accessed by Incline Road and construction would occur on the bankfull bench on river-right. The area would be cleared of rocks and a flat gravel fill surface would be constructed to allow equipment to work safely while building the falsework and trestle. The flat gravel fill surface would be parallel to the bridge alignment (roughly 50 feet either side of the bridge centerline) and extend approximately 75 feet into the river.

Upstream Bridge River-Left

A temporary access road will need to be constructed down from Route 140 to allow equipment access to build the flat-gravel-fill surface (or jetty) for the trestle and falsework footings. This would be required at the left river bank to divert water. This is also needed to provide access for a drill rig to drill a 10 foot diameter hole in the channel for the bridge column. General dimensions of the flat-gravel-fill surface (or jetty) would be 20-feet wide and 250 feet long; the flat-gravel-fill surface will extend approximately 10-feet into the river. Concrete pads will be placed on leveled areas along the sloping bank to support the horizontal falsework members.

Northeast Ridge

A temporary access road will be cut from Incline Road (heading to the southeast) up to the point where the falsework and formwork can be constructed for the bridge abutments, superstructure retaining walls and or tunnel portal. The same type of access road will be mirrored on the opposite side of the ridge for the same construction needs for the upstream bridges. This ground disturbance is well above bankfull elevation and is not expected to impact the free-flowing condition of the river.

Alternative S (Viaduct Realignment)

Alternative S would realign Route 140 to the northeast and include two bridges crossing the Merced River. This Alternative would include a 358-foot-long viaduct and retaining wall on the hill directly across from the rockslide (north of the river) and would include a 10-foot-wide terrace on either side of the Route to catch rock fall from the hill slope. The two bridge that cross the Merced River would be supported by columns constructed within the active bankfull channel. The northwest bridge segment would be 805-feet-long and have two in-stream support columns; the southeast bridge would be 725-feet-long and also have two in-stream support columns.

To accommodate traffic during construction, the current one-lane detour along Incline Road would be extended and a third temporary bridge would be constructed upstream. This bridge would be constructed using concrete abutments and columns on each side of the river. The newly formed embankment slopes would be protected with the placement of rocks. This temporary bridge would be removed and the river channel restored to its original state once the final bridge is complete.

Downstream Bridge River-Left

In order to build the falsework for the downstream bridge alternatives, a temporary access road will need to be built down from the abandoned section of Route 140 to the bankfull bench located on river-left. The temporary road would either be cut down from the abandoned section of Route 140 or clean construction-grade fill will be brought in to create a ramp. On the bankfull bench, the large rocks would be moved and a 100 foot wide “flat-gravel-fill surface” platform would be constructed from Route 140 and would be roughly 50 feet either side of the bridge centerline(s).

The flat gravel fill surface provides a substrate on which footings can be poured to support the vertical members for the falsework. It also provides a flat working surface for

large construction equipment (excavators and cranes). The flat gravel fill surface would be roughly three to four feet higher than the bankfull bench. For Alternative S, the flat-gravel-fill surface would extend from Route 140, cover the bankfull bench, and extend approximately 10-feet into the river.

A trestle and falsework would be constructed across the river, parallel to the alignment of the bridge. The trestle would be on-grade with the flat gravel fill surface constructed on the bankfull bench on river-left. The trestle would require holes drilled in the channel (to support the vertical members) in the river near the edge of water. This is done by "diverting" water to drill the holes. The diversion is constructed by creating a small "jetty" of large boulders back-filled by clean gravel. The gravel displaces the water and allows for the footings to be drilled. Once the vertical members are founded in the channel, the jetty is removed. The trestle will allow heavy equipment to construct the falseworks and bridge segments over the river.

Downstream Bridge River-Right

For Alternatives S, the trestle from the river-left bank would extend to the river-right bank and tie into a temporary access road constructed down from Incline Road. For Alternative S, vertical members supporting the trestle and falsework would be founded in the bedrock on the river-right bank. This trestle would provide the work platform for the equipment on this side of the river.

Upstream Bridge River-Right

For Alternative S, a trestle would need to be constructed across the river. A succession of flat-gravel-filled surfaces would be built across the river to found the footings for the vertical members of the trestle and falsework. Once the footings and vertical members have been constructed (for both falsework and trestle), the flat-gravel-fill surface would be removed and another built further across the river to facilitate construction of the next series of vertical members. It is anticipated that two to three of these flat-gravel-filled surfaces will have to be built to get the trestle and falsework across the river.

Upstream Bridge River-Left

A temporary access road will need to be constructed down from Route 140 to allow equipment access to build the flat-gravel-fill surface (or jetty) for the trestle and falsework footings. This would be required at the left river bank to divert water. This is also needed to provide access for a drill rig to drill a 10 foot diameter hole in the channel for the bridge column. General dimensions of the flat-gravel-fill surface (or jetty) would be 20-feet wide and 250 feet long; the flat-gravel-fill surface will extend approximately 10-feet into the river. Concrete pads will be placed on leveled areas along the sloping bank to support the horizontal falsework members.

Northeast Ridge

Project activities under Alternative S will require construction on the ridge east of the rockslide (north side of the river). One temporary road will be cut up from and parallel Incline Road from north to south to the point where the upstream bridge crosses the river (approximately 500-feet). This road is necessary to accommodate the equipment that will construct the falsework and formwork necessary to construct the bridge abutments, super

structure, and retaining walls for the viaduct and retaining wall. This ground disturbance is well above bankfull elevation and is not expected to impact the free-flowing condition of the river.

BASIS FOR EVALUATION OF EFFECTS TO FREE FLOW, WATER QUALITY AND RIVER VALUES

This evaluation of effect to free flow, water quality and river values is responsive to the alternatives presented in the Caltrans DEIS/DEIR (November 2010) for the Ferguson Slide Restoration Project and to the following supplemental information provided to the Forest Service by Caltrans between January 2011 and November 2012, including construction activities descriptions developed jointly by Caltrans and Forest Service:

a. Description of construction activities prepared for each Ferguson Slide DEIS/DEIR alternative (Forest Service and Caltrans, May, 2012)
b. River Geomorphology Study for the Merced River at the Ferguson Rock Slide: Effects of Proposed Transportation Alternatives on River Morphology and Flood Flow Behavior, Balance Hydrologics, Inc., Technical Report 207240 for the California Department of Transportation.
c. Archeological Reconnaissance Records, provides by the Forest Service and Caltrans.
d. Acceptance of Forest Service response to release of DEIS (January 13, 2011),
e. State Assembly Bill AB1973 (July 13, 2012) allowance for "take" of the Limestone Salamander,
f. Geotechnical Report, Ferguson Rockslide Geology Report, prepared for Caltrans, 2008 ,
g. All environmental studies that addressed impacts that the project would have on the human, physical and biological environments within the project area and part of the DEIS project record
h. Merced Recreation Study, Caltrans, 2011
i. Visual Quality Assessment prepared for the Ferguson Slide Restoration Project, Caltrans, 2007
j. Botanical Report – Ferguson Slide Permanent Restoration Project, Caltrans Study, 2007
k. Limestone salamander biological report for Ferguson Slide Area, Prepared for Caltrans, 2007
l. Community Impact Assessment, prepared for the Caltrans, 2009
m. Water Quality Assessment prepared for Ferguson Slide Permanent Restoration Project, Prepared for Caltrans, 2007
n. California Department of Transportation, 2003, Construction Site Best Management Practices (BMP), Caltrans, 2003
o. Statewide Storm Water Management Plan, Caltrans, 2003

DESCRIPTION OF THE MERCED WSR

The Merced River flows through one of the more unique and breathtakingly beautiful environments found in North America. From its source approximately 8,000 feet above sea level in the central Sierra Nevada mountain range, the river tumbles, cascades, and carves its way through 100 million year old granite, glacial valleys, and deeply incised canyons on a 145-mile long journey, eventually joining the San Joaquin River just south of Turlock, CA. The upper portion of the Merced River was federally designated as "Wild and Scenic" on November 2nd, 1987 (Public Law 100-149) and on May 18, 1989 the SNF and BLM finalized boundaries and classifications for the wild & scenic river corridor. An Environmental Impact Statement was completed by the SNF in June, 1991 outlining management alternatives for the main stem and South Fork Merced Rivers. Concurrent with this environmental analysis was the South Fork and Merced River WSR Implementation Plan, which detailed the management zones (i.e., Wild, Scenic, and Recreational), monitoring plan, river corridor boundaries, management direction, and ORV's for the Merced WSR. The segment of the Merced River that flows through the project reach has been classified as "Recreational", which means that the river is readily accessible by road or railroad, may have some development along the shorelines, and/or may have undergone some impoundment or diversion in the past.

On April 29th, 2006, a rock block slide-rock fall complex (the "Ferguson rockslide") buried a segment of California State Highway 140, approximately eight river miles west of El Portal, California, the western gateway to Yosemite National Park. Under emergency directive, the California Department of Transportation installed two temporary (one-way) bridges to re-route traffic around the rockslide. These bridges were replaced by two new (relocated) temporary bridges when it was discovered that the original bridges would not accommodate vehicles with an axel length of greater than 28 feet. The current temporary bridges are one-way and traffic-controlled with stop lights. Thus, there is a clear purpose and need for a long-term solution to bypass the Ferguson rockslide.

WSRs Act Section 7(a) Requirements

Section 7(a) of the WSRA provides for the protection of WSR values from the construction of any water resources project. Forest Service regulations (36 CFR 297) and policy (FSM 2354) provide direction on the process for evaluating water resources projects within a WSR administered by the Secretary of Agriculture through the Forest Service.

A water resources project includes any federally assisted construction of developments which would affect the free-flowing characteristics of a WSR (36 CFR 297.3). All action alternatives identified in Caltrans' DEIR/DEIS appear to have some construction in the river's bed or its banks and, therefore, qualify as a water resources project subject to WSRA Section 7(a).

No license, permit or other authorization can be issued for a federally assisted water resources project on any portion of a WSR without prior notification to the Secretary of Agriculture and a determination in accordance with Section 7(a). In order for the FS, as the WSR-administering agency of this segment, to make its determination, the project authorizing agencies should, to the extent possible, ensure that any environmental studies prepared for a water resources project adequately address the environmental effects of a project on WSR values and continue to apprise the agency of ongoing analyses to facilitate coordination and identification of WSR-related issues (36 CFR 297.6).

The project will be evaluated so as to determine whether any of the action alternatives will result in any direct and adverse effects to the river's values. If adverse effects are identified with one or more action alternative, the Forest Service may recommend measures to eliminate adverse effects and the authorizing agencies may submit revised plans for consideration (36 CFR 297.4 and 297.5). Under FSM 2354.74a, the Regional Forester has the responsibility to make determinations for water resources projects on designated WSRs where other federal agency assistance is involved. This responsibility may not be delegated.

WSRs Act Section 7(a) Evaluation Criteria

The following specific criteria were used to evaluate for direct and adverse effects to the free flow, water quality and ORVs:

Free Flow

- Alteration of riparian and/or floodplain conditions (Relevant floodplain properties such as width, roughness, bank stability, or susceptibility to erosion.)
- Alteration of upland conditions (Relevant hydrologic properties such as drainage patterns or the character of surface and subsurface flows.)
- Alternation of hydrological processes (The ability of the channel to change course, re-occupy former segments, or inundate its flood plain; Stream bank erosion potential, sediment routing and deposition, or debris loading; Surface and subsurface flow characteristics; Flood storage (detention storage); and Aggradation/degradation of the channel.
- Magnitude and extent of off-site changes (Changes that influence other parts of the river system; Processes involved, such as water and sediment, and the movement of nutrients.)

Water Quality

- Dissolved oxygen
- Temperature
- pH
- Turbidity
- Pollutants (oil and grease)
- Floating material
- Sediment
- Settleable material
- Suspended material

Outstandingly Remarkable Values

Recreation

There are 4 elements to the Recreation ORV. They are:

- Whitewater Rafting
- Wading and Water Play
- Camping
- Hiking

Wading, water play and camping are not available along the steep canyon walls in the project area adjacent to the slide, and therefore are not evaluated in this determination

Geology

- Contact between meta-sedimentary and granitic rocks
- Limestone blocks forming prominent escarpments

WILDLIFE

- Important riparian-dependent wildlife: limestone salamander (state-listed rare species)
- Rare, lower elevation, high value, suitable riparian habitat for riparian species [1]

BOTANY

The botany ORV includes four state-listed rare/endangered plants

- Allium yosemitense
- Clarkia lingulata
- Eriophylium Congdonii
- Lewisia Congdonii

Allium yosemitense, Eriophylium Congdonii, and Lewisia Congdonii are not present in the project area along the steep canyon walls adjacent to the slide, and therefore, are not evaluated in this determination

CULTURAL AND HISTORIC LANDSCAPE

The cultural and historical ORVs of the Merced River, as originally designated (U.S. Forest Service 1986), are comprised of an amalgamation of prehistoric and historic period resources, as well as those of ethnographic importance to the Southern Sierra Miwuk. Due to the quantity and complexity of the resources, these ORV's have been combined into a single management unit classified as the Merced River Cultural Landscape (MRCL). The MRCL is comprised of two distinct elements, a historic vernacular landscape and an ethnographic landscape. Within the APE of the Project, eleven (11) features of the MRCL have been identified.

- Historic Vernacular Landscape – There are 6 features:
  - The Yosemite Valley - Railroad (a.k.a. The Incline Road;
  - California State Highway 140;
  - The Exchequer Power line;
  - The Jenkins Hill Trail;
  - A series of historic bridge footings,
  - Historic period foundation and debris.

- Ethnographic Landscape: Five (5) features of the ethnographic landscape of the MRCL are within the APE of the Project.
  - Two prehistoric/ethnographic bedrock milling features.
  - An ethnographic ritual/sacred use, "bathtub" feature.
  - Ethnographic traditional use plant resources along the river.
  - *Üzümati* , sacred site, traditional cultural property (TCP), Bear effigy.[2]

[1] The original 1986 Land and Resources Management Plan Draft Environmental Impact Statement Appendix D cited 177 riparian species however additional species have been identified. The current number of riparian species is undetermined.

In the following sections these specific criteria will be applied to each alternative to determine whether or not it will result in any direct or adverse effects to the Merced WSRs free flow, water quality or outstandingly remarkable values.

[2] The 1986 Land and Resources Management Plan Draft Environmental Impact Statement Appendix D originally identified an additional ethnographic landscape: a prehistoric/ethnographic bedrock milling feature however this landscape no longer exists as it was destroyed by the existing temporary bridge construction.

WSRs Act Section 7(a) Evaluation for Alternative C (*Open-cut Realignment*)

Free Flow

a. Short-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions:***
  - Erecting trestles and falsework would require the construction of flat-gravel-filled surfaces that would be built in the actively flowing part of the river and on the downstream river-left bankfull floodplain bench. As such, floodplain width and roughness would be affected and may inhibit floodplain hydrologic function during high flow events (i.e., groundwater percolation and banking could be affected while the flat-gravel-fill surfaces are in place). Susceptibility to erosion on the floodplain may also increase at high flow where the flat-gravel-fill surface causes a constriction increasing flow velocity.

- ***Alteration of Upland Conditions:***
  - Project activities would require construction on the ridge east of the rockslide (north of the river). Temporary access roads would be constructed up from Incline Road to accommodate the falsework and formwork necessary for the abutments, retaining walls, super structure and or tunnel portals. One road will be constructed on the west side of the ridge with its alignment extending approximately 200-feet from Incline Road up the ridge to the southeast and loop back to Incline Road; another similar road will be constructed on the east side of the ridge with its alignment extending from Incline Road up the ridge to the northwest, looping back to Incline Road.

    The northwest aligned temporary road may truncate one to two ephemeral first-order channels and could intercept groundwater percolating down from recharge areas on the ridge tops. Storm water runoff from the temporary roads, ephemeral surface runoff and groundwater seepage will be addressed in the Caltrans Statewide SWMP plan.

- ***Alteration of Hydrological Processes:***
  - At the project location, the Merced River flows through a deep, steep-sided, V-shaped canyon with relief in excess of 2000 feet. The river geometry is largely controlled by the canyon bedrock, which is comprised of the Calaveras Complex (an assemblage of metamorphic rock), which structurally controls the sinuosity of the river. Although impacts to the river substrate could occur from construction activities impacts to the river's ability to change course or inundate its floodplain along the project reach should not be significant. Infiltration through the flat-gravel-fill surfaces on the river-left bankfull bench could be inhibited if the percentage of fines in the gravel fill is high enough to affect the vertical hydraulic conductivity.

    During high flow events (e.g., 50 to 100-year floods) and/or after catastrophic wildfire within the watershed, there is the potential for debris to accumulate or

"raft" along the trestles, falsework, and flat-gravel-filled surfaces. Although the timing of most of the construction is designed to avoid high flow periods, if a wildfire should occur upstream in the watershed during construction, the rafting potential for debris would be extremely high. Rafting of debris along falsework, trestles and/or flat-gravel-fill surfaces could pose a serious safety concern for whitewater recreation by creating entrapments for swimmers, kayakers, or rafts. Mean peak flow discharge through the project reach has been estimated to be approximately 5000 cubic feet per second (cfs), with bankfull discharge calculated at 8,800 cfs, and potential high peak flow of approximately 49,000 cfs (for a more detailed discussion of stream flow, see hydrology report). Although *in situ* channel scour and alteration of bed features is expected at constriction points, a significant change to the timing of flow for the Merced River from the construction activities is not expected. Moreover, direct and adverse changes to the flow pattern is unlikely, but some short-term changes to subsurface flow characteristics and floodplain detention storage may occur at the downstream, river-left construction area where a flat-gravel-fill surface will occupy approximately 1500 square-feet of floodplain.

- ***Magnitude and Extent of Off-Site Changes:***
  - The potential for long-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is considered low.
  - Time Scale – Falsework in the channel would take about six weeks to construct for both the upstream and downstream components. The superstructure for the falsework would take about 3 weeks to construct. Falsework in the channel would be in place for 6 months, the falsework for the V-bent footings would be in place for 4 months (but out of the bankfull channel). Falsework foundations in the channel would take about three to four weeks to remove. Thus, the falsework would be in the river, on the floodplain or adjacent to the banks for eight to ten months.

    Trestles used for construction support would take approximately six weeks to construct for both the upstream and downstream bridge elements. Trestles would be in the river, on the floodplain, or adjacent to the banks for eight to ten months.

    Flat gravel-filled-surfaces used to construct both the trestles and falsework would need to be in place for a corresponding amount of time; thus these structures will likely be in place for 10 to 24 months.

    Construction operations are scheduled to start in the late summer (June) after spring peak flows when flow conditions are relatively low (approximately 250 cfs – see hydrology report for a peak flow analysis). In-channel construction would be restricted to a nine month construction window between June and March, and thus in-stream construction elements should not be exposed to spring peak flows. Although in an average year the spring peak flow occurs in May (and usually does not exceed 5000 cfs), there are instances where rain-on-snow events have caused extreme flooding (see hydrology report for more information). These large (> 40,000 cfs) peak flow events have occurred between December and February, and

thus there is a chance that both the falsework and trestles (and associated flat-gravel-surfaces) could be subjected to extreme flood stressors.

b. Long-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions:***
  - Although Alternatives C calls for in-stream support columns, the cut slope alignment and tunnel are well out of the 100-year floodplain. As such, no impacts to the floodplain features such as width, roughness, or susceptibility to erosion is expected.

- ***Alteration of Upland Conditions:***
  - As road construction for this alternative is temporary, there would be no long-term effects to upland conditions.

- ***Alteration of Hydrological Processes***
  - Although bridge columns within the active bankfull channel could cause localized impacts to the river substrate or banks (e.g., scour/erosion), impacts to the river's ability to change course or inundate its floodplain along the project reach should not be significant.
  - Each column will be in the actively flowing part of the river channel either year-round or during common bankfull events (floods that have the chance of occurring every two years.) 2-D modeling results showed that changes in velocity and sediment mobility would occur at the upstream bridge, potentially causing erosion to mapped bed features. During high flow conditions, constriction between the bridge columns on the upstream bridge and channel bank could cause an increase in velocity up to 4.0 feet per second, increasing shear stress and sediment mobility on the bed and banks. This alternative has the potential to permanently change the nature of the river through the project reach, although the most pronounced changes would occur at the upstream bridge during high flow conditions. Changes could include modification of channel form and gradient by the development of scour within channel bars, erosions of riffles and enlargement of a large pool mapped mid-way through the project reach. Major changes in channel geometry (e.g., sinuosity and width-to-depth) are not expected.
  - Additionally since this alternative places columns in the active river channel, then rafting potential is high. This would be a particular concern on the upstream bridge along the left bank column. Rafting of debris at bridge columns could result in structural damage during an extreme flood event.

- ***Magnitude and Extent of Off-Site Changes:***
  - The potential for long-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is considered low.

c. Alternative Actions to Reduce or Eliminate Impacts

Construction methodologies that would obviate the need for in-channel support structures such as trestles, falseworks, or flat-gravel-filled surfaces (e.g., segmental bridge construction) would reduce or eliminate the short-term impacts to the free-flowing condition of the Merced River. The use of cofferdams could also reduce some of the impacts imparted by the flat-gravel-fill surfaces. Potential flood and debris impacts to in-stream construction elements such as falsework, trestles, and flat-gravel-fill surfaces could be mitigated by phasing construction seasonally, and shortening the construction windows to six months.

d. Conclusion

The short-term effects to the free-flowing condition of the Merced WSR would be direct and adverse due to the obstruction and constriction to flow by the construction of flat-gravel-filled surfaces, trestles, and falsework within the active bankfull channel. Through this modification of flow, these construction elements have the potential to alter bed and bank morphology. Moreover, the flat-gravel-filled surfaces (depending on the degree of fines and the resulting change in vertical hydraulic conductivity) could inhibit floodplain function by reducing the area available for groundwater infiltration. The likely potential impacts to water quality will be primarily attributable to increases in suspended sediment (i.e., turbidity) being introduced into the Merced River during construction activities.

The long-term effects to the free-flowing condition of the Merced WSR would be the obstruction of flow and the potential for bed and bank alteration by the placement of four bridge columns within the active bankfull channel.

Water Quality

a. Short-term Effects

Water quality, beneficial uses, and water quality objectives are discussed in more detail in the hydrology specialist report, but water quality parameters that may be impacted during construction include:

- Dissolved Oxygen (DO)
- Temperature
- pH
- Turbidity
- Oil and Grease
- Floating Material
- Sediment
- Settleable Material
- Suspended Material
- Tastes and Odors

Changes to DO, temperature, and pH could adversely affect aquatic life in the vicinity and downstream of the project reach. Since it is unclear if impacts to these water quality

parameters will occur, more information is needed for each to determine the extent of the potential short-term impact.

b. Long-term Effects

Long-term water quality impacts (i.e., impacts not associated with short-term construction) are expected to be minor. The geology in the project reach is characterized by relatively stable metamorphic bedrock (phyllite), and river substrate dominantly composed of coarse granitic boulders, cobble, and gravel. Based on this (and that most of the banks in the project reach are bedrock or armored by rip-rap) erosion-related turbidity would be very low. The primary long-term impact to water quality would be from storm water runoff carrying contaminates from the road and bridge surfaces. The primary pollutants would include petroleum distillates, metals, wear products from motor vehicle operation, and hazardous materials spilled in route accidents.

c. Alternative Actions to Reduce or Eliminate Impacts

These concerns have been addressed in the Caltrans Statewide SWMP. The SWMP addresses impacts on water quality standards from erosion, discharges of hazardous materials and disruption of natural drainage patterns in the planning, design and construction phases of the project. The SWMP also assures compliance to the National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit issued by the State Water Resources Control Board (SWRCB) for Section 402 of the Clean Water Act.

d. Conclusion

Long-term effects to water quality from any of the alternatives should be negligible.

Recreation Outstandingly Remarkable Value

a. Short-term Effects

- ***Whitewater Rafting***
  - According to the "Advanced Planning Study" for Alternative C the falsework is expected to leave an 80 foot wide gap between the support columns for the falsework, jetties, and trestles. Even though 80 feet would be wide enough to support river rafting during this phase of construction, narrowing the river by 50 percent would increase the flow velocity through the construction site. The increase of flow would change the generally class III river to a class VI making it unsafe for commercial rafters to take customers through the constricted openings of the river.
  - Falsework in the channel will take about six weeks to construct for both the upstream and downstream components. The superstructure for the falsework will take about three weeks to construction. Falsework will remain in the river channel for six months. Falsework in the channel will take about three to four weeks to remove. As a result, falsework will be in the river for eight to ten months. Rafting season is three to six months dependent on river flow. Therefore a minimum of one

rafting season will be adversely impacted. The design of the falsework and construction specifications adversely impacts river rafting as it inhibits the safety of rafting curtailing the rafting business during the construction period. There are six rafting companies running the Merced River. Trips are offered April, May, June and depending on flows, there is potential for trips in July.

- ***Hiking***
  - The current one-lane detour along existing Yosemite Valley Railroad grade would be extended and a third temporary bridge would be constructed upstream. The Merced River Canyon Trail (Yosemite Valley Railroad grade) is approximately 14 miles long. The total amount paved is approximately 0.5 miles. According to the Categorical Exclusion for the temporary bridges the unpaved portion is 2.8 miles from Incline Road to the temporary bridges. Therefore, access is reduced from 14 miles to 2.8. The paving of the existing Yosemite Valley Railroad grade (Incline Road) adversely impacts the use of the railroad grade as a trail (Merced River Canyon Trail).

b. Long-Term Effects

- ***Whitewater Rafting***
  - Rafters would be affected negatively by having two bridges spanning the river. Noise from vehicular traffic overhead, visual impairment from the bridges, bank stabilization, and constructed features would detract from the overall whitewater boating experience. In addition, there are two columns in the river to be avoided by river users. The columns will change the flow in such a way to impact the rafters to paddle away from the obstacle. In addition, there is concern with debris accumulating up against the columns creating an additional hazard. Also Alternative C has an extensive cut slope across from the Ferguson Slide of at least 400 feet long and as high as 130 feet. According to the Visual Impact Analysis conducted by Caltrans, in analyzing the view from visitors using the river, there are some vantage points where only the top of the cutslope would be visible. From other vantage points the "full effect of the slope and its engineered appearance in the landscape would be fully visible." The enormity of the cutslope is not in harmony with the surrounding landscape. The use of the cuts slope next to the river corridor adversely impacts the visual quality to the Visual Quality Objectives level of Retention and therefore impacts the recreation experience of whitewater rafting. According to participants in the Merced Wild and Scenic River Ferguson Slide Recreation Survey Reports prepared for Caltrans by the University of Utah and the Pennsylvania State University, for Alternative C a participant stated this alternative would "make me not want to revisit" and "it would negatively impact my experience of the Merced River."

- ***Hiking***
  - The current one-lane detour along existing Yosemite Valley Railroad grade used as a trail (Merced River Canyon Trail) will have the asphalt removed and restored to natural conditions. However, this section of the trail will be noticeably wider than the remainder of the trail. All that is known from the EIS is the natural conditions

will be met by removing any existing paving.. For trail users the greatest impact is where the new bridges cross over the Merced River Canyon Trail. Per the Visual Impact Analysis conducted by Caltrans, it is likely the abutment walls would be visible to the hikers. Overall visual quality of the area would be reduced for visitors utilizing the Merced River Canyon Trail due to the bridges overhead and the abutment walls will block some views. Visually, the terrain will appear different to the hiker, equestrian or mountain biker. According to participants in the Merced Wild and Scenic River Ferguson Slide Recreation Survey Reports prepared for Caltrans "the options that cross the river would make me not want to hike or bike in the area."

c. Alternative Actions to Reduce or Eliminate Impacts

- Preserve existing vegetation to provide visual screening of constructed features.
- Reduce impacts to the visual intrusion of the bridge by choosing colors of concrete or concrete stain that blends the structure into the surrounding terrain.
- The following alternative actions are recommended for hiking:
    - Use vegetation to soften the cut slopes and or retaining walls.
    - Remove asphalt from the old railroad grade and return it to a natural appearance.

d. Conclusion

Alternative C short-term would impact the finances of those who operate businesses related to whitewater rafting on the Merced River as well as the local economy for communities nearby the slide as rafting related tourism would be curtailed during construction. For the short-term, construction activities would prohibit river use during construction. Hiking and riding on the old Yosemite Railroad grade are impacted due to the management of the section for vehicle travel during construction. For the long-term, whitewater rafting would be impacted as a "new roadway with its wider shoulders and rockfall benches would be a substantial departure from the existing roadway section" (Visual Impact Analysis, Caltrans, 2009). The bridge columns would impact the navigation of the river. For hiking, there would be no hiking or use of the trail for the short-term due to the use of the trail as a roadway for the temporary bridges. For the long-term, hiking would resume after the completion of the project with the overhead bridge and cutslopes impacting the visual landscape. This alternative has a major adverse effect to the Recreation ORV.

Geology Outstandingly Remarkable Value

a. Short-Term Effects

The following short-term effects are expected:

- ***Contact between meta-sedimentary and granitic rocks***

- The contact between the metamorphic rocks (meta-sediments) and the nearest igneous intrusive rocks is three miles to the east of Ferguson Slide around the Indian Flat area and again further east on the Merced River near El Portal. Since the contact between meta-sedimentary and granitic rocks does not occur within the project area, there are no short-term effects.

- ***Limestone rocks forming prominent escarpments***
  - Although limestone beds of prominent escarpments have been identified in segment 8 of the Merced River, within the project area, there is no construction activity within or near the prominent escarpments limestone beds. Since there will be no construction in this area, there will be no short-term effects.

b. Long-Term Effects

The effects are the same as those described under short-term effects.

c. Alternative Actions to Reduce or Eliminate Impacts

No mitigation is necessary as there are no effects.

d. Conclusion

Since the contact between the meta-sedimentary and granitic rocks, and prominent limestone escarpments do not occur within the Ferguson Slide potential effected area, there are not expected short or long-term effects on the identified geological ORVs.

Wildlife Outstandingly Remarkable Value

a. Short-term effects

- ***Limestone salamander***
  - During project implementation, individual limestone salamanders may move onto the closed portion Highway 140 (south side river) staging areas from adjacent habitat at night during rainy periods. Caltrans has not proposed that operations be restricted at night during these periods, which could subject limestone salamander to direct mortality.

- ***Important Riparian Vegetation***
  - The access roads, gravel fill supports, and other structures that would be built within the river would destroy the riparian vegetation in the direct vicinity of the falsework and bridges. Destruction of the riparian vegetation results in a major short-term effect to riparian vegetation. According to the hydrology report, the potential for short-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is considered low. This implies that effects to riparian vegetation downstream should be minimal and that effects to the native riparian vegetation are

expected to be limited to the vicinity of the slide and the construction activities. The destruction of the riparian vegetation would lead to a reduction in wildlife habitat for species that use riparian habitat for nesting, denning or food gathering however there would be possibilities for mobile species to temporarily utilize nearby riparian habitat. The destruction of riparian habitat would be a major impact to riparian species in the project area that are not mobile.

b. Long-Term Effects

- ***Limestone salamander***
  - Upland surface ground disturbance that might represent a long-term affect to limestone salamander habitat would not occur. Rock material generated by the project would be transported off-site to a disposal area beyond the distributional range of the species.

- ***Important Riparian Vegetation***
  - Native riparian vegetation at the disturbed sites (e.g. access and temporary roads) would not recover properly as invasive species may out compete native species and natural successional patterns may be disrupted. This disruption puts the disturbed sites at a high risk of being permanently type-converted to a weed-dominated, erosion-vulnerable, unsightly state. The destruction of the riparian vegetation would lead to a reduction in wildlife habitat for species that use riparian habitat for nesting, denning or food gathering however there would be possibilities for mobile species to utilize nearby riparian habitat. The destruction of riparian habitat would be a major impact to riparian species in the project area that are not mobile.

c. Alternative Actions to Reduce or Eliminate Impacts

- ***Limestone salamander***
  - Caltrans would adopt mitigation measures to protect the limestone salamander as follows:
    - A construction work window that prevents initial ground-disturbing construction activities from occurring on the southern slope during the salamander's active season of November through March, inclusive (Assembly Bill 1973).
    - Environmentally sensitive area fencing in the form of five-foot orange plastic mesh, as well as salamander protection exclusionary fencing in the form of 24-inch sheet metal, will be erected if construction-related activities will occur adjacent to limestone salamander habitat during their active season (Assembly Bill 1973).
    - A biological monitor will be onsite during active building to inspect the worksite and all exclusionary fencing (Assembly Bill 1973).
    - All ground-disturbing activities within 100 feet will cease if a limestone salamander is detected in an active construction site until the animal can be safely removed from the area according to an agreed-upon salvage plan (Assembly Bill 1973).

- Rock material generated by project activities would be transported approximately 20 miles from the project site (Caltrans).
- Enhancement opportunities include providing de interpretative signing at turnouts in the vicinity of the Ferguson Slide that describe the Limestone salamander (U.S. Forest Service).

- ***Important Riparian Vegetation:***
  - Minimize effects to the existing riparian vegetation (e.g. trim back riparian trees and shrubs rather than uproot or cut them to the base).
  - Implement an aggressive re-vegetation plan for the riparian corridor.
  - Use of locally native seeds and cuttings gathered from the site several years prior to implementation would mitigate the damage over time.

d. Conclusion

There is potential for direct mortality to limestone salamander from project related nocturnal use of staging areas along the closed segment of Highway 140 on the south side of the Merced River during the winter, and to salamanders that may attempt to cross Highway 140 at night during project operations. Considering that ground disturbing actions occur in unsuitable habitat; the mitigation measures adopted; and that locations of the known occupied sites near the Ferguson Slide would be unaffected, the wildlife ORV would not be adversely affected.

Construction activities would destroy riparian vegetation over the short-term. However, damage would be mitigated to limit effects and the values that would be affected are not unique to this section of the river. Neither the riparian vegetation nor the riparian vegetation dependent wildlife would be adversely affected once mitigation has been implemented.

Botany Outstandingly Remarkable Value

a. Short-Term Effects

- ***Clarkia lingulata***
  - Since this rare plant is 0.4 miles on either side of the project area and not within the project area, there would be no effect on the Botanical ORV for Alternative C.

b. Long-Term Effects

- ***Clarkia lingulata***
  - Since this rare plant is 0.4 miles on either side of the project area and not within the project area there would be no effect on the Botanical ORV for Alternative C.

c. Alternative Actions to Reduce or Eliminate Impacts

No alternative actions are required.

d. Conclusion

There are no effects to the Botany ORV, specifically none to the Clarkia lingulata, because it is not found in the Alternative C project area.

Cultural and Historical Landscape Outstandingly Remarkable Value

a. Short-term Effects

- ***Historic Vernacular Landscape***
  - There are no short-term effects.

- ***Ethnographic Landscape***
  - The construction of the trestle for the downstream bridge would have a short-term effect on the integrity of setting for the ethnographic resource Üzümati. The trestle and falseworks would block the view of the bear effigy from the vicinity of the downstream bridge and the ethnographic bathtub. This impact should not be permanent and would last until the temporary bridge was removed.

b. Long-term Effects*:*

- ***Historic Vernacular Landscape***
  - The alignment and construction of Alternative C would impact the historic vernacular landscape of the MRCL by altering the integrity of design and materials of Highway 140, the Yosemite Valley Railroad, and the Jenkins Hill Trail, as well as destroy a series of historic bridge footings and a historic foundation and debris.
  - Construction activities would alter the historic design and materials of Highway 140 by rerouting an approximately 4000-foot section of the highway across the river and installing two new bridges. The construction of access roads would further impact the integrity of materials of Highway 140 by digging through and below the old highway.
  - Similarly, approximately 600 feet of the existing grade of the Yosemite Valley Railroad would be destroyed by the construction of the two bridges and associated terraces, falseworks and trestles, and access roads.
  - Further impacts to its historic design and material would occur by constructing the third temporary bridge and the need to upgrade an additional 1000 feet of the existing historic grade to serve as a temporary one-lane road.
  - The historic design and materials of the Jenkins Hill Trail would be impacted by the construction of the downstream bridge and the cut slope and terrace feature. Approximately 800 feet of the trail would be destroyed.
  - Downstream bridge construction with its associated 100-foot wide flat-gravel fill surface and access roads would destroy a series of historic bridge footings, which lie directly in the path of construction.

- Access road construction on the south side of the river for the upstream bridge, and construction of the third temporary bridge, would destroy historic period foundation and debris scatter.

- ***Ethnographic Landscape***

  - The alignment and construction of Alternative C would impact the ethnographic landscape of the MRCL by altering the integrity of setting and feeling of the traditional cultural property Üzümati, removing many of the ethnographic plant resources, preventing ritualistic use of the ethnographic "bathtub" by destroying the feature, and destroying the integrity of design and materials of the bedrock milling features.
  - Downstream bridge construction with its associated 100-foot wide flat-gravel fill surface and access roads would destroy prehistoric bedrock milling features, which lie directly in the path of construction.
  - Construction of the third temporary bridge would destroy a bedrock milling feature.
  - The extent of the construction activities associated with the upstream bridge on the north side of the river would include a 100-foot wide flat-gravel fill surface to support trestles and falseworks, as well as access road construction that would require that the area be cleared of rocks and graded sufficiently to allow equipment to work safely. These activities would destroy the ethnographic bathtub.
  - Construction activities associated with Alternative C would remove ethnographic plant resources form the project area. The cut slope and terraces across the toe of the ridge on the north side of the river would have the greatest impact.

c. Alternative Actions to Reduce or Eliminate Impacts:

In determining appropriate mitigation, it is important to remember two things. First, what is the inherent value of the resource, and second, how will the public best be served. Many of the features do not possess the ability to provide additional scientific information; however, they have an intrinsic value for public education and recreational enhancement, as well as cultural and religious connotation for the Southern Sierra Miwuk Nation. Additionally, it is important to remember that this portion of the Merced WSR was set aside for its recreational values, not its scenic or wild characteristics. Thus, special attention was given to how best to enhance the recreational experience for the public within the Merced WSR, and maintain the traditional cultural and religious use of the area by the Southern Sierra Miwuk Nation. Therefore, with the aforementioned criteria for guidance, the following mitigation measures were developed:

- Yosemite Valley Railroad Grade - Reconstruct damaged and washed-out portions of the grade to return it to near historic condition. Establish trail for hiking, biking, and equestrian enjoyment. Provide funding to construct interpretive signs to interpret history of the railroad for the public. Provide funding to inventory the grade and identify its character defining features within the main stem of the Merced Wild and Scenic River.

- Highway 140 - Design bridges, tunnels, or rockshed to maintain the historic character of the original highway and complement the historic vernacular landscape. Use complimentary materials and designs that would meet the Secretary of the Interiors Standards. Provide funding to inventory the highway corridor and identify its character defining features within the main stem of the Merced WSR
- The Jenkins Hill Trail - Provide funding to reconstruct damaged and washed-out portions of the trail to return it to near historic condition. Establish trail for hiking. Construct interpretive signs to interpret history of the trail for the public. Provide funding to inventory the trail within the Merced WSR.
- Ethnographic bear effigy, *Üzümati*, Traditional Cultural Property (TCP) - Redesign bridges to be lower and less visually intrusive. Provide funding to document, record, evaluate, and nominate the TCP to the National Register of Historic Places (NRHP).
- Ethnographic "bathtub" - Try to avoid the site. Have a Native American monitor present during construction.
- Prehistoric bedrock milling feature (CA-MRP-1566) - Avoid the site if possible. Have archaeologist and Native American monitor present during construction. Provide funding for interpretive signs to explain Native American use of the area and the bedrock milling feature.
- Ethnographic plant resources - Provide funding to replant affected species in the canyon. Provide funding for interpretive signs that explain Native American use of plant resources.

d. Conclusion

The construction of Alternative C would have an adverse effect on the MRCL by damaging or destroying ten of the identified eleven remaining elements. Additionally, more information is required for the newly discovered bedrock milling feature (FS# 05-16-54-0216), as well as, testing in the vicinity of site to demonstrate subsurface potential. It is important to remember that in order to maintain the historic function of the Highway 140 transportation corridor as a living system, adverse effects to its material and design will occur; however, these adverse effects to the historic fabric are superseded by the need to maintain the historic function of the highway. Following the recommended mitigation measures would allow for the historic function of Highway 140 transportation corridor to continue while limiting the impacts to the cultural landscape.

WSRs Act Section 7(a) Evaluation for Alternative T (*Tunnel Realignment*)

Free Flow

a. Short-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative C
- ***Alteration of Upland Conditions***
  - The effects are the same as Alternative C except that this alternative would not disrupt any of the surface drainage features along the alignment, but may intercept groundwater. Groundwater seepage would be addressed in the Caltrans Statewide SWMP plan.
- ***Alteration of Hydrological Processes***
  - Same as Alternative C
- ***Magnitude and Extent of Off-Site Change***
  - Same as Alternative C

b. Long-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative C
- ***Alteration of Upland Conditions***
  - Same as Alternative C
- ***Alteration of Hydrological Processes***
  - Same as Alternative C
- ***Magnitude and Extent of Off-Site Changes***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Water Quality

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Recreation Outstandingly Remarkable Value

a. Short-term Effects

- ***Whitewater Rafting***
  - Same as Alternative C
- ***Hiking***
  - Same as Alternative C

b. Long-term Effects

- ***Whitewater Rafting***
  - Same as Alternative C
- ***Hiking***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Geology Outstandingly Remarkable Value

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Wildlife Outstandingly Remarkable Value

a. Short-term Effects

- ***Limestone salamander***
  - Same as Alternative C
- ***Important Riparian Vegetation***
  - Same as Alternative C

b. Long-term Effects

- ***Limestone salamander***
  - Same as Alternative C
- ***Important Riparian Vegetation***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Botany Outstanding Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

The effects are the same as Alternative C with the exception that the Jenkins Hill Trial will not be impacted.

a. Short-term Effects

- ***Historic Vernacular Landscape***
  - Same as Alternative C

- ***Ethnographic Landscape***
  - Same as Alternative C

b. Long-term Effects

- ***Historic Vernacular Landscape***
  - Same as Alternative C with the exception that the Jenkins Hill Trail will not be impacted

- ***Ethnographic Landscape***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

WILD AND SCENIC RIVERS ACT SECTION 7(A) EVALUATION FOR ALTERNATIVE T-3 (*TUNNEL UNDER SLIDE REALIGNMENT*)

Free Flow

a. Short-Term Effects

- ***Alteration of Riparian and/or Floodplain***
  - Same as Alternative C.

- ***Alteration of Upland Conditions***
  - The effects are the same as C except that temporary access roads would not be constructed up from Incline Road to accommodate the falsework and formwork necessary for the abutments, retaining walls, superstructure and or tunnel portals. Therefore, the effects caused by these access roads would not occur under this alternative.

- ***Alteration of Hydrological Processes***
  - There is one first-order ephemeral channel that may be truncated by temporary road and work area construction on the south side of the river (south of the rockslide). There are two second-order ephemeral channels that may be truncated by the temporary road and work area.

- ***Magnitude and Extent of Off-Site***
  - The potential for short-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is not expected. Storm water runoff from temporary roads or staging areas may contribute to a short-term increase in turbidity and the introduction of petroleum distillates.

b. Long-Term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - If a volumetrically significant amount of talus slides onto the bankfull bench/flood prone area due to construction activities, then changes to floodplain hydrologic function could occur. Changes could include modification of floodplain roughness and potentially (based on the percentage of fines) decrease infiltration capacity due to a change in vertical hydrologic conductivity.

- ***Alteration of Upland Conditions***
  - If talus materials slide into the bankfull bench/flood prone area, the bed and bank morphology may be changed sufficiently to alter the flow velocities and shear stress in that location. This change would be proportional to the additional slide material.

- ***Alteration of Hydrological Processes***
  - Impacts to the hydrological function of the Merced River from these upland disturbances are considered negligible.

- Magnitude and Extent of Off-Site Changes
    - A significant change to the timing of flow for the Merced River from the construction activities for is not expected.

c. Alternative Actions to Reduce or Eliminate Impacts

No alternative actions are required.

d. Conclusion

Ephemeral runoff from these channels would be accommodated by proper culvert sizing and placement defined under the Caltrans road construction BMP's. Mitigation for storm water runoff is addressed in the Caltrans Statewide SWMP. The SWMP addresses impacts on water quality standards from erosion, discharges of hazardous materials and disruption of natural drainage patterns in the planning, design and construction phases of the project.

Water Quality

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Recreation Outstandingly Remarkable Value

a. Short-term Effects

- ***Whitewater Rafting***
    - There are no known short-term effects as the boring under the base of the slide into the hillside would not require any jetties or falsework in the river bed. All construction is based on the existing closed State Route 140. It is not known if rocks will fall into the river during construction which would impact rafting safety if it was to occur. It is unknown how many years it will take for the boring to take. If rafter safety is jeopardized rafting would be curtailed.
- ***Hiking***
    - Same as Alternative C

b. Long-term Effects

- ***Whitewater Rafting***
  - There are minimal long-term effects. The most noticeable change would be the view of the tunnel portals, especially the eastern portal because the flow of the river and the bend near the portal location. The portals are not expected to have a substantial impact to river user's visual experience.

- ***Hiking***
  - There are minimal long-term effects. The most noticeable change is the view of the tunnel portals; however the portals are located on the other side of the river and therefore will not majorly impact the visual landscape.

c. Alternative Actions to Reduce or Eliminate Impacts

Use vegetation to soften the cut slopes and or retaining walls.

d. Conclusion

The tunnel alternative would have short-term negative effects to trail users and whitewater rafters. Trail users would be displaced from using the existing railroad grade (Merced River Canyon Trail). Trail user's recreational experience would not be protected or enhanced in the short-term. Whitewater rafting opportunities may not be protected or enhanced in the short-term with the potential of rocks falling during construction of the tunnel. If the river is closed to whitewater rafting, there would be impacts to the six commercial rafting businesses, as well as tourism in Mariposa County. In the short-term, there are major effects to the Recreation ORV

The alternative would not have long-term negative effects to visitors to the Merced River Canyon Trail and whitewater rafters. There are no bridge spans or vehicle noise along the trail. There are no cut slopes or massive retaining walls as in the other alternatives that could affect the visual experience. One portal would be noticeable to the river rafters however the structure is across the river from the trail visitors which minimizes the visual impact. There are no long-term effects to the Recreation ORV.

Geology Outstandingly Remarkable Value

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Wildlife Outstandingly Remarkable Value

a. Short-Term Effects:

- ***Limestone salamander:***
  - Highway construction represents a threat to limestone salamander and its habitat. Direct effects or mortality to salamanders may occur during road construction (inadvertent burial or death from blasting), or from contact with equipment. Surface ground disturbance may also disrupt the network of fissures among the rock utilized by limestone salamanders for both surface and subsurface movements. Interdependent actions would also occur on areas of suitable limestone salamander habitat. Temporary access roads and retaining walls would be necessary as part of tunnel construction. Staging areas may be expanded into upland slopes, which are also suitable habitat. Mortality of individuals is likely.

- ***Important Riparian Vegetation:***
  - Same as for Alternative C.

b. Long-Term Effects

- ***Limestone salamander***
  - Construction activities would represent a loss of salamander habitat. Staging areas may need to be expanded into upland slopes, which are also suitable habitat. Long-term indirect effects of habitat fragmentation may also result from habitat isolation.

- ***Important Riparian Vegetation***
  - Direct effects or mortality to salamanders may occur during road construction (inadvertent burial or death from blasting), or from contact with equipment. Mortality of individuals is likely in the short term and there is not enough information provided to evaluate the effects to viability in the project area.

c. Alternative Actions

- ***Limestone salamander***
  - Since limestone salamander habitat and the species would be directly affected, species conservation could be enhanced by purchasing property adjacent to the Limestone Salamander Ecological Reserve to expand the size of the reserve. Other alternative effects would be similar to those described under Alternative C. A limited ground-disturbing construction work window covering most of the period of surface activity, the installation of environmental fencing, and the use of biological monitors may reduce these potential effects. Rock material generated by the alternative would be transported approximately 20 miles, which would be outside the distributional range of limestone salamander. Enhancement opportunities

include providing interpretative signing at turnouts in the vicinity of the Ferguson Slide that describe the wildlife ORV - limestone salamander.

- ***Important Riparian Vegetation***
  - Same as Alternative C.

d. Conclusion

Ground disturbing actions would occur on suitable habitat for limestone salamander. Two known occupied sites are within the assumed species maximum dispersal distance from project actions. Suitable habitat would be directly altered and rendered unsuitable, and individual limestone salamander would be directly affected (take). The limestone salamander component of the wildlife ORV would be adversely affected.

There should be no effects to riparian vegetation anticipated. The wildlife riparian vegetation component of the Wildlife ORV would not be adversely affected by the alternative.

Botany Outstandingly Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts
  - Same as Alternative C

d. Conclusion
  - Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

a. Short-Term Effects

- ***Historic Vernacular Landscape***
  - Construction of Alternative T-3 would have no short-term effects on the ORVs of the MRCL because the only effect of this alternative would be permanent in nature.

- ***Ethnographic Landscape***
  - Construction of Alternative T-3 would have no short-term effects on the ORVs of the MRCL because the only effect of this alternative would be permanent in nature.

b. Long Term Effects

- ***Historic Vernacular Landscape***
  - Construction of Alternative T-3 would have a minimal long-term effect on the integrity of design and materials of Highway 140 by the introduction of the new tunnel feature into the historic corridor of the highway. Construction of the tunnel would alter the historic design by rerouting the corridor through a tunnel on the south side of the river for approximately 3600 feet.

    While this alteration would constitute an adverse effect to the historic design and materials of the highway, the adverse effect to the historic design is counterbalanced by the maintenance of the historic function of the transportation system.

- ***Ethnographic Landscape***
  - This alternative will not affect the Ethnographic Landscape.

c. Alternative Actions to Reduce or Eliminate Impacts

Since there are minimal effects, no alternative actions are required; however, the historic design and materials of the highway corridor would be achieved by using construction methods that are sympathetic to the historic character of the highway and the surrounding cultural landscape. This could be achieved using a couple of methods. One example would be to leave the tunnel opening unfinished like the Wawona Tunnel on Wawona Road (aka. Hwy. 41) in Yosemite National Park. Another example would be to face the tunnel entrance with rock, matching the existing rock work on the historic bridges that are character defining features of the historic highway corridor.

d. **Conclusion**

Since Highway 140, as a transportation corridor, represents a living system, the impact to the historic fabric would be reduced by the continuation of the historic function of the transportation system.

WSRs Act Section 7(a) Evaluation for Alternative S *(Viaduct Realignment)*

Free Flow

a. Short -Term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative C.

- ***Alteration of Upland Conditions***
  - Impacts to the hydrological function of the Merced River from these upland disturbances are considered negligible. The effects are the same as Alternative C except that temporary access roads would not be constructed up from Incline Road to accommodate the falsework and formwork necessary for the abutments, retaining walls, superstructure and or tunnel portals. Additionally an access road would be constructed up from Incline Road on the northwest side of the ridge and travel southeast along the extent of the alignment, reconnecting with Incline Road on the southeast side. This temporary road would be approximately 0.2 miles long and is required for the construction of the abutments, viaduct and terrace.

- ***Alteration of Hydrological Processes***
  - Disturbances would occur well above the 100-year floodplain elevation and thus impacts to the free-flowing condition or water quality of the Merced River from these upland disturbances are considered negligible. The potential for debris to accumulate or "raft" along the trestles, falsework, and flat-gravel-filled surfaces increases, during high flow events (e.g., 50 to 100-year floods) and/or after uncharacteristic wildfire within the watershed. Although construction activities are designed to avoid high flow periods, if a wildfire should occur upstream in the watershed during construction; rafting potential for debris would be extremely high. Rafting debris along falsework, trestles and/or flat-gravel-fill surfaces could pose serious safety concern for whitewater recreation or potentially result in catastrophic structural failure of these construction elements during an extreme flood event.

- ***Magnitude and Extent of Off-Site Changes***
  - The potential for short-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is considered low

b. Long-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Although Alternative S calls for in-stream support columns, the viaduct alignment would be well out of the 100-year floodplain. As such, no significant impacts to the floodplain features such as width, roughness, or susceptibility to erosion is expected.

- ***Alteration of Upland Conditions***
    - Project activities under Alternative S would require a viaduct to be constructed, which would include a 10-foot cut slope and retaining wall along the slope opposite the rock slide. This construction may truncate two first-order ephemeral drainages and could intercept groundwater percolating down from recharge areas on the ridge tops. Impacts to the hydrological function of the Merced River from these upland disturbances are considered negligible. Ephemeral surface runoff would be addressed in the Caltrans Statewide SWMP plan.

- ***Alteration of Hydrological Processes***
    - During high flow events (e.g., 100-year return floods) and/or after catastrophic wildfire there is the potential for debris to accumulate or "raft" along bridge columns or along the bridge if the flow is high enough. Since Alternative S proposes placement of columns in the active river channel, rafting potential for this alternative is high. This is could be a particular concern on the upstream bridge along the left bank column (as seen looking downstream). Rafting of debris at bridge columns could pose a serious safety concern for whitewater recreation by creating entrapments for swimmers, kayakers, or rafts.

      Mean peak flow discharge through the project reach has been estimated to be approximately 5000 cubic feet per second (cfs), with bankfull discharge calculated at 8,800 cfs, and potential high peak flow of approximately 49,000 cfs (for a more detailed discussion of stream flow, see hydrology report). Although in situ channel scour and alteration of bed features is expected at high flows, a significant change to the timing or flow of the Merced River from Alternative S is not expected. Moreover, major changes to flow pattern, subsurface flow characteristics, and floodplain detention storage potential are unlikely.

- ***Magnitude and Extent of Off-Site Changes***
    - Under high-flow conditions, changes in velocity and hence sediment mobility are predicted for both the upstream and downstream bridge segments. The model suggests constriction of flow along the river-left bridge column on the downstream bridge that may affect the bed and banks adjacent to Route 140. Changes to pool morphology and erosion of channel bars are also predicted. There is a potential to permanently change the nature of the river through the project reach, although the most pronounced changes would occur at the upstream bridge during high flow conditions. Major changes in channel geometry (e.g., sinuosity and width-to-depth) are not expected.

c. Alternative Actions to Reduce or Eliminate Impacts

All actions to comply with BMPs would be address in the storm water runoff from the temporary roads, ephemeral surface runoff and groundwater seepage would be addressed in the Caltrans Statewide SWMP plan.

d. Conclusion

Project activities are not expected to have short or long-term effects to upland conditions because impacts to the hydrological functions of the Merced River from upland disturbances are considered negligible. Changes to pool morphology and erosion of channel bars are also predicted. Long-term effects to subsurface flow characteristics and floodplain detention storage potential are not expected.

Water Quality

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Recreation Outstandingly Remarkable Values

a. Short-term Effects

- ***Whitewater Rafting***
  - Same as Alternative C
- ***Hiking***
  - Same as Alternative C

b. Long-term Effects

- ***Whitewater Rafting***
  - Same as Alternative C
- ***Hiking***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Geology Outstandingly Remarkable Value

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Wildlife Outstandingly Remarkable Value

a. Short-term Effects

- ***Limestone salamander***
  - Same as Alternative C
- ***Important Riparian Vegetation***
  - Same as Alternative C

b. Long-term Effects

- ***Limestone salamander***
  - Same as Alternative C
- ***Important Riparian Vegetation***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Botany Outstandingly Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***
    - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

a. Short-term Effects

- ***Historic Vernacular Landscape***
    - There are no short-term effects

- ***Ethnographic Landscape***
    - The construction of the trestle for the downstream bridge would have a short-term effect on the integrity of setting for the ethnographic resource *Üzümati*. The trestle and falseworks will block the view of the bear effigy from the vicinity of the downstream bridge and the ethnographic bathtub. This impact should not be permanent.

b. Long-term Effects

Although the alignment and construction activities for Alternative S differ somewhat from Alternatives C and T, the long-term effects to cultural resources are essentially the same as under those alternatives with the exception that the Jenkins Hill Trail would not be impacted.

- ***Historic Vernacular Landscape***
    - The alignment and construction of Alternatives S would impact the historic vernacular landscape of the MRCL by altering the integrity of design, and materials of Highway 140, the Yosemite Valley Railroad, as well as destroy a series of historic bridge footings and a historic foundation and debris.
    - Construction activities would alter the historic design and materials of Highway 140 by rerouting an approximately 2700-foot section of the highway across the river and installing two new bridges. The construction of a viaduct and retaining wall and numerous access roads will further impact the integrity of materials of Highway 140 by cutting down from the old highway.
    - Similarly, approximately 800 feet of the existing grade of the Yosemite Valley Railroad would be destroyed by the construction of the two bridges and associated terraces, falseworks and trestles, and access roads. Further impacts to its historic design and material will occur by the construction of the third temporary bridge and the need to upgrade an additional 1000 feet of the existing historic grade to serve as a temporary one-lane road.

- Downstream bridge construction with its associated 100-foot wide flat-gravel fill surface and access roads would destroy a series of historic bridge footings, which lie directly in the path of construction.
- Access road construction on the south side of the river for the upstream bridge, and construction of the third temporary bridge, would destroy a historic foundation and debris.

- ***Ethnographic Landscape***
  - The alignment and construction of Alternatives S would impact the ethnographic landscape of the MRCL by altering the integrity of setting, and feeling of the traditional cultural property *Üzümati*, removing many of the ethnographic plant resources, preventing ritualistic use of the ethnographic "bathtub" by destroying the feature, and destroying the integrity of design and materials of bedrock milling features.
  - Downstream bridge construction with its associated 100-foot wide flat-gravel fill surface and access roads would destroy prehistoric bedrock milling features, which lie directly in the path of construction.
  - Construction of the third temporary bridge will destroy another bedrock milling feature.
  - The extent of the construction activities associated with the upstream bridge on the north side of the river will include a 100-foot wide flat-gravel fill surface to support trestles and falseworks, as well as access road construction that will require that the area be cleared of rocks and graded sufficiently to allow equipment to work safely. These activities would destroy the ethnographic bathtub.
  - Construction activities associated with Alternative S would remove ethnographic plant resources form the project area.

c. Alternative Actions to Reduce or Eliminate Impacts:

- Same as Alternative C.

d. Conclusion:

- Same as Alternative C.

WSRs Act Section 7(a) Evaluation for Alternatives S2-V1 (Modified Viaduct Realignment – 2 Tiered-arch Bridges)

Free Flow

a. Short -Term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative C.
- ***Alteration of Upland Conditions***
  - Same as Alternative S.
- ***Alteration of Hydrological Processes***
  - Same as Alternative S.
- ***Magnitude and Extent of Off-Site Changes***
  - Same as Alternative S except that this alternative uses the falsework construction method, construction elements that may be in channel for up to 12 months. The potential for short-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is considered low.

b. Long-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative S.
- ***Alteration of Upland Conditions***
  - Same as Alternative S.
- ***Alteration of Hydrological Processes***
  - Same as Alternative S.
- ***Magnitude and Extent of Off-Site Changes***
  - Same as Alternative S.

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as for Alternate S

d. Conclusion

- Same as for Alternate S

Water Quality

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Recreation Outstandingly Remarkable Value

a. Short-term Effects:

- ***Whitewater Rafting***
  - Same as Alternative C.
- ***Hiking***
  - The current one-lane detour along existing Yosemite Valley Railroad grade (Incline Road) would be extended an additional 393 feet and a third temporary bridge would be constructed upstream for Alternative S2-V1. The remaining effects are the same as Alternative C.

b. Long-term Effects:

- ***Whitewater Rafting***
  - Whitewater rafters would be affected negatively by having two bridges spanning the river with the presence of a wall and the viaduct. Noise from vehicular traffic overhead, visual impairment from the bridges, and bank stabilization features detract from the overall whitewater rafting experience. Constructed features such as the V-bent supports, will also have impacts to the visitor experience as well as potentially posing as safety hazards during high water events. In addition, there would be a supporting retaining wall on the hill directly across from the rockslide and a 10-foot-wide terrace on either side of the state route which impact the visual experience of rafters.
- ***Hiking***
  - The alternative would impact the use of the Merced River Canyon Trail as the spans and supports impact use of the trail. The alternative would remove the pavement on the Yosemite Valley Railroad grade returning it to a more natural condition; however, the grade was widened to accommodate the width of large trucks, buses, and motorhomes traveling to or from Yosemite. Visually, the terrain would appear

very different to the hiker, equestrian or mountain biker. "The most notable visual difference would be (a) where the new bridges cross over the trail and (b) the viaduct portion of the roadway with its retaining wall paralleling Incline Road. "… The retaining wall would be prominent to the trail users …" (Visual Impact Analysis, Caltrans, 2009). Since the trail would continue to be able to be used, there are no major impacts to hiking, assuming that the trail is restored.

c. Alternative Actions to Reduce or Eliminate Impacts

During rafting season construction times would be adjusted and may be curtailed to minimize impacts on rafting.

For hiking, the alternative actions would be the same as Alternative C.

d. Conclusion

This alternative would have an adverse effect to the Recreation ORV. Placing portions of the bridge abutments in the river or below the high water mark could cause a hazardous condition and may impede river navigability. Even though the alternative description states the V-bents and the abutments are above high water level, the base of the V-bents and abutments are located in such a manner that it could be hazardous to rafters especially during high water events. Further determination of the placement of the V-bents and their impacts to rafters is needed.

For hiking, the effects conclusion is the same as Alternative C.

Geology Outstandingly Remarkable Value

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Wildlife Outstandingly Remarkable Value

a. Short-Term Effects:

- ***Limestone salamander***

- Temporary access roads would be necessary to complete tie-off structures within potential habitat. Salamanders would be directly affected if the subsurface network of crevices in which they reside or travel were disturbed.

- ***Important Riparian Vegetation***
  - Same as for Alternative C.

b. Long-Term Effects:

- ***Limestone salamander***
  - Access roads for construction of two cable support towers and five tie-off features for the bridge would affect potential habitat. These represent temporary features, but habitat recovery and occupancy would not occur within the short-term due the limited dispersal capabilities of limestone salamander and the time needed for disturbed areas to recover.

- ***Important Riparian Vegetation***
  - Same as for Alternative C.

c. Alternative Actions to Reduce or Eliminate Impacts:

- ***Limestone salamander***
  - Since limestone salamander habitat and the species would be directly affected, species conservation could be enhanced by purchasing property adjacent to the Limestone Salamander Ecological Reserve to expand the size of the reserve. Other alternative actions would be similar to those described under Alternative C and would require a limited ground-disturbing construction work window covering most of the period of surface activity, the installation of environmental fencing, and the use of biological monitors may reduce these potential effects. Rock material generated by the alternative would be transported beyond the distributional range of the species. Enhancement opportunities include providing interpretative signing at turnouts in the vicinity of the Ferguson Slide that describe the limestone salamander.

- ***Important Riparian Vegetation***
  - Same as Alternative C.

d. Conclusion
  - Same as Alternative C.

Botany Outstandingly Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

a. Short-term Effects

- ***Historic Vernacular Landscape***
  - Although the alignment and construction activities for Alternative S2-V1 differ somewhat from Alternative S, the short-term effects to cultural resources are essentially the same.

- ***Ethnographic Landscape***
  - Although the alignment and construction activities for Alternative S2-V1 differ somewhat from Alternative S, the short-term effects to cultural resources are essentially the same.

b. Long-term Effects

Although the alignment and construction activities for Alternative S2-V2 differ somewhat from Alternatives C and T, the long-term effects to cultural resources are essentially the same as under those alternatives with the exception that the Jenkins Hill Trail would not be impacted.

- ***Historic Vernacular Landscape***
  - Long-term effects are essentially the same as Alternative C, T and S.

- ***Ethnographic Landscape***
  - Long-term effects to the MRCL are essentially the same as Alternative C, T and S, with the exception that construction of the downstream bridge would affect the integrity of setting and feeling of the traditional cultural property *Üzümati.*

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

WSRs Act Section 7(a) Evaluation for Alternative S2-V2 (Modified Viaduct Realignment – Slant-leg V Column Bridges)

Free Flow

a. Short -Term Effects

The effects are the same as Alternative S however northwest aligned temporary road disturbances would occur well above the 100-year floodplain elevation and thus impacts to the free-flowing condition of the Merced River from these upland disturbances are considered negligible.

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative C.
- ***Alteration of Upland Conditions***
  - Same as Alternative C.
- ***Alteration of Hydrological Processes***
  - Same as Alternative C.
- ***Magnitude and Extent of Off-Site Changes***
  - Same as Alternative C however the foundations would be constructed above the bankfull elevation, and should not be exposed to spring peak flows.

b. Long-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - Same as Alternative S.
- ***Alteration of Upland Conditions***
  - Same as Alternative S.
- ***Alteration of Hydrological Processes***
  - Same as Alternative S.
- ***Magnitude and Extent of Off-Site Changes***
  - Same as Alternative S.

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative S.

d. Conclusion

- Project activities are not expected to have short or long-term effects to upland conditions because impacts to the hydrological functions of the Merced River from upland disturbances Same as Alternative S.

Water Quality

a. Short-term Effects
- Same as Alternative C

b. Long-term Effects
- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts
- Same as Alternative C

d. Conclusion
- Same as Alternative C

Recreation Outstandingly Remarkable Value

a. Short-term Effects:

- ***Whitewater Rafting***
  - Same as for Alternative S2-V1.
- ***Hiking***
  - Same as for Alternative S2-V1.

b. Long-term Effects:

- ***Whitewater Rafting***
  - Same as for Alternative S2-V1.
- ***Hiking***
  - Same as for Alternative S2-V1.

c. Alternative Actions to Reduce or Eliminate Impacts
- Same as for Alternative S2-V1.

d. Conclusion
- Same as for Alternative S2-V1.

Geology Outstandingly Remarkable Value

a. Short-term Effects
- Same as Alternative C

b. Long-term Effects
- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Wildlife Outstandingly Remarkable Value

a. Short-Term Effects:

- ***Limestone salamander***
  - Same as for Alternative S2-V1.
- ***Important Riparian Vegetation***
  - Same as for Alternative C.

b. Long-Term Effects:

- ***Limestone salamander***
  - Same as for Alternative C S2-V1.
- ***Important Riparian Vegetation***
  - Same as for Alternative C.

d. Alternative Actions to Reduce or Eliminate Impacts:

- ***Limestone salamander***
  - Same as Alternative S2-V1.
- ***Important Riparian Vegetation***
  - Same as for Alternative C.

e. Conclusion

- Same as for Alternative C.

Botany Outstandingly Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
  - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

a. Short-term Effects

- ***Historic Vernacular Landscape***
  - Although the alignment and construction activities for Alternative S2-V2 differ somewhat from Alternative S2-V1, the short-term effects to cultural resources are essentially the same with the exception that the site of the historic foundation with debris feature would not be impacted.

- ***Ethnographic Landscape***
  - Although the alignment and construction activities for Alternative S2-V2 differ somewhat from Alternative S2-V1, the short-term effects to cultural resources are essentially the same with the exception that the prehistoric bedrock milling feature would not be impacted.

b. Long-term Effects

- ***Historic Vernacular Landscape***
  - Long-term effects to the MRCL are essentially the same as Alternative C, T and S, with the exception that the historic foundation with debris would not be impacted.

- ***Ethnographic Landscape***
  - Long-term effects to the MRCL are essentially the same as Alternative C, T and S, with the exception that construction of the downstream bridge would affect the integrity of setting and feeling of the traditional cultural property *Üzümati.* The historic foundation with debris and a prehistoric bedrock milling feature would not be impacted.

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as for Alternative C

d. Conclusion

- Same as for Alternative C

WSRs Act Section 7(a) Evaluation for Alternatives R *(Rockshed/Tunnel)*

Free Flow

a. Short-term Effect

- ***Alteration of Riparian and/or Floodplain Conditions***
  - No significant impacts to the floodplain features such as width, roughness, or susceptibility to erosion are expected. However, this alternative has the likelihood of remobilizing the rock fall talus during construction.

- ***Alteration of Upland Conditions***
  - Changes to flow velocity, shear stress, or bed and bank features are considered negligible. If, however, a volumetrically significant amount of talus is remobilized during construction, it could slide onto the bankfull bench and/or into the actively flowing part of the river.

- ***Alteration of Hydrological Processes***
  - There is one first-order ephemeral channel that may be truncated by temporary road and work area construction; on the south side of the river (south of the rockslide) there are two second-order ephemeral channels that may be truncated by the temporary road and work area.

- ***Magnitude and Extent of Off-Site Changes***
  - The potential for short-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is not expected.

b. Long-term Effects

- ***Alteration of Riparian and/or Floodplain Conditions***
  - If a volumetrically significant amount of talus slides onto the bankfull bench/flood prone area, then changes to floodplain hydrologic function could occur. Changes could include modification of floodplain roughness and potentially (based on the percentage of fines) decrease infiltration capacity due to a change in vertical hydrologic conductivity.

- ***Alteration of Upland Conditions***
  - If talus material slides into the bankfull, the bed and bank morphology may change sufficiently to alter the flow velocities and shear stress in that location.

- ***Alteration of Hydrological Processes***

- Impacts to the hydrological function of the Merced River from these upland disturbances are considered negligible. A significant change to the timing of flow for the Merced River from the construction activities

- ***Magnitude and Extent of off-site changes***
  - More information on the construction methodologies implemented is necessary to determine the magnitude and effects of off-site changes.

c. Alternative Actions to Reduce or Eliminate Impacts

Storm water runoff from temporary roads or staging areas may contribute to a short-term increase in turbidity and the introduction of petroleum distillates. Ephemeral runoff from these channels would be accommodated by proper culvert sizing and placement defined under the Caltrans road construction BMPs. This runoff would be addressed in the Caltrans SWMP plan. The SWMP addresses impacts on water quality standards from erosion, discharges of hazardous materials and disruption of natural drainage patterns in the planning, design and construction phases of the project.

d. Conclusion

Since construction activities would occur well out of the active bankfull channel, there would be no major effects to the free-flowing condition of the Merced River. Assuming that the construction activities do not remobilize a volumetrically significant amount of talus, then no major impact to the free-flowing condition is expected. If, however, there is a volumetrically significant amount of talus remobilized onto the bankfull bench and/or in the actively flowing river channel, then this action would result in a direct effect to the overall free flow if the WSR.

Water Quality

a. Short-term Effects
- Same as Alternative C

b. Long-term Effects
- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts
- Same as Alternative C

d. Conclusion
- Same as Alternative C

Recreation Outstandingly Remarkable Value

a. Short-term Effects:

- ***Whitewater Rafting***
  - The falsework would be located up against the Ferguson Slide talus and would not span the river. There would be potential for unimpeded river rafting during construction. However, there is expectation the slide may be active during construction and there would be a need to prevent the talus from falling into the river and on rafters. The information provided does not show whether the talus would go over the construction in to the river, or be held up above the construction project and therefore for this analysis the most impacts must be assumed. It is therefore assumed that rafting would be unsafe for whitewater rafting during construction of the rock shed.

- ***Hiking***
  - Same as for Alternative C

b. Long-term Effect:

- ***Whitewater Rafting***
  - Alternative R allows for whitewater rafters opportunity to raft under similar conditions as those occurring at the time of designation. However, at the turn in the river it would allow the rafters a clear and unobstructed view of the side wall of the rock shed, which would have a large visual presence along the edge of the river.

- ***Hiking***
  - The Merced River Canyon Trail would be usable. This alternative would allow use of the trail without any overhead structures or abutments in the river area. Visitors to the Trail would be exposed to the downhill wall of the rock shed along the river would be very noticeable in the visual landscape. Visually, the terrain would appear very different to the hiker, equestrian or mountain biker.

c. Alternative Actions to Reduce or Eliminate Impacts

- ***Whitewater rafting***
  - Reduce visual impacts of the linear rock shed by using a dull roof and the wall to blend with the surrounding rock.

- ***Hiking***
  - Reduce visuals of the linear rock shed by using a dull roof and the wall to blend with the surrounding rock.

d. Conclusion

The long term effects are the same as Alternative T-3 for whitewater rafting and hiking with the exception being the addition that the presence of the long wall of the rock shed along the river may be softened with the existing trees along portions of the trail, assuming the trail is

restored, but the wall will still be visually noticeable (Visual Impact Analysis, Caltrans, 2009).

Geology Outstandingly Remarkable Value

a. Short-term Effects

- ***Contact between meta-sedimentary and granitic rocks***
  - The effects of this alternative on this component of the Geology ORV are not permanent and therefore there are no short-term effects.

- ***Limestone rocks forming prominent escarpments***
  - The effects are the same as Alternative C.

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b. Long-term Effects:

- ***Contact between meta-sedimentary granitic rocks***
  - This alternative would remove talus material from the project area. Although some of the material would be returned to the base of the Ferguson Slide, the potential for a considerable amount of valuable meta-sedimentary talus rock material would be taken from the site. CalTrans existing easement for Highway 140 allows for removal of material on the highway. This includes material failing from rockfalls and landslides.

- ***Limestone rocks forming prominent escarpments***
  - The effects are the same as short-term effects.

c. Alternative Actions to Reduce or Eliminate Impacts

Where feasible, replace all removed talus material during construction of the rock shed.

d. Conclusion

There are no expected short or long-term effects. When the Merced River was declared a WSR, the Ferguson Slide was a dormant rockslide and the talus deposit did not exist at the time. With the implementation of alternative measures, replace talus materials, adverse effects are not expected to occur.

Wildlife Outstandingly Remarkable Value

a. Short-Term Effects:

- ***Limestone salamander:***
  - Same as Alternative T-3.

- ***Important Riparian Vegetation:***
    - Same as for Alternative C.

b. Long-Term Effects

- ***Limestone salamander***
    - Same as Alternative T-3.
- ***Important Riparian Vegetation***
    - Same as for Alternative C.

c. Alternative Actions

- ***Limestone salamander***
    - Same as Alternative T-3.
- ***Important Riparian Vegetation***
    - Same as for Alternative C.

d. Conclusion

- Same as Alternative T-3.

Botany Outstandingly Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
    - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***
    - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

a. Short-term Effects

- ***Historic Vernacular Landscape***
    - Construction of Alternative R would have no short-term effects because all effects are permanent.

- ***Ethnographic Landscape***
    - Construction of Alternative R would have no short-term effects because all effects are permanent.

b. Long-term Effects

- ***Historic Vernacular Landscape***
    - Construction of Alternative R would have a long-term effect on the integrity of design and materials of Highway 140 by the introduction of the new rockshed feature into the historic corridor of the highway. Construction activities would widen the existing road.

- ***Ethnographic Landscape***
    - There are no long term effects to the ethnographic landscape.

c. Alternative Actions to Reduce or Eliminate Impacts

- Highway 140 - Design rockshed to maintain the historic character of the original highway and complement the historic vernacular landscape.
- Use complimentary materials and designs that would meet the parkways standards used by the National Park Service.
- Provide funding to inventory the highway corridor and identify its character defining features within the main stem of the Merced WSR.

d. Conclusion

Since Highway 140, as a transportation corridor, represents a living system, the impact to the historic fabric would be offset by the continuation of the historic function of the transportation system.

The alignment and construction of Alternative R would have a minimal effect on the ethnographic landscape of the MRCL; however, depending on which construction method is utilized, it is likely that ethnographic plant resources would be destroyed.

WSRs Act Section 7(a) Evaluation for No-build Alternative (*Removal of Temporary Bridges*)

Free Flow

a. Short-term Effects

Demolition and removal of the abutments and columns would greatly reduce the dust and debris that is currently being introduced into the river by the existing abutments and columns, but will take a longer to complete. No changes to flow velocity, shear stress, or bed and bank features are expected. If demolition work is phased to coincide with low flow conditions, then no effects in channel conditions are expected.

b. Long-term Effects

There will be no long-term effects.

- ***Alteration of Riparian and/or Floodplain Conditions***
  - No significant impacts to the floodplain features such as width, roughness, or susceptibility to erosion are expected because once the temporary bridges are removed the riparian and flood plain conditions will return to pre-bridge conditions over time.

- ***Alteration of Upland Conditions***
  - No impact to upland conditions is expected as no construction will occur in this area and therefore there is not potential to alter upland conditions.

- ***Alteration of Hydrological Processes***
  - No significant changes to the timing of flow for the Merced River from the demolition activities are expected since demolition impacts would be short-term and hydrologic processes would return to pre-bridge conditions over time.

- ***Magnitude and Extent of Off-Site Changes***
  - The potential for long-term indirect effects downstream of the project reach to river characteristics such as flow frequency, sediment transport capacity, or floodplain accessibility is not expected as the river will return to pre-bridge conditions.

c. Alternative Actions to Reduce or Eliminate Impacts

No mitigation is necessary to reduce or eliminate impacts.

d. Conclusion

The free flow would be restored to pre-Ferguson Slide conditions therefore there would be no effect.

Water Quality

a. Short-term Effects

Potential impacts to water quality would be primarily attributable to increases in suspended sediment (i.e., turbidity) being introduced into the Merced River during demolition activities. Storm water runoff from working areas may contribute to a short-term increase in turbidity and the introduction of petroleum distillates.

b. Long-term Effects

Potential impacts to water quality would be primarily attributable to increases in suspended sediment but would return to pre-bridge conditions over time.

c. Alternative Actions to Reduce or Eliminate Impacts

Mitigation for storm water runoff is addressed in the Caltrans Statewide SWMP.

d. Conclusion

Although some of the demolition, removal, and restoration activities would occur on the river-right floodplain for the upstream bridge, the work would be done in six weeks during low flow conditions in the late summer or early fall, and thus there is a very low probability of the work area being inundated by a high flow event and thus a major effect to the free-flowing condition is unlikely. There may be short-term impacts to water quality from increased turbidity due to demolition activities. The SWMP addresses impacts on water quality standards from erosion, discharges of hazardous materials and disruption of natural drainage patterns in the planning, design and construction phases of the project.

Recreation Outstandingly Remarkable Value

a. Short-term Effects

- ***Whitewater Rafting***
    - The temporary bridges are being removed in 2018. If the removal is in the late summer, early fall there would be no short term effects from removal. Until 2018 a column remains in the river requiring care in navigation.

- ***Hiking***
    - The temporary bridges are being removed in 2018; there will continue be no access to hiking on the Merced River Canyon Trail within the Ferguson Slide project area until after 2018 when traffic is scheduled to be eliminated from this section of trail.

b. Long-term Effects

- ***Whitewater Rafting***
    - The bridges will be removed in 2018. At that time, there will be no access from El Portal to Briceburg, (the current put in and take out areas for rafting the Merced River) which will greatly reduce or eliminate rafting. This alternative will financially impact the existing river rafters with the loss of revenue from the 8,000-10,000 rafters who would find Class 3 / 4 rivers elsewhere.

- ***Hiking***
    - When the bridges are removed in 2018 there will be no access from Mariposa or Briceburg. Unless the trail is restored through this section, hiking would be difficult to unpassable in places. Trail use would be impacted most for those who traditionally have accessed the trail via Hwy. 140 from the west as opposed to those who live in El Portal or access the area from the park to the east end of the canyon. It is possible for visitors to travel other routes into Yosemite National Park to exit on State Route 140 to conduct recreation access to Segment 8 of the Wild and Scenic River, however time and fuel expenses would not find this desirable.

c. Alternative Actions to Reduce or Eliminate Impacts

During rafting season deconstruction times would be adjusted and may be curtailed to minimize impacts on rafting. For hiking, the mitigation is to remove asphalt and naturalization of the old Yosemite Railroad grade.

d. Conclusion

The No-build Alternative, once the temporary bridges are removed, would be less practical for rafting from El Portal to Briceburg, the current put in and take out areas for the Merced River, which includes the Ferguson Slide area. There will continue be no access to hiking on the Merced River Canyon Trail within the Ferguson Slide project area until after 2018 when traffic is scheduled to be eliminated from this section of trail. When the bridges are removed in 2018 there will be no access from Mariposa or Briceburg. Unless the trail is restored through the project area, hiking would be difficult to impassable in places. Assuming the trail is restored, it will be possible for visitors to travel other routes into Yosemite National Park to exit on State Route 140 to conduct recreation access to Segment 8 of the Wild and Scenic River, however time and fuel expenses would not find this desirable. This alternative will financially impact the existing river rafters with the loss of revenue from the 8,000-10,000 rafters who would find Class 3 / 4 rivers elsewhere. In the long term with the bridges removed there is a direct and adverse effect to the Recreation ORV.

Geology Outstandingly Remarkable Value

a. Short-term Effects

- Same as Alternative C

b. Long-term Effects

- Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts

- Same as Alternative C

d. Conclusion

- Same as Alternative C

Wildlife Outstandingly Remarkable Value

a. Short-term Effects

- ***Limestone Salamander***
  - No actions would occur within suitable habitat for limestone salamander. Removal of the temporary bridges and abutments would not occur within suitable salamander habitat. None of the three confirmed occupied sites in the vicinity of the Ferguson Slide are within the assumed 100-meter maximum dispersal zone from ground surface disturbing actions. Rock material generated by the alternative would be transported approximately 20 miles and be deposited outside the range of limestone salamander.

- ***Important Riparian Vegetation***
  - There should be no effects to the riparian vegetation under this alternative because the work done to demolition the bridge would be minimal in the riparian zone and the riparian zone near the temporary bridges is highly impacted currently so no additional effects would occur.

b. Long-Term Effects

- ***Limestone Salamander***
  - Effects to habitat and limestone salamander would not occur under the No-build Alternative.

- ***Important Riparian Vegetation***
  - There should be no long-term effects to the riparian vegetation under this alternative as the riparian vegetation will return to pre-bridge status overtime.

c. Alternative Actions to reduce Impacts

No mitigation is required however; enhancement recommendation includes providing an interpretative signing at turnouts in the vicinity of the Ferguson Slide that describe the limestone salamander. No mitigation is required for important riparian vegetation as there would be no effect.

d. Conclusion:

- ***Limestone Salamander***
    - No disturbing actions would occur, thus here would be no effects to limestone salamander anticipated under the No-Build Alternative. Locations of the known occupied sites near the Ferguson Slide would be unaffected by the alternative; and that the locations of other populations and potential habitat along the WSR would be retained, thus the wildlife ORV - limestone salamander would not be adversely affected by the No-build Alternative.

- ***Important Riparian Vegetation***
    - The wildlife riparian vegetation ORV would not be adversely affected by the alternative.

Botany Outstandingly Remarkable Value

a. Short-term Effects

- ***Clarkia lingulata***
    - Same as Alternative C

b. Long-term Effects

- ***Clarkia lingulata***
    - Same as Alternative C

c. Alternative Actions to Reduce or Eliminate Impacts
    - Same as Alternative C

d. Conclusion
    - Same as Alternative C

Cultural and Historic Landscape Outstandingly Remarkable Value

a. Short-term Effects

- ***Historic Vernacular Landscape***
    - Unlike the other alternatives that require new construction, this alternative represents the existing built environment; thus, no new construction is necessary. Additionally, as long as Highway 140 is open and functional, there are no short-term adverse effects to the historical vernacular landscape.

- ***Ethnographic Landscape***
    - Unlike the other alternatives that require new construction, this alternative represents the existing built environment; thus, no new construction is necessary.

Additionally, as long as Highway 140 is open and functional, there are no short-term adverse effects to the ethnographic landscape.

b. Long-term Effects

- ***Historic Vernacular Landscape***
  - The No-build Alternative would ultimately have a long-term effect to the historical vernacular landscape by closing this portion of Highway 140. Closing the highway would end its historic function, thereby changing the character and quality of the living system.

- ***Ethnographic Landscape***
  - While careful monitoring of the deconstruction activities will ensure that none of the remaining ethnographic features would be destroyed, the No-build Alternative would ultimately have a long-term effect to the ethnographic landscape by reducing access to the sites. Closing the highway would end the millennia-old function of the canyon as a transportation corridor; thereby changing the character and quality of the MRCL.

c. Alternative Actions to Reduce or Eliminate Impacts

- This alternative would directly and adversely affect the cultural and historical ORVs of the river by removing the transportation corridor from the MRCL. There are no alternative actions that would mitigate the adverse effect.

d. Conclusion

The No-build Alternative has the greatest potential of all the Alternatives to alter the character defining qualities of the MRCL by eventually closing Highway 140. By closing Highway 140, this alternative would majorly affect the historic function of Highway 140 as the embodiment of the millennia-old living system transportation corridor between the San Joaquin and Yosemite Valleys.

SUMMARY OF EFFECTS TO MERCED RIVER WILD AND SCENIC RIVER VALUES

All of the DEIS alternatives propose either temporary and/or permanent construction and/or construction related activities within the bed and banks at or below the normal high water mark. Each alternative is reviewed under the "direct and adverse" effects standard of Section 7(a) of the Wild and Scenic Rivers Act. Both short- and long-term effects are evaluated.

The following table summarizes the anticipated findings for each alternative for direct and adverse effects to free flow, water quality and ORVs and whether acceptable alternative actions have been proposed to reduce or eliminate direct and adverse effects. The findings for each alternative can be categorized in the following four ways:

- No direct and adverse effect
- Direct and adverse effect but the proposed construction and construction-related activities contained in the Nov. 2010 DEIS (and the additional supplemental information and analysis provided since then) includes acceptable alternative actions sufficient to reduce or eliminate a direct and adverse finding.
- Direct and adverse effect and proposed construction and construction-related activities do NOT include acceptable alternative actions, but the FS has suggestions for acceptable alternative actions that if incorporated into the updated proposal in the next DEIS could reduce or eliminate a direct and adverse finding in our determination responsive to that future document.
- Direct and adverse effects – no acceptable alternative actions exist.

Table 1: Summary of Effects to Free Flow, Water Quality and River Values and Acceptable Alternative Actions

DEIR/DEIS Alternative	Are there short term direct and adverse effects?	Does the proposal include acceptable alternative actions to eliminate or reduce short term effects?	Are there long term direct and adverse effects?	Does the proposal include acceptable alternative actions to eliminate or reduce long term effects?
C	Yes	More Information Needed	Yes	No
T	Yes	More Information Needed	Yes	No
S	Yes	More Information Needed	Yes	No
S1-V1	Yes	No	Yes	No
S1-V2	Yes	No	Yes	No
R	Yes	Yes	No	Yes
T-3	Yes	Yes	No	Yes
No Build	Yes	Yes	Yes	No

Based on the evaluation to date, the Forest Service ID team anticipates recommending a finding of adverse short-term effects to the Merced Wild and Scenic River's free flow, water quality and outstandingly remarkable values for all eight alternatives. However, Cal Trans has proposed acceptable measures to 2 of these and acceptable alternative actions may be possible for 3 other alternatives, but more information is needed to make that assessment. Additional Forest Service-identified alternative measures for the some of the remaining direct and adverse short term effects will be recommended to CalTrans.

The ID team also anticipates recommending a finding of direct and adverse long-term effects to 6 of the 8 alternatives. While some alternative actions for the long term effects have been included in the CalTrans proposal or identified by the ID team and reduce the impacts, they do not eliminate the adverse effects. Our overall findings of effect of direct and adverse will be only

for those alternatives with long term effects where no effective alternative measures have been proposed or is thought possible.