



Final Planning and Environmental Linkages Report

Reds Meadow Road

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List of Abbreviated Terms

3R	resurfacing, restoration, and rehabilitation
4R	resurfacing, restoration, rehabilitation, and realignment
BMP	best management practices
CDFW	California Department of Fish and Wildlife
CHRIS	California Historical Resources Information System
DPNM	Devils Postpile National Monument
FHWA-CFLHD	Federal Highway Administration Central Federal Lands Highway Division
IRA	inventoried roadless area
JMT	John Muir Trail
mph	miles per hour
NEPA	National Environmental Policy Act
NPS	National Park Service
PCT	Pacific Crest Trail
PEL	planning and environmental linkage
RCA	Riparian Conservation Area
RWQB	Central Valley Regional Water Quality Control Board
SJIRA	San Joaquin Inventoried Roadless Area
the valley	Reds Meadow Valley
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VQO	Visual Quality Objective

Final Planning and Environmental Linkages Report for Reds Meadow Road

1.0 Introduction

This planning and environmental linkage (PEL) project is a coordinated effort between the United States Forest Service (USFS) and Federal Highway Administration Central Federal Lands Highway Division (FHWA-CFLHD) to evaluate options to improve Reds Meadow Road, which provides access into Reds Meadow Valley (the valley) from State Route 203. The USFS wishes to improve Reds Meadow Road to increase safety, facilitate emergency response, and improve the deteriorated condition of the roadway. Along with the high-level environmental screening and alternatives development discussed in this document, the PEL study included developing associated cost estimate(s) to understand the cost of improving Reds Meadow Road; understanding funding sources available to fund the project; and discussing the project with stakeholders to understand their considerations and potential funding contributions to the project.

1.1 Project Setting

The project is situated in northeast Madera County, California, near the Mono County line approximately 3.0 miles west of the Town of Mammoth Lakes. The area is renowned for its recreational resources, with Mammoth Mountain Ski Area directly to the east, Devils Postpile National Monument (DPNM) within the valley, and some 2 million acres—nearly half of which are designated wilderness—of Inyo National Forest to the north, south, and west. Reds Meadow Road begins where State Route 203 ends at the Minaret Vista Entrance Station to Inyo National Forest and extends approximately 8 miles until dead-ending at Reds Meadow Resort. Although the valley can be accessed via the regional trail network without having to pass through the entrance station, Reds Meadow Road is the only vehicular access to this portion of Inyo National Forest and the recreational resources in the valley. Annual visitation to this area of Inyo National Forest is approximately 125,000 individuals staying an average of between 3 and 4 hours (USFS, 2013). Figure 1 illustrates the project location.

1.2 Existing Facility and Operation

Reds Meadow Road is a seasonal facility generally operating from May 15 to October 15 depending on snow conditions. During the operating season Reds Meadow Road is utilized by the public, shuttle bus service into the valley and to DPNM, USFS vehicles, and commercial traffic. Private vehicle access is restricted between 7 am and 7 pm from mid-June to the Wednesday after Labor Day, except for vehicles carrying 11 or more people, disabled persons, those transporting boats or canoes, vehicles towing horse or livestock trailers, campers staying in developed valley campgrounds, administrative vehicles, hunters transporting game, and Reds Meadow Resort campers and guests (FHWA, 2005). Personal vehicles are allowed in the valley in September and October after shuttle bus service is stopped; approximately 400 to 600 cars per day access the valley during this time (USFS, 2015).

Traffic counts collected during the summer of 2011 identified average daily traffic of 445 vehicles. Morning peak hour occurred from 10:45 am to 11:45 am with an average of 40 vehicles. Afternoon peak hour occurred from 3:00 pm to 4:00 pm with an average of 38 vehicles. Shuttle bus service operates from mid-June to the Wednesday after Labor Day (USFS, 2013).

The 8-mile Reds Meadow Road can effectively be separated into two segments: a steep upper segment descending approximately 2.5 miles from the Minaret Vista Entrance Station to Agnew Meadows, and a relatively flat lower segment extending approximately 5.8 miles through the valley, from Agnew Meadows to Reds Meadow Resort. The upper 2.5-mile segment is a paved one-lane roadway built on a combination of steep cut and fill slopes as it descends into the valley. The existing cut and fill slope grades vary in severity from 1:1 (horizontal: vertical) to approximately 2:1 with no existing retaining walls present. Pavement width of the one-lane road varies from 16 to 21 feet, with graded shoulders or roadside ditches varying in width from 1 to 5 feet. The original oiled dirt road was paved with approximately 2 inches of cold-mix asphalt in the early 1980s. Subsequent pavement maintenance has been limited to patching potholes and digging out small areas of settlement (Scholten, 2015, pers. Comm.). Passing on the one-lane roadway is accomplished via eight paved, intermittently spaced pullout locations, although passing is often forced to occur on shoulders and fill slope. The posted speed limit for this segment of road is 15 miles per hour (mph).

After turning sharply south at Agnew Meadows, the lower 5.8-mile segment of roadway is a paved two-lane facility with a relatively consistent pavement width of 22 feet. Graded shoulders or roadside ditches vary in width from 1 to 5 feet. Several curves throughout this segment have sharp radiuses and exhibit poor sight distance. The posted speed limit for this segment of road is 25 mph. The general pavement condition on the lower segment is better than the upper segment, where the majority of existing maintenance activities are needed.

1.3 Purpose and Need

The purpose of the project is to improve the deteriorated condition of Reds Meadow Road and improve mobility so as to continue to provide access to recreational resources. These improvements would facilitate emergency response in the valley and would facilitate the USFS goal of enhancing traffic safety by reducing the likelihood of a vehicular crash. Reds Meadow is a popular area for outdoor recreation and is important to the local tourism economy during the summer (USFS, 2013). Reds Meadow Road provides the only vehicular access to the valley and DPNM, and the road is a popular access point for two nationally significant trails: John Muir Trail (JMT) and Pacific Crest Trail (PCT).

The existing roadway is deteriorated, with longitudinal cracks and edge deterioration along much of the upper 2.5 miles and in sections of the lower 5.8 miles supported by significant fill slopes. Road surface cracking also exists in several locations where the road crosses natural drainage swales. The cracks appear to be the result of fill settlement and slope creep, and the structural integrity of the fill slopes, particularly on the upper 2.5 miles, is questionable. The deteriorated condition of the roadway appears to be caused by lack of aggregate base layer, poor subgrade soil (e.g., pumice), settlement in poorly compacted fill areas, localized saturation from year-round runoff from springs, heavy traffic loading from frequent shuttle bus service, and lack of lateral support.

The upper 2.5 miles of steep one-lane roadway hinders mobility and access into the valley because vehicles traveling in opposite directions cannot pass each other easily, resulting in long queues of waiting vehicles and safety concerns. Paved turnouts are located occasionally along the one-lane road segment but do not occur at regular intervals or in ideal locations for passing, relative to the road geometry. Inadequate sight distance at curves and narrow shoulders also hinder passing and create safety risks. USFS staff work continuously with shuttle bus drivers to manage traffic, often holding vehicles at the bottom of the valley behind a shuttle bus or at the top of the valley at the entrance station to allow queues of vehicles to safely pass. Additionally, the

narrow one-lane roadway inhibits quick emergency service access into the valley and concurrent evacuation of visitors out of the valley in an earthquake or fire event.

Without improvements, the roadway will continue to deteriorate and impede vehicular access and mobility. Maintenance activities provide only temporary roadway repairs and cannot address ongoing structural and drainage concerns. Temporary road repairs will eventually be insufficient to maintain the roadway's integrity, potentially resulting in future road closures for more costly and complex repairs. The existing roadway will continue to pose safety concerns for emergency response and evacuation in the valley and will perpetuate the potential for vehicle accidents.

2.0 Alternatives Development and Evaluation

Nine alternatives, including the No Action Alternative, were developed during the PEL process and in conjunction with stakeholders and the public (Section 5 provides more information about agency and stakeholder involvement). Three design concepts were developed for the upper road segment treatments, consisting of a resurfacing, restoration, and rehabilitation (3R, hereafter referred to as rehabilitation) concept; a combination one-lane/two-lane concept; and a two-lane concept. Lower road treatment alternatives include rehabilitation and select resurfacing, restoration, rehabilitation, and realignment (4R, hereafter referred to as realignment) concepts. The project's *Alternative Concepts Design Technical Memorandum*—developed in conjunction with the PEL—analyzed the same alternatives with the exception of the no action scenario on the lower roadway segment for Alternative 2a and Alternative 3a. The upper and lower segment road treatments were then grouped to create the following action alternatives, in addition to new alignment alternatives:

- Alternative 1 – Rehabilitate Entire Length of Project
- Alternative 2 – Construct Combination One-Lane/Two-Lane Roadway on Upper 2.5-Mile Segment and Rehabilitate the 5.8-Mile Lower Segment
- Alternative 2a – Construct Combination One-Lane/Two-Lane Roadway on Upper 2.5-Mile Segment and Perform No Action for the 5.8-Mile Lower Segment
- Alternative 3 – Construct Two-Lane Roadway on Upper 2.5-Mile Segment and Rehabilitate the 5.8-Mile Lower Segment
- Alternative 3a – Construction Two-lane Roadway on Upper 2.5 Mile Segment and Perform No Action for the 5.8-Mile Lower Segment
- Alternative 4 – Construct Combination One-Lane/Two-Lane Roadway and Rehabilitate with Select Areas of Realignment on the 5.8-Mile Lower Segment

These alternatives, along with the No Action Alternative, have been evaluated against 18 measures grouped into five main categories:

- Improving roadway deterioration
 - Degree of improvement to roadway drainage
 - Degree of improvement to poor subgrade conditions
 - Degree of improvement to slope stability
- Improving mobility and safety
 - Degree of improvement to passing conditions on upper roadway segment
 - Degree of improvement to safety of travel conditions for vehicles

- o Degree of improvement to access for incoming emergency responders and outgoing evacuees
- Constructability (including cost)
 - o Complexity, difficulty, and duration of construction
 - o Visitor and emergency access during construction
 - o Financial feasibility
 - o Potential to improve operations and maintenance
- Community values
 - o Impact of construction duration and/or closure plans on businesses and recreation
 - o Compatibility with established local plans and visions
- Environmental resources
 - o Impact on previously undisturbed land
 - o Impact on wetlands
 - o Impact on sensitive plant and animal species
 - o Impact on cultural and/or tribal resources
 - o Impact on visual resources
 - o Impact on designated wilderness and other sensitive areas

The first two categories of criteria focus on evaluating the alternatives against the purpose and need for the project. The measures of drainage, subgrade, and slope stability address the underlying roadway integrity in order to improve roadway deterioration and allow the road to function efficiently in the long term. Baseline pavement rehabilitation was not viewed as an adequate solution to roadway deterioration. The measures of passing conditions, travel safety, and emergency access address the functionality of the road as a safe facility that provides efficient access to the recreation resources in the valley. Alternatives that did not meet these purpose and need criteria were considered to have “fatal flaws” and were eliminated from future consideration.

The remaining three categories of criteria examined the types of impacts of the alternatives on constructability, community, and environmental impacts. These criteria resulted in determining several alternatives as infeasible, helped compare the benefits and impacts of the alternatives, and inform future design and NEPA evaluation.

The complete alternatives screening matrix is included in Appendix B. The following subsections include a description of the major project work that would be included in each alternative and a summary of the alternatives’ performance against the screening criteria. Each alternative is concluded with a statement of whether it is eliminated from further consideration or can be considered a feasible alternative for subsequent National Environmental Policy Act (NEPA) analysis and design phases. Because the project is anticipated to be completed using only federal funds and is located entirely on federal lands, compliance with the California Environmental Quality Act of 1970 would not be required. If state funds are added in the future, the project would have to comply with California Environmental Quality Act. A resource-specific analysis of feasible alternatives is provided in Section 4. The goal of the alternatives analysis included in this PEL study is to provide a range of feasible alternatives, eliminating only those alternatives that do not meet any element of the purpose and need or contain a fatal flaw that would preclude feasible construction.

2.1 No Action Alternative

Under the No Action Alternative, the roadway would continue to deteriorate and impede vehicular mobility. Maintenance activities would continue to provide only temporary roadway repairs and would not address existing structural and drainage deficiencies. Traffic management by USFS staff would continue to allow for safe vehicle passage but would not address inefficient mobility in and out of the valley. The existing one-lane roadway section would continue to pose safety concerns for emergency response and evacuation in the valley and would perpetuate the potential for vehicle accidents.

The No Action Alternative would not meet any element of the purpose and need for the project to improve the deteriorated condition of Reds Meadow Road and improve vehicular travel mobility in the valley, but remains a baseline for comparison in future NEPA analysis.

2.2 Action Alternatives

2.2.1 Elements Common to All Action Alternatives: Construction Traffic Control

Constructability is a central consideration for the feasibility of all the analyzed alternatives. Construction work periods for all of the alternatives are limited by winter weather shutdown, the desire to maintain summer access for recreation users, and the need to provide emergency response and evacuation access at all times.

For all the alternatives, road closure options for construction include nighttime, intermittent daytime (e.g., 3-hour closures each in the morning and evening), or full closure for a specific duration (e.g., 1 month) or all summer. Each closure option comes with concerns such as nighttime light and noise impacts, daytime reduction in user access or experience, and subsequent impacts to the local tourist economy.

Ultimately, the available construction work period(s) will weigh heavily on the cost and duration of the project. Overly restrictive work periods could push the project into multiple construction years. Construction traffic control is not a part of this conceptual-level PEL study. Including traffic control in the design would occur during subsequent design phases of the project. To account for this item in the cost estimate, each alternative assumes a percentage of total cost dedicated to traffic control.

2.2.2 Alternative 1: Rehabilitate Entire Length of Project

Under Alternative 1, the entire 8-mile length of Reds Meadow Road would be rehabilitated utilizing standard pavement rehabilitation methods. The roadway would be resurfaced with asphalt. This alternative would also include approximately 70 culvert replacements to adequately sized culverts.

Alternative 1 is anticipated to result in a negligible improvement to vehicular mobility and public or emergency access as the existing road geometry, lane widths, number of turnouts, and number of lanes would remain unchanged with improvements to the roadway surface only. On the lower segment, Alternative 1 would result in minor improvements to safety conditions because of an improved pavement surface (curve geometry and sight distance would remain unchanged). Construction of this alternative is expected to last one season. Section 2.2.1 provides additional discussion on traffic control considerations for all action alternatives.

The footprint of Alternative 1 would be limited to the existing roadway prism with the exception of culverts, which may need to be extended to meet current design standards. As a result, permanent environmental impacts resulting from this alternative are anticipated to be minor.

Temporary environmental impacts would also be minor and associated with areas needed for culvert construction and equipment staging.

Alternative 1 is intended to be a low-cost alternative for immediate improvements needed for the existing deteriorating roadway; however, this alternative does not address the safety concerns resulting from the one-lane passing conditions on the upper roadway segment. Additionally, this alternative does not address the unstable roadside slope conditions, which undermine the roadway's integrity. Although this alternative extends the life of the road in the near term, it does not address the underlying road condition or improve safety or mobility in the upper roadway segment. This alternative does not meet the purpose and need for the project and, therefore, is not considered a feasible alternative.

2.2.3 Alternative 2: Construct Combination One-Lane/Two-Lane Roadway on Upper 2.5-Mile Segment and Rehabilitate the 5.8-Mile Lower Segment

Alternative 2 would include the construction of a combination one-lane/two-lane roadway on the upper 2.5-mile segment and pavement rehabilitation of the lower 5.8-mile segment. The two-lane portions of the upper 2.5-mile segment would be constructed at the existing turnout locations and approximately seven new turnout locations in the most difficult passing areas. In addition to the new turnouts, six segments of two-lane road would be constructed. The two-lane segments would represent approximately 3,000 linear feet, or 22 percent, of the upper 2.5-mile segment. Alternative 2 also includes culvert replacement throughout the roadway alignment and slope stabilization in the form of retaining walls at the widened locations. On the lower segment, improvements would be limited to pavement rehabilitation and culvert replacement.

Alternative 2 is anticipated to result in a moderate improvement to vehicular mobility and public and emergency access on the upper 2.5-mile segment as a result of new turnout locations and two-lane segments, allowing for more passing opportunity. On the lower segment, Alternative 2 would result in minor improvements to safety conditions because of an improved pavement surface (curve geometry and sight distance would remain unchanged). Construction of Alternative 2 is expected to last one season, with standard traffic control methods allowing the flow of one-way traffic during work hours and regular traffic flow outside work hours. Section 2.2.1 provides additional discussion on traffic control considerations for all action alternatives.

The footprint of Alternative 2 would be limited to the existing roadway prism with the exception of culverts, two-lane sections, and new turnout locations. As a result, only minor permanent environmental impacts resulting from Alternative 2 are anticipated. The addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes when compared with Alternative 1; however, there are few views of the road from the valley or nearby trails and the changes are anticipated to be consistent with the Visual Quality Objective (VQO) of the adjacent roadway. Temporary environmental impacts would be minor and associated with areas needed for equipment staging and culvert and wall construction.

This alternative is intended to be a mid-cost solution, providing moderate mobility and safety improvements in the most difficult passing areas as well as improving the condition of the roadway through drainage improvements throughout the alignment and subgrade and slope stability improvements in areas where turnouts and two-lane sections would be constructed. In other roadway sections, the condition of the roadway surface would be improved. Alternative 2 is considered a feasible alternative, but does not meet the purpose and need as well as Alternatives 3 and 3a (the two-lane alternatives on the upper segment) or Alternative 4 (combination one-lane/two-lane road on upper roadway segment with select areas of realignment on the lower roadway segment) because mobility and deteriorating roadway conditions would be addressed in fewer areas.

2.2.4 Alternative 2a: Construct Combination One-Lane/Two-Lane Roadway on Upper 2.5-Mile Segment and Perform No Action for the 5.8-Mile Lower Segment

Alternative 2a would include the construction of a combination one-lane/two-lane roadway on the upper 2.5-mile segment with no improvements to the lower 5.8-mile segment. The two-lane portions of the upper 2.5-mile segment would be constructed at the existing turnout locations and approximately seven new turnout locations in the most difficult passing areas. In addition to the new turnouts, six segments of two-lane road would be constructed. The two-lane segments would represent approximately 3,000 linear feet, or 22 percent, of the upper 2.5-mile segment. Alternative 2a also includes culvert replacement and slope stabilization in the form of retaining walls at the widened locations.

Alternative 2a is anticipated to result in a moderate improvement to vehicular mobility and public and emergency access on the upper 2.5-mile segment as a result of new turnout locations and two-lane segments, allowing for more passing opportunity. No improvements would occur on the lower segment. Construction of this alternative is expected to last one season with standard traffic control methods allowing the flow of one-way traffic during work hours and regular traffic flow outside work hours. Section 2.2.1 provides additional discussion on traffic control considerations for all action alternatives.

The footprint of this alternative would be limited to the existing roadway prism with the exception of culverts, two-lane sections, and new turnout locations. The addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes when compared with Alternative 1; however, there are few views of the road from the valley or nearby trails, and the changes are anticipated to be consistent with the VQO of the adjacent roadway. As a result, only minor permanent environmental impacts resulting from this alternative are anticipated. Temporary environmental impacts would also be minor and associated with areas needed for equipment staging and culvert and wall construction.

Alternative 2a is intended to be a mid-cost solution, providing moderate mobility and safety improvements in the most difficult passing areas as well as improving the condition of the upper roadway segment through drainage improvements throughout the upper roadway segment and subgrade and slope stability improvements in areas where turnouts and two-lane sections would be constructed. In other upper roadway sections, the condition of the roadway surface would be improved. Alternative 2a is considered a feasible alternative, but does not meet the purpose and need as well as Alternatives 2, 3, 3a, or 4 because mobility and deteriorating roadway conditions would be addressed in fewer areas.

2.2.5 Alternative 3: Construct Two-Lane Roadway on Upper 2.5-Mile Segment and Rehabilitate the 5.8-Mile Lower Segment

Alternative 3 would widen the upper 2.5-mile segment of road, accommodating two lanes along the entire section. Pavement rehabilitation would occur on existing pavement, and new pavement would be applied for the widened section of road. Culverts would be replaced and extended as needed to accommodate the revised roadway section. Extensive retaining wall work would be needed to stabilize slopes along the widened upper segment. On the lower segment, improvements would be limited to pavement rehabilitation and culvert replacement.

Alternative 3 would provide full mobility and public and emergency access improvement on the upper 2.5-mile segment by providing continuous two-way travel, thereby eliminating the existing passing conflicts caused by one-way travel. On the lower segment, the improved pavement is

anticipated to provide minor improvements to safety conditions because of an improved pavement surface (curve geometry and sight distance would remain unchanged).

Extensive use of retaining walls needed to widen the road to two lanes on the upper segment would significantly increase the difficulty and duration of construction. Unlike Alternatives 1, 2, 2a, and 4, this alternative is anticipated to require two construction seasons to complete, potentially resulting in a greater degree of impact to visitation. One-way traffic could be intermittently maintained; however, because of the work areas needed for retaining wall construction, traffic control would likely be more complex, requiring K-rail (or jersey barriers) installation for adequate traffic separation and traffic signals. Delays in travel time would occur both during work hours and after work hours as a result of traffic control measures. Section 2.2.1 provides additional discussion on traffic control considerations for all action alternatives.

Environmental impacts of Alternative 3 are anticipated to be moderate in the upper segment and negligible in the lower segment. The widened roadway and work areas needed for retaining wall construction on the upper segment could result in moderate permanent environmental impacts to habitat, soils, and sensitive species. If environmental surveys indicate a prevalence of sensitive species and habitat along the upper segment roadside, the U.S. Fish and Wildlife Service (USFWS) may be less likely to permit the project if significant impacts are anticipated. Similarly, retaining wall construction could result in a greater degree of visual impact and create noise, light, dust, noise, and vibration from construction. The lower segment footprint of Alternative 3 would be limited to the existing roadway prism, thereby limiting the potential for impacts to nearby resources.

Alternative 3 is anticipated to be a high-cost solution, providing substantial mobility, roadway condition, and safety improvements throughout the entirety of the upper segment and minor improvement through drainage improvements and roadway surface replacement on the lower segment. Alternative 3 is considered a feasible alternative. Alternative 3 meets the purpose and need better than all other alternatives because mobility, safety, and deteriorating roadway conditions would be addressed in more areas.

2.2.6 Alternative 3a: Construction Two-lane Roadway on Upper 2.5 Mile Segment and Perform No Action for the 5.8-Mile Lower Segment

Alternative 3a would widen the upper 2.5-mile segment of road, accommodating two lanes and new pullout locations. Pavement rehabilitation would occur on existing pavement and new pavement would be applied for the widened section of road. Culverts would be replaced and extended as needed to accommodate the revised roadway section. Extensive retaining wall work would be needed to stabilize slopes along the widened upper segment. On the lower segment, no rehabilitation would occur.

This alternative would provide full mobility and public and emergency access improvement on the upper 2.5-mile segment by providing continuous two-way travel, thereby eliminating the existing passing conflicts caused by one-way travel. On the lower segment, the existing pavement and poor sight distance conditions would remain unchanged.

Extensive use of retaining walls needed to widen the road to two lanes on the upper segment would significantly increase the difficulty and duration of construction. Unlike Alternatives 1, 2, 2a, and 4, this alternative is anticipated to require two construction seasons to complete, potentially resulting in a greater degree of impact to visitation. One-way traffic would be maintained throughout construction; however, because of the work areas needed for retaining wall construction, traffic control would likely be more complex, requiring K-rail (or jersey barriers) installation for adequate traffic separation and traffic signals. Delays in travel time

would occur both during work hours and after work hours as a result of traffic control measures. Section 2.2.1 provides additional discussion on traffic control considerations for all action alternatives.

Environmental impacts of Alternative 3a are anticipated to be moderate in the upper segment. The widened roadway and work areas needed for retaining wall construction on the upper segment could result in moderate permanent environmental impacts to habitat, soils, and sensitive species. If environmental surveys indicate a prevalence of sensitive species and habitat along the upper segment roadside, the USFWS may be less likely to permit the project if significant impacts are anticipated. Similarly, retaining wall construction could result in a greater degree of visual impact and create noise, light, dust, noise, and vibration from construction. With Alternative 3a, the lower segment would not be improved, thereby eliminating the potential for impacts to nearby resources.

Alternative 3a is anticipated to be a high-cost solution, providing substantial mobility, roadway condition, and safety improvements throughout the entirety of the upper segment. Alternative 3a is considered a feasible alternative, but does not meet the purpose and need as well as Alternative 3 because no mobility or deteriorating roadway conditions would be addressed in the lower roadway segment.

2.2.7 Alternative 4: Construct Combination One-Lane/Two-Lane Roadway and Rehabilitate with Select Areas of Realignment on the 5.8-Mile Lower Segment

Alternative 4 would share the same improved one-lane/two-lane upper 2.4-mile segment as Alternatives 2 and 2a, and use the same rehabilitated lower segment as Alternatives 1, 2, and 3. In addition, this alternative would utilize realignment work on four preliminarily identified segments of the lower 5.8-mile segment to substantially improve sight distance and curve safety. The four realignment areas include roadway segments at the following locations: Agnew Meadows, north of Starkweather Lake, at the turnoff for Minaret Falls, and south of the turnoff for DPNM (see Figure 5). Replacing the culvert throughout the entire roadway and stabilizing the slope on the upper roadway segment are also included with this alternative.

Alternative 4 would result in moderately improved vehicular mobility and public and emergency access for the entire 8-mile Reds Meadow Road. In the upper segment, new turnout locations, two-lane segments, and improved pavement conditions would allow for improved passing and emergency vehicle access. In the lower segment, the improved pavement and realignment of selected curves with poor sight distance would improve roadway safety.

When compared to Alternatives 1, 2, and 2a, Alternative 4 would include a greater amount of work outside the roadway prism from realigning the roadway on select curves of the lower segment. Moderate permanent and temporary environmental impacts requiring additional permitting may result from the increased ground disturbance area. On the lower segment, only minor impacts to the viewshed are anticipated, as abandoned sections of pavement could be reclaimed to their natural state. Adding retaining walls and removing trees in areas of new pullouts on the upper roadway segment may result in limited visual changes when compared with Alternative 1; however, there are few views of the road from the valley or nearby trails, and the changes are anticipated to be consistent with the VQO of the adjacent roadway.

Alternative 4 is anticipated to be a mid- to high-cost solution. Alternative 4 would provide moderate mobility and safety improvements in the most difficult passing areas and tight curves. Alternative 4 would also improve the condition of the roadway through drainage improvements throughout the alignment and subgrade and slope stability improvements in areas where turnouts

and two-lane sections would be constructed in the upper roadway segment and in areas where roadway geometry would be improved through realignment in the lower roadway segment.

Alternative 4 is considered a feasible alternative. Alternative 4 meets the purpose and need better than Alternatives 2 and 2a (the other alternatives with a combination one-lane/two-lane road on upper roadway segment) because mobility and deteriorating roadway conditions would be addressed in more areas through the realignment sections of the lower roadway. Alternative 4 does not meet the purpose and need as well as Alternatives 3 and 3a (the two-lane alternatives on the upper segment) because mobility and deteriorating roadway conditions would be addressed in fewer areas on the upper roadway segment.

2.2.8 Alternative 5: New Alignment

Alternative 5 would consist of an entirely new two-lane road on a new alignment connecting the Minaret Vista Entrance Station to Reds Meadow Resort. A new alignment would offer substantial mobility, access, and safety improvements because the new roadway would be constructed to current roadway design standards. Access to the existing recreation areas and shuttle stops could be maintained on the existing road during construction. New alignment construction would be anticipated to last two seasons.

Alternative 5 was eliminated from further consideration early in the alternatives analysis. Any new potential alignment would be severely limited by both the mountain terrain and the inventoried roadless area (IRA). The steep terrain west of the entrance station prohibits a more direct alignment into the valley. An alignment that turns south from the entrance station would not be feasible as new road construction within IRA is prohibited under the USFS Roadless Rule. Additionally, preliminary environmental analysis indicates a new alignment would require approximately 30 acres of existing undisturbed land to be cleared, graded, and paved. The potential for permanent displacement of sensitive federal, state, and USFS species is greatest with this alternative. The light, noise, dust, and vibration generated during construction would impact previously undisturbed habitat as opposed to the existing roadway where those impacts are already experienced because of the normal operation of the road. The potential for significant impacts to environmental resources—likely prohibiting project approval from the USFS and USFWS as part of the NEPA process—was identified as a fatal flaw of Alternative 5. Alternative 5 is not considered a feasible alternative.

2.2.9 Alternative 6: New Alignment (Emergency Access Route)

Alternative 6 would consist of an entirely new one-lane emergency access road on a new alignment connecting the Minaret Vista Entrance Station to Reds Meadow Lodge. The route would only be accessible to emergency responders and administrative personnel. Although Alternative 6 would provide improved emergency response times into the valley, it would do nothing to improve mobility of the general public, public access to the valley, or the degraded condition of the existing roadway.

Any new potential alignment would be severely limited by both the mountain terrain and the IRA. The steep terrain west of the entrance station prohibits a more direct alignment into the valley. An alignment that turns south from the entrance station would not be feasible, as new road construction within IRA is prohibited under the USFS Roadless Rule. The Roadless Rule does include provisions for new road construction in the case of an imminent public safety threat, such as a flood, fire, or hazardous material spill; however, no such condition currently exists in the valley. Preliminary environmental analysis indicates a new emergency access alignment would require roughly half the area of Alternative 5, or approximately 15 acres, of existing undisturbed land to be cleared, graded, and paved. The significant impact to environmental resources—

prohibiting the necessary resource agency permitting needed for construction—was identified as a fatal flaw of Alternative 6. In addition, Alternative 6 fails to meet the purpose and need of improving public mobility and access on Reds Meadow Road. Alternative 6 is not considered a feasible alternative.

3.0 Recommended Alternatives

The alternatives recommended as feasible alternatives for a future project include the following:

- **Alternative 2:** Construct Combination One-Lane/Two-Lane Roadway on Upper 2.5-Mile Segment and Rehabilitate the 5.8-Mile Lower Segment
- **Alternative 2a:** Construct Combination One-Lane/Two-Lane Roadway on Upper 2.5-Mile Segment and Perform No Action for the 5.8-Mile Lower Segment
- **Alternative 3:** Construct Two-Lane Roadway on Upper 2.5-Mile Segment and Rehabilitate the 5.8-Mile Lower Segment
- **Alternative 3a:** Construct Two-lane Roadway on Upper 2.5 Mile Segment and Perform No Action for the 5.8-Mile Lower Segment
- **Alternative 4:** Construct Combination One-Lane/Two-Lane Roadway and Rehabilitate with Select Areas of Realignment on the 5.8-Mile Lower Segment

While this list represents five distinct recommended alternatives, in essence, these alternatives can be viewed as two recommended upper segment options and three recommended lower segment options. In the upper segment, the recommended alternatives have been narrowed down to a one-lane/two-lane combination option or a two-lane option; the rehabilitation-only alternative was eliminated from further consideration during the alternatives screening process. On the lower segment, the recommended alternatives consist of no action, rehabilitation, or realignment options. Future analysis is not limited to the upper and lower segment combinations presented in this PEL study and could consider alternative additional combinations if they arise as design and environmental analysis progress.

This range of feasible alternatives provides varying degrees of improvements on different segments of the road. While all the recommended alternatives address the deteriorated pavement condition of the upper segment, Alternative 2a and Alternative 3a are unique in that they include no action on the lower segment of road. No action on the lower segment of road is not considered a fatal flaw: the lower segment of road has existing two-way travel, and the project's purpose and need can be met without action on this segment.

Alternative 3 and Alternative 4 best meet the purpose and need because they address the roadway integrity, mobility, and safety to the greatest extent. Alternative 3 accomplishes this through converting the upper roadway segment into a two-lane facility, thereby connecting the existing two-lane lower segment and creating a continuous two-lane roadway along the entire roadway length. Alternative 4 does not include a full two-lane width on the upper segment, but does include additional passing locations on the upper segment and select areas of curve realignment on the lower segment, improving overall mobility, safety, and roadway integrity.

Subsequent to the alternatives evaluation process and formal meetings with stakeholders, the Town of Mammoth Lakes suggested consideration of an uphill bicycle lane on the upper roadway segment. It is recommended that future NEPA and design processes consider and evaluate the feasibility and impacts of adding an uphill bicycle lane on the upper roadway segment.

4.0 Environmental Overview

Section 4 summarizes the existing environmental conditions of the project study area, potential environmental effects of the recommended alternatives, and suggested mitigation strategies. All of the recommended alternatives conform to the infrastructure goals of the *Inyo National Forest Land and Resource Management Plan* (USFS, 1988) and *Draft Inyo Forest Management Plan* to provide an efficient transportation system (USFS, 2016).

The recommended alternatives have been conceptually designed to minimize environmental impacts while meeting the project purpose and need. The environmental impacts identified in this section should be regarded as preliminary, and should be further assessed during NEPA evaluation. Specific mitigation measures for environmental impacts will be determined during NEPA evaluation, and will be included in final plans for incorporation into the project design. Construction of the project may result in direct, indirect, and cumulative impacts to environmental resources depending on the type and location of the resource in proximity to the improvements.

Based on the conceptual nature of the design at the PEL level, the absence of some resources in the project area, and regulatory context, certain resource areas were not included in this analysis. Following is a list of excluded resources and an explanation of why they were excluded from evaluation. Several resources listed would still need to be considered in subsequent NEPA environmental analysis: air quality, noise, and floodplains. Because of the high-level nature of the environmental analysis in this PEL, cumulative effects, including secondary and indirect impacts, are not evaluated but would be addressed during the NEPA analysis phase of the project.

Section 4(f): Reds Meadow Road is included on the USFS National Federal Lands Transportation Facility Inventory. In accordance with FHWA's November 20, 2012 "Guidance on Section 4(f) Exception for Federal Lands Transportation Facilities under MAP-21," Section 4(f) approval is not necessary for any project included in the national inventory. Reds Meadow Road would continue to provide access to recreational resources. Therefore, the project is exempt from Section 4(f) with no further analysis recommended. This exemption only applies if the USFS continues to own and maintain the road.

Section 6(f): No Land and Water Conservation Fund grants have been utilized within Inyo National Forest (Land and Water Conservation Fund, 2016). No further analysis is recommended.

Farmlands: No prime farmland, unique farmland, or farmland of statewide importance is located in the immediate vicinity of the road or in the larger valley (USDA, 2016). No further analysis is recommended.

Wilderness: No designated wilderness areas are intersected by the project. Although the valley is bordered by the Ansel Adams and Owens River Headwaters Wildernesses, the road itself is buffered from the wilderness by several hundred feet of vegetation. Best management practices (BMPs) utilized during construction would minimize any light, air, or noise disturbance to wilderness areas. No further analysis is recommended.

Air Quality: The project is located within the San Joaquin Valley of Madera County. The San Joaquin Valley is a non-attainment area for particulate matter and ozone (United States Environmental Protection Agency [EPA], 2016a). A determination of whether an air quality analysis is required would be determined in subsequent NEPA phases of project development.

Coastal: Reds Meadow Valley is located in the northeast corner of Madera County, approximately 150 miles east of the nearest coastal zone (California Coastal Commission, 2016). In the absence of any coastal resources in the project area, no further analysis is recommended.

Noise: The recommended alternatives occur largely on the existing Reds Meadow Road alignment. None of the recommended alternatives would cause an increase in traffic volumes as the number of vehicles allowed into the valley is controlled via the USFS entrance station. Sensitive receptors (e.g., developed camping and picnic areas) are proximal to the road. A noise analysis was not completed as part of this PEL. The process may be needed as identified in 23 Code of Federal Regulations Section 772. A final determination as to the level of noise analysis will be made early in the NEPA phase.

Environmental Justice: Reds Meadow Road is located exclusively on USFS land, a recreation area with no permanent residents (i.e., no *populations* as described in Executive Order 12898). No minority or low-income populations are present in the valley. No further analysis is recommended.

Hazardous Materials: The desktop review of federal and state database inquiries did not identify any releases of hazardous materials or active remediation programs in the project area (EPA, 2016b; California State Water Resources Control Board, 2016). No further analysis is recommended.

Economics: The shuttle service agreement between the USFS and the operating shuttle bus concessionaire would not be impacted by any of the alternatives. Traffic control methodology (see Section 2.2.1) has not been identified at this time, but could include full closure of the road for periods ranging from a few hours to a full season; the greater the duration of full closure, the more likely the project would impact economics to a greater degree.

Following project completion, visitor access to the valley's campgrounds would remain unchanged. Access to the valley through the Minaret Vista Entrance Station would not be impacted by the project. Mammoth Mountain Ski Area, and the other businesses within the Town of Mammoth Lakes, are east of the project area and are not anticipated to be impacted. A more in-depth analysis into potential economic impacts, particularly during construction, and potential mitigation strategies would be conducted during the NEPA process.

Right of Way: Reds Meadow Road resides entirely within USFS land. The USFS owns and maintains both the roadway and surrounding land. No roadway ownership or maintenance changes are proposed in this PEL study. No further analysis is recommended.

Wild & Scenic Rivers: Neither the Middle Fork San Joaquin River nor its tributaries in the larger valley are listed on the National Wild & Scenic River System inventory (2016). No further analysis is recommended.

Floodplains: Although Madera County participates in the National Flood Insurance Program, the Flood Insurance Rate Maps that cover the project (06039C01510E and 06019C0275E) identify the area as Zone D. The Federal Emergency Management Agency defines Zone D as "areas where there are possible but undetermined flood hazards, as no analysis of flood hazards has been conducted" (Federal Emergency Management Agency, 2011). With no available data identifying the potential floodway and floodplain boundaries of the Middle Fork San Joaquin River, or its major tributary creeks within the project area, no analysis was conducted as part of this PEL study. It is anticipated that subsequent phases of environmental analysis and design will include a hydraulic analysis to establish the existing and proposed 100-year water surface elevation.

4.1 Environmental Context

Reds Meadow Road is located entirely within Inyo National Forest in the valley, an approximately 50,000-acre area of the forest. Although no wilderness areas are intersected, the road is bordered by the Ansel Adams Wilderness to the north, west, and south, and the Owens

Rivers Headwaters Wilderness to the east (see Figure 2). The road also skirts the northeast corner of DPNM. North of Sotcher Lake the road enters San Joaquin Inventoried Roadless Area (SJIRA) and remains in the SJIRA for approximately 3/4 of a mile. The valley is flanked by Mammoth Mountain to the east and the Minarets to the west, and is dominated by a mixed conifer/red fir forest. For the majority of its alignment Reds Meadow Road generally follows the Middle Fork San Joaquin River, which is a California designated Wild Trout Water.

4.1.1 Biological Resources

The valley is a convergence of bioregions and considered one of the most biologically rich and ecologically important areas along the Eastern Sierra Nevada Mountain Range. The valley sits in a unique geographic area at the nexus of the Central, Southern, and Eastern Sierra climate zones. Plant and animal species usually observed only in the Western Sierra are intermingled with species usually observed only in the Eastern Sierra. Nutrient rich soils have been created from the weathering of volcanic and metamorphic rock comprising the substrate, supporting a wide variety of species and contributing to a high prevalence of wetland-containing meadowlands along the valley floor. Over 400 plant species, 100 bird species, and 35 mammals—including 12 different species of bats—have been documented in the adjacent DPNM alone (NPS, 2008).

A review of the USFWS Information for Planning and Conservation (2015a) and California Department of Fish and Wildlife (CDFW) RareFind (California RareFind, 2015) databases also identified 17 species of migratory bird and approximately 70 USFWS and CDFW special status species plants with potential to occur in the project area. Additionally, the Paiute cutthroat trout (USFWS threatened) range includes the Middle Fork San Joaquin River that parallels segments of Reds Meadow Road (CH2M, 2015b).

Portions of the Middle Fork San Joaquin River through the project area are designated Wild Trout Waters by the California Fish and Game Commission (CDFW, 2016). Although available data indicates Reds Meadow Road does not cross USFWS designated critical habitat for any species, critical habitat for the Sierra Nevada Yellow-Legged Frog (USFWS endangered, CDFW threatened, and USFS sensitive) is present north and east of the project area, and for the Yosemite Toad (USFWS threatened and USFS sensitive) south of the project area. The most prevalent predators in the valley include the Northern Goshawk (CDFW species of concern and USFS sensitive), Sierra Nevada red fox (CDFW threatened and USFS sensitive), and the pine marten (CDFW species of concern and USFS sensitive).

Riparian Conservation Areas (RCAs) have been established as 300-foot buffers along all the water features (see Section 4.1.2) in the valley. Approximately 3.5 miles of the 8-mile Reds Meadow Road is located within a designated RCA (see Figure 3). According to the USFS, RCAs are directed at:

- (1) preserving, enhancing, and restoring habitat for riparian and aquatic-dependent species,
- (2) ensuring that water quality is maintained or restored, (3) enhancing habitat conservation for species associated with the transition zone between upslope and riparian areas, and (4) providing greater connectivity within watersheds. (USFS, 2001a)

Transportation improvements are not prohibited in RCA; however, improvements must be consistent with the objectives, standards, and guidelines identified in the *USFS Sierra Nevada Forest Plan*, as amended (2004).

4.1.2 Wetlands and Water Resources

At its most southern point in the project area, the Middle Fork San Joaquin River drains approximately 50 square miles to the northwest, extending as far north as the river's origin near

Thousand Island Lake at the Mono County Line. The Middle Fork San Joaquin River is the predominant drainage feature in the valley, with its two major tributaries, Minaret Creek and Reds Creek, flowing into the valley from the Ritter Range peaks west of Reds Meadow Road. Several small alpine lakes are present in the valley including Starkweather Lake and Reds Lake.

In addition to Minaret Creek and Reds Creek, approximately 10 ephemeral drainages cross the existing Reds Meadow Road. The valley floor, fed by the Middle Fork San Joaquin River and the alpine drainages from the Ritter Range to the west and Mammoth Mountain to the east, contains an abundance of palustrine emergent, forested, and shrub wetlands. National Wetlands Inventory data (USFWS, 2015b) indicate the known palustrine forested, emergent, and shrub wetlands are concentrated near Agnew Meadows, Minaret Creek, and Reds Creek (see Figure 4). Although a subsequent wetland delineation will be needed to confirm definitive locations, riverine wetlands associated with these major creeks and Middle Fork San Joaquin River are likely to be present in the valley in proximity to Reds Meadow Road.

Reds Meadow Valley is located within the Upper Middle Fork San Joaquin River hydrologic unit. This unit falls within the Central Valley Regional Water Quality Control Board's jurisdiction and within the Sacramento District of the U.S. Army Corps of Engineers (USACE). Subsequent design and NEPA processes will require coordination and permitting through the Central Valley Regional Water Quality Control Board and USACE to ensure applicable Clean Water Act, drainage design, and water quality treatment standards are met.

4.1.3 Land Use and Recreational Resources

The project is located entirely on federally owned land within Inyo National Forest. Inyo National Forest receives over 5 million visitors per year, with the valley being one of the most popular areas (USFS, 2013). Visitors use the valley predominantly for its numerous recreational activities including hiking, equestrian use, camping, picnicking, bicycling, fishing, photography, and wildlife viewing. Hunting is allowed in designated areas of Inyo National Forest but not within the valley. The most prominent visitor destination in the valley is DPNM, which contains both the Devils Postpile basalt rock formation and the 100-foot-high water fall, Rainbow Falls.

Between the fee station and Reds Meadow Resort, Reds Meadow Road provides hiking/backpacking access at all 10 of the shuttle stops. The two major trailheads at Agnew Meadows and Rainbow Falls feed numerous day hiking and backpacking trails, including accesses to the PCT and JMT—both of which are considered among the most scenic hiking trails in the nation. Backpackers along the 2,660 mile PCT can rest and restock their supplies in the general store and campground at Reds Meadow Resort—an additional pack station is located at Agnew Meadows. There are seven USFS campgrounds in the valley (see Figure 5). Five campgrounds are first-come, first-served and two group campgrounds are available by reservation for a fee; Agnew Campground has three equestrian campsites available to reserve for a fee. All campgrounds in the valley close when Reds Meadow Road closes on or before October 15, depending on weather (USFS, 2013).

Reds Meadow Road is within the SJIRA between approximately mile marker 5.18 and mile marker 6.0. Inventoried roadless areas are defined by the USFS as undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act. In 2001, the USFS completed its evaluation of roadless areas on a national level (USFS, 2001b) and subsequently issued rules for constructing roads within IRA under 36 Code of Federal Regulations Section 294.12, more commonly known as the Roadless Rule. The Roadless Rule establishes prohibitions on road construction, road reconstruction, and timber harvesting within IRA on USFS lands. Exceptions to the Roadless Rule are narrow and include:

1. Reconstruction is needed to implement road safety improvement projects on roads determined to be hazardous on the basis of accident experience or accident potential;
2. The Secretary of Agriculture determines that a Federal Aid Highway project authorized pursuant to Title 23 of the United States Code is in the public interest or is consistent with the purposes for which the land was reserved or acquired, and no other feasible alternative exists; or
3. A road is needed for prospective mineral leasing activities in inventoried roadless areas.

The purpose and need for this project (see Section 1.3) is to improve the deteriorated condition of Reds Meadow Road and improve vehicular access and travel mobility. These improvements would facilitate emergency response in the valley and would facilitate the USFS goal of enhancing traffic safety by reducing accident potential. It is anticipated the project could utilize the Roadless Rule exemption for road safety improvements and be able to reconstruct/realign this small segment of Reds Meadow Road within SJIRA. FHWA and USFS agreement on the approach to evaluating and constructing within the SJIRA would be secured before NEPA approval and construction.

4.1.4 Cultural Resources

In addition to the abundant natural resources the valley has been the backdrop for a rich human history. Not until the late 19th century, when the wilderness areas came under federal land management, did the area become a recreation destination (USFS, 2006). Following the deglaciation and emergence of big game species in the Sierra Nevada, archeological evidence from the Sierra crest east of DPNM suggests the area was crossed by American Indians utilizing a trans-Sierra route at least 7,500 years ago. Obsidian fragments found in DPNM further suggest the area was active during the California obsidian trade approximately 2,500 to 5,000 years ago (Stevens, 2002; Jackson and Jackson, 1997; Jackson and Morgan, 1999; Theodoratus et al., 1984). For thousands of years, the Paiute and North Fork Mono Tribes, among other tribes, utilized the valley and surrounding areas for hunting, the exchange of food, tools, customs, and ideas. The Mammoth Pass Trail, a trail used by the Fork Mono and Paiute Tribes well into the 19th century, can be followed even today by following King Creek Trail across DPNM, through Reds Meadow, and over Mammoth Pass (NPS, 2016)

By the mid-19th century, American Indian Tribes across the Sierras had begun being displaced by Euro-American cattle herders, loggers, and miners. Such was the case in the valley, where the trans-Sierra trail was converted into a toll trail, known as French Trail, for gold miners passing through the region. The valley was used to grow crops and raise livestock to support the nearby mining operation on Mammoth Mountain. The original Reds Meadow Road was created in 1929 to provide access to new mining claims near Minaret Lake. Reds Meadow Resort was built in 1934 by Red Sotcher after the failure of the Minaret Lake mining claim (NPS, 2016).

Since 1972, more than 20 cultural resource studies and field surveys have been completed for past federal actions in the valley, including 100 percent of the existing roadway. In March of 2016, a literature search of the files at the Southern San Joaquin Valley Information Center of the California Historical Resources Information System (CHRIS) was conducted in support of the project. The records search included the existing roadway prism and a 0.25-mile buffer. According to the results of the records and literature search, there are no historic districts, cultural landscapes, or listed National Register of Historic Places properties within the search radius; however, the CHRIS search did identify 17 areas within the search radius where historic resources are documented. Because of the sensitive nature of historic resources in the valley—and at the request of the California Office of Historic Preservation—the CHRIS database results are considered confidential and are not described or located in further detail in this study.

4.1.5 Visual Resources

The valley is an undeveloped area with the small areas of existing development being limited to shuttle stops/trailheads, developed campgrounds and picnic areas, and pack stations. As travelers proceed through the entrance station, they are greeted with an expansive view of the Minarets and Ritter Range to the west. After turning north and beginning to descend the upper 2.5-mile segment of Reds Meadow Road, the road becomes heavily forested on both sides, somewhat limiting the views into the valley. Similarly, this segment of the road is not visible from the valley. The existing cut slopes on the upper 2.5-mile segment have not been stabilized and consist of rock outcroppings and poorly sorted aggregate with limited vegetative cover. After reaching Agnew Meadows and turning south, the road remains heavily forested. Openings occur at shuttle stops, trailheads, and at Starkweather and Sotcher Lakes.

The overarching visual direction of Inyo National Forest is one that emphasizes a continued high level of visual quality for its economic and social benefits to local communities and to recreation visitors. This emphasis is expressed by assigning VQO to specific acres of land that are consistent with the overall management direction for that land. VQO are objectives identified by the USFS that describe the degree to which the natural landscape can acceptably be modified, based on a combination of variety class and sensitivity level. The valley area adjacent to the roadway has been categorized as a concentrated recreation area with VQO of partial retention (USFS, 1988). In partial retention areas, activities may be noticeable but must blend well with the natural appearance of the land.

4.2 Potential Impacts and Mitigation Approaches

One of the goals of the PEL process is to identify potential impacts early in the planning process and to identify potential mitigation strategies to avoid or minimize these impacts. The following subsections discuss potential impacts, minimization measures, and mitigation approaches that could be employed during subsequent phases of environmental analysis and design.

Potential impacts and mitigation approaches are evaluated for Alternatives 2, 2a, 3, 3a, and 4, with Alternatives 1, 5, and 6 being eliminated from further consideration, as described in Section 2. Because of similarities in anticipated project footprints Alternatives 2 and 2a have been grouped together, as well as Alternatives 3 and 3a; Alternative 4 is evaluated separately. For resource areas where differences between anticipated impacts are not such that any meaningful differentiation exists, alternatives are further combined for discussion. The No Action Alternative is not evaluated below but would be considered in the NEPA phase of the project.

4.2.1 Biological Resources

As identified in Section 4.1.1, the valley is recognized as a biodiversity hotspot that supports species from east and west of the Sierra Nevada. Although no critical habitat for any special status federal, state, or USFS species was identified in the research completed for this study, subsequent project environmental analysis and engineering design would include field surveys for special status federal, state, or USFS species, and consultation with the USFWS in accordance with Section 7 of the Endangered Species Act. Where avoidance and minimization would not be practicable, mitigation for impacts to biological resources could be achieved through the use of temporary and permanent BMPs.

4.2.1.1 Impacts

Impacts common to all alternatives include light, dust, vibration, and noise generated during the construction period, which could temporarily disrupt animals in the immediate area, and vegetation disturbance in areas of construction outside the existing roadway prism, including

riparian areas. With the implementation of mitigation strategies, species disruptions during the construction period are anticipated to be minor and temporary in nature. Permanent and temporary impacts to riparian areas will need to be mitigated under Section 401 of the Clean Water Act for any alternatives affecting riparian areas.

Alternatives 2 and 2a share the same combination one-lane/two-lane roadway concept on the upper 2.5-mile segment, with the lower segment concepts being rehabilitation and no action, respectively. No critical habitat for sensitive species is present in the project area, but sensitive species do have potential to occur in the project area; therefore, Alternatives 2 and 2a would have a minor potential for biological resource impacts on the upper segment, primarily because of vegetation disturbance at the seven new turnout locations and five areas of two-lane widening. The potential for impacts for these alternatives is less than that of Alternatives 3 and 3a, which would require widening the roadway throughout the upper segment. On the lower segment, both alternatives would stay on the existing alignment and within the existing roadway prism, resulting in negligible impact on this segment.

Alternative 4 consists of a combination one-lane/two-lane upper 2.5-mile segment and rehabilitation with select areas of realignment on the 5.8-mile lower segment. The biological resource impacts on the upper segment are the same as Alternatives 2 and 2a and are anticipated to be minor. On the lower segment, impacts are most likely at the realignment locations where the road would be realigned (see Section 2.5), resulting in the disturbance of vegetation, including riparian areas, and the potential for greater construction-related disturbance to animals than Alternatives 1, 2, 2a, and 3. The curve realignments at Agnew Meadows and the Minaret Falls turnoff would occur within the RCA. Realignment in these areas is not prohibited by the RCA because the realignment is consistent with the USFS desired condition of providing safe visitor access to recreation resources throughout the forest (USFS, 2014).

Alternatives 3 and 3a share the same two-lane roadway concept on the upper 2.5-mile segment, with the lower segment concepts being pavement rehabilitation and no action, respectively. On the upper segment, Alternatives 3 and 3a would have the greatest potential for vegetation impacts, as the widened roadway and extensive retaining wall areas would require new vegetation disturbance along the entirety of the upper segment. On the lower segment, both Alternatives 3 and 3a would stay on the existing alignment and roadway prism, resulting in negligible impact on this segment. Light, dust, vibration, and noise disruptions during the construction period could be substantial because of the increased equipment and staging needed for widening operations.

4.2.1.2 Mitigation Strategies and Next Steps

Surveys for federal, state, and USFS special status plant and animal species surveys, and consultation with the USFWS, in accordance with Section 7 of the Endangered Species Act, would occur during the NEPA process. Depending on the results of the field surveys and USFWS consultation, work in certain areas of species occurrence could be avoided or minimized, and species-specific mitigation measures may need to be used. FHWA-CFLHD and the USFS would coordinate efforts to minimize impacts on USFS-sensitive species. Impacts to riparian areas would be permitted and mitigated under Section 401 of the Clean Water Act as needed.

Noise, dust, vibration, and light BMPs would be used throughout construction. Other mitigation strategies such as limiting night work and lighting, limiting the number of simultaneously active construction areas, limiting the construction window, and using wildlife fencing are options which may help to minimize biological disturbance during the construction period.

4.2.2 Wetlands and Water Resources

National Wetlands Inventory Data (2016) indicates palustrine forested, emergent, and shrub wetland are concentrated near Agnew Meadows, Minaret Creek, and Reds Creek. Riverine and other additional palustrine wetlands are likely present in the project area along the Middle Fork San Joaquin River and major creeks. A formal wetland delineation will be conducted during the NEPA process to identify specific wetland and waters of the United States (U.S.) locations and types. Any widening, realigning, or disturbance outside the existing roadway prism south of Agnew Meadows would likely result in impacts to wetlands and/or waters of the U.S. The greater the degree to which the final design strays from the existing alignment, the greater the amount of impact should be anticipated—especially in the valley floor occupying the lower 5.8-mile segment.

4.2.2.1 Impacts

Roadside disturbance for Alternatives 2 and 2a would primarily be located in new turnout and two-lane locations on the upper segment, and in areas of culvert extension. National Wetlands Inventory data does not indicate the presence of wetlands in the upper segment, except near Agnew Meadows; this would be confirmed by formal wetland delineation during the NEPA process. A minor potential for permanent impacts is anticipated at the turnout locations if water resources are present, and impacts at culvert extension locations would be temporary in areas needed for construction crews to excavate and install culvert pipe. Additional impervious surface from Alternatives 2 and 2a would be less than Alternatives 3 and 3a because of the lesser impacted areas between the widened roadway at the turnout and two-lane sections. Based on the conceptual design developed for this study, approximately 0.4 acre of new impervious surface would be created by Alternatives 2 and 2a.

For Alternative 4, roadside disturbance would be located at the new turnout and two-lane locations in the upper segment and the preliminarily identified realignment areas in the lower segment (see Section 2.5). National Wetlands Inventory data indicates the known wetland resources in the valley are concentrated at Agnew Meadows, Pumice Flat, and Rainbow Falls—the realignment at Agnew Meadows is an area with a high potential for wetlands impacts. A minor potential for permanent impacts is anticipated at the turnout and two-lane locations on the upper segment if water resources are present, and impacts at culvert extension locations would be temporary in areas needed for construction crews to excavate and install culvert pipe. Additional impervious surface on the upper segment from Alternative 4 would be the same as Alternatives 2 and 2a but less than Alternatives 3 and 3a. On the lower segment, impervious surface would potentially be reduced from existing conditions as a result of curve straightening at the preliminarily identified locations. Abandoned sections of curves could be reclaimed as native vegetation.

Roadside disturbance for Alternatives 3 and 3a would occur along the entire upper segment of roadway, essentially doubling the amount of impervious surface by adding approximately 3.6 acres of new pavement. On the lower segment, additional impervious surface would be the same as Alternatives 2 and 2a and would be limited to covering the extended culverts. National Wetlands Inventory data identify a concentration of palustrine wetlands in the upper segment of roadway near Agnew Meadows. The potential for impacts to wetlands on the upper segment with these alternatives would likely be greater than with the other alternatives because of the wider roadway section and retaining walls.

4.2.2.2 Mitigation Strategies and Next Steps

Section 404 of the Clean Water Act establishes that impacts to waters of the U.S., including wetlands and open water features, must be avoided, minimized, or mitigated to ensure that there

is no net loss of functions and values of jurisdictional wetlands. A formal wetland delineation will be conducted during the NEPA process to identify specific wetland and waters of the U.S. locations and types. To the extent practicable, future design should incorporate avoidance and impact minimization to known wetland areas. Where avoidance and minimization would not be practicable, mitigation for impacts to wetlands could be achieved through the use of temporary and permanent BMPs.

Permanent impacts to wetlands and riparian areas that cannot be avoided may require mitigation at ratios dictated by the acreage and quality of the affected wetlands. Consultation with the USACE Sacramento District and Central Valley Regional Water Quality Control Board (RWQB) would be carried out as part of Section 404 and Section 401 Clean Water Act permitting.

4.2.3 Land Use and Recreational Resources

The predominant land use in the valley is recreation. No portion of the existing Reds Meadow Road enters private property or a designated wilderness. An approximate 1-mile portion of the road (see Section 4.1.3) travels through the SJIRA.

4.2.3.1 Impacts

The recommended alternatives follow the existing road alignment for the majority of their courses. Solely occupying USFS land within Inyo National Forest, Reds Meadow Road does not enter any designated wilderness or private land. Rehabilitation or realignment of a portion of the lower segment of Reds Meadow Road would occur within the SJIRA. No changes to recreational land use surrounding the road would result from any of the recommended alternatives.

For all alternatives, road closure options for construction include nighttime, intermittent daytime (e.g., 3-hour closures each in the morning and evening), or full closure for a specific duration (e.g., 1 month) or all summer. Each closure option comes with concerns such as nighttime light, dust, and noise impacts, daytime reduction in user access or experience, and subsequent impacts to the local tourist economy.

In the absence of any anticipated change in land use or impact to recreation resources for any of the recommended alternatives, they are not discussed individually. Ultimately, access into the valley would be improved under all of the recommended alternatives.

4.2.3.2 Mitigation Strategies and Next Steps

Access to the campgrounds, trailheads, fishing areas, equestrian areas, pack stations, and all other recreational resources could be maintained throughout construction. A detailed public information plan would be developed in coordination with stakeholders to notify visitors of any anticipated delays. Temporary noise, light, dust, and vibration impacts to the resources in the valley could be minimized through the use of BMP and by avoiding work during peak visitation.

As discussed in Section 4.1.3, the portion of Reds Meadow Road within the SJIRA is subject to the Roadless Rule prohibitions on road construction and reconstruction within IRA on USFS lands. It is anticipated the project could utilize the Roadless Rule exemption for road safety improvements and be able to reconstruct/realign this small segment of Reds Meadow Road within SJIRA. FHWA and USFS agreement on the approach to evaluating and constructing within the SJIRA would be secured before NEPA approval and construction.

4.2.4 Cultural Resources

Numerous Native American Tribes have history throughout the Sierra Nevada's and have been consulted in the past when the USFS has acted in the valley. In general, the valley has a long and rich human history that continues today. Any action that results in disturbance outside the

existing roadway prism has the potential to impact a known resource or discover a previously unknown resource during construction. The greater the amount of new disturbance, the greater the potential to impact becomes. Listed National Register of Historic Places resources are not present in the valley; however, historic resources are located in seventeen areas in the valley, many of which are in the immediate vicinity of the road and may be affected by project construction.

4.2.4.1 Impacts

Alternatives 2 and 2a, which include additional disturbance for new pullouts and two-lane segments on the upper segment of roadway, have a decreased potential compared with Alternatives 3 and 3a to encounter historic resources. On the lower segment, both alternatives are limited to the existing roadway, with Alternative 2 having a slightly higher impact potential because of culvert replacement. Alternative 4, which shares the same impact potential as Alternatives 2 and 2a for the upper segment, has a greater potential for impacts on the lower segment because of road realignment in select locations.

Alternatives 3 and 3a have the greatest potential for impacts on the upper segment. As described in Section 2, both of these alternatives require widening the roadway and extensive use of retaining walls on the upper segment. Ground disturbance with Alternatives 3 and 3a is the greatest on the upper segment when compared with the other recommended alternatives. On the lower segment, both alternatives are limited to the existing roadway, with Alternative 3 having a slightly higher impact potential because of culvert replacement.

4.2.4.2 Mitigation Strategies and Next Steps

Where feasible (and where previous inventory data is lacking or insufficient), an intensive inventory of the project's Area of Potential Effect would be conducted in accordance with the *Programmatic Agreement among the USDA Forest Service - PSW Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation, Regarding the Identification, Evaluation and Treatment of Historic Properties Managed by the National Forests of the Sierra Nevada, California* (USFS, 1996) before any ground-disturbing activities. The inventory should include the historic resources located in the valley, documented in CHRIS, and Reds Meadow Road itself. Consultation with the California Office of Historic Preservation is anticipated following the completion of field surveys. In conjunction with the USFS, a formal tribal consultation list would be developed and tribal consultation conducted as part of the NEPA process.

An archaeological monitor is one mitigation option if the preferred alternative is one that includes disturbance outside the existing roadway prism. In addition, BMPs would be utilized during construction to mark and avoid any resources in the vicinity of disturbance activities.

4.2.5 Visual Resources

The valley is largely undeveloped and draws its visual character from the natural setting of the valley and the surrounding mountains. Because of the large elevation change between the upper segment and the valley, the viewshed changes substantially depending on which segment of the road the viewer occupies. Input from stakeholders has indicated a preference to maintain a rustic aesthetic for the roadway. The USFS identifies the valley as a concentrated recreation area with a partial retention VQO, meaning activities may be noticeable but must blend well with the natural appearance of the land.

4.2.5.1 Impacts

The recommended alternatives follow the existing road alignment for the majority of their courses. Alternatives 2, 2a, and 4, which would include new pullout and two-lane locations, are

likely to add a minor amount of paved area to the upper segment. Alternatives 3 and 3a would add a greater amount of paved area to the upper segment because of the roadway widening. In addition, the extensive retaining walls needed to stabilize the widened roadways would likely represent an additional minor visual impact. The impacts on the upper road segment would be visible only to viewers traveling on the upper road segment; the changes would not be visible from the valley below. The pavement rehabilitation and no action options for the lower segments are not anticipated to result in any visual impacts. The minor realignments of Alternative 4 have a greater potential for visual impact. None of the recommended alternatives are anticipated to alter the visual character of the viewshed in either the upper or lower segments of road. All of the recommended alternatives conform to the partial retention VQO, which allows USFS activities to be noticeable but blend well with the environment.

4.2.5.2 Mitigation Strategies and Next Steps

A visual resource analysis in accordance with FHWA guidelines would be performed as part of the NEPA process. Views of the road from the adjacent trails will likely need to be considered if the preferred alternative is one that includes retaining walls or other slope changing work. Additionally, input from stakeholders has indicated a preference to maintain a rustic aesthetic for the roadway. This input should be considered during project design.

To mitigate for construction-related impacts, temporarily disturbed areas could be revegetated and construction activities could be limited to off-peak periods. Any new signage would be designed in accordance with USFS aesthetic guidelines. Any proposed retaining walls or rockeries could be treated to match the character of the surrounding geology. If Alternative 4 is identified as the preferred alternative, visual impacts of the realigned roadway could be minimized by reclaiming the abandoned sections of pavement.

4.3 Anticipated Permits and Approvals

When working through the NEPA and advanced stages of design, the following permits and/or approvals are anticipated:

- USFS Special Use Permit
- Madera County Grading and Erosion Control Permit
- Section 404 Clean Water Act Permit (anticipated Nationwide Permit 14 issued through the Sacramento District USACE)
- Section 401 Clean Water Act Permit (Water Quality Certification issued through the RWQB)
- Section 402 Clean Water Act Permit (waste discharges to surface water issued through the RWQB)
- Section 7 Endangered Species Act consultation with the USFWS
- Section 106 National Historic Preservation Act consultation with the California Office of Historic Preservation
- Tribal Consultation (list of tribes to be consulted will be developed in coordination with the USFS)

Additional permits and/or approvals or consultations not listed above may be required as design and environmental process progress.

5.0 Agency Coordination and Public Involvement

A series of three stakeholder meetings were held February 10, 2016, at the Inyo National Forest Supervisor's Office in Bishop, California. The meetings were organized around the following groups: agencies and permit holders, Native American tribes, and interest groups. The project team included representatives from the USFS, FHWA-CFLHD, and CH2M.

The purpose of the meetings was to brief the stakeholders on the progress made to date, continue to collect information and data on the roadway and surrounding resources, as well as gather feedback on purpose and need for the project and the alternatives and discuss next steps.

Agenda topics included the following:

- History and Purpose and Need for the Project – The USFS provided an overview of the history of Reds Meadow Road and its importance in providing sole access to Devil's Postpile National Monument and to other recreational features in the valley. The key elements of the project purpose and need were also discussed.
- Project Development Process – The project team discussed the role of FHWA-CFLHD as a delivery agency partnering with Inyo National Forest to deliver the PEL study. A brief overview of the elements of a PEL was provided as well as a summary of what work efforts have been accomplished to date. This included a discussion of the project scoping effort completed in June 2015, the purpose and need, screening criteria, alternatives evaluation, the draft design technical memo, and cost estimates.
- Description of the Alternatives and Evaluation Results – A detailed review of the alternatives being considered, including typical sections and alignments, was provided to the attendees. The project team also discussed the screening criteria, including environmental constraints, used to evaluate the alternatives as well as the results of the screening documented in the evaluation matrix.
- Description of Project Funding Options and Requirements – FHWA-CFLHD discussed the current funding for the project and provided an overview of potential funding sources currently being evaluated. This included a discussion of Federal Lands Access Program and USFS Federal Lands Transportation Program Funding. FHWA-CFLHD also discussed Nationally Significant Programs funding, TIGER Grants, and potential partnering with other agencies.
- Next Steps – The project team concluded the meetings by discussing the next steps for the project. This included completion of the PEL study in spring 2016 as well as fieldwork for topographic survey, geotechnical analysis, and environmental surveys in summer of 2016. The project team also discussed beginning NEPA documentation and 15 percent design in fall of 2016 as funding allows.

The project team delivered a presentation covering the agenda items listed above followed by open discussion with the attendees. Handouts were provided at each of the meetings and included a project fact sheet, draft project purpose and need statement, alternatives evaluation matrix, examples of retaining wall types, and typical sections. A scroll plot showing the project alignment along with preliminarily identified retaining wall locations for a two-lane upper segment was also provided. The issues, concerns, and suggestions that came out of the stakeholder meetings shaped the alternatives and alternative evaluation described in this document. A full summary of the stakeholder meetings is included in Appendix C.

6.0 Next Steps

The PEL process is intended to provide the framework for the long-term implementation of the improvements to Reds Meadow Road as funding is available and to be used as a resource for future NEPA documentation. Funding for the project has not yet been identified.

Anticipated next steps include:

- Secure necessary funding to move the project forward into the NEPA process
- Complete NEPA analyses
- Complete design
- Obtain all needed permits
- Complete construction

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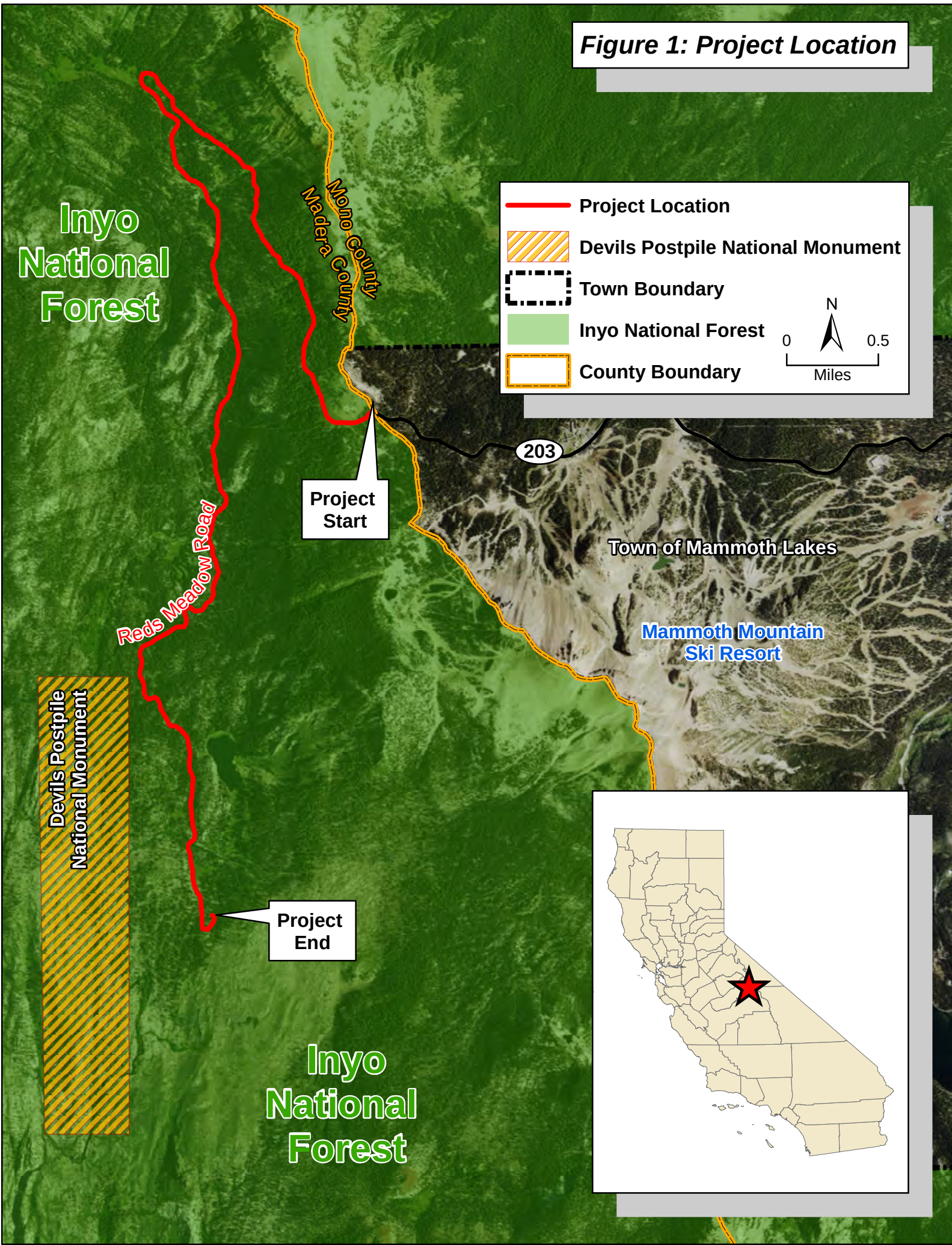
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Appendix A

Figures

Figure 1: Project Location



Legend

- Project Location
- Devils Postpile National Monument
- Town Boundary
- Inyo National Forest
- County Boundary

Scale and Orientation

0 0.5 Miles

N



Figure 2: Land Use

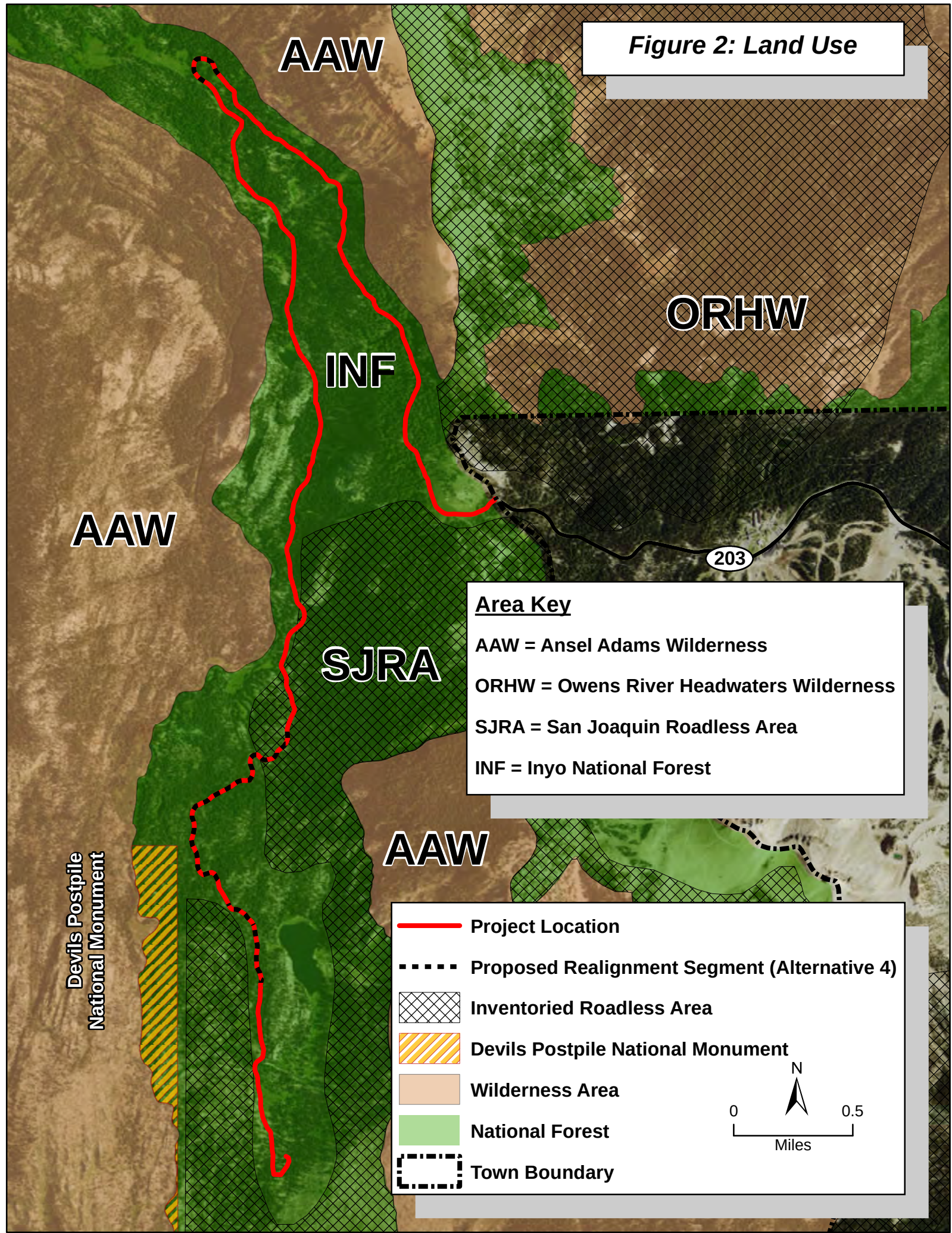


Figure 3: Biological Resources

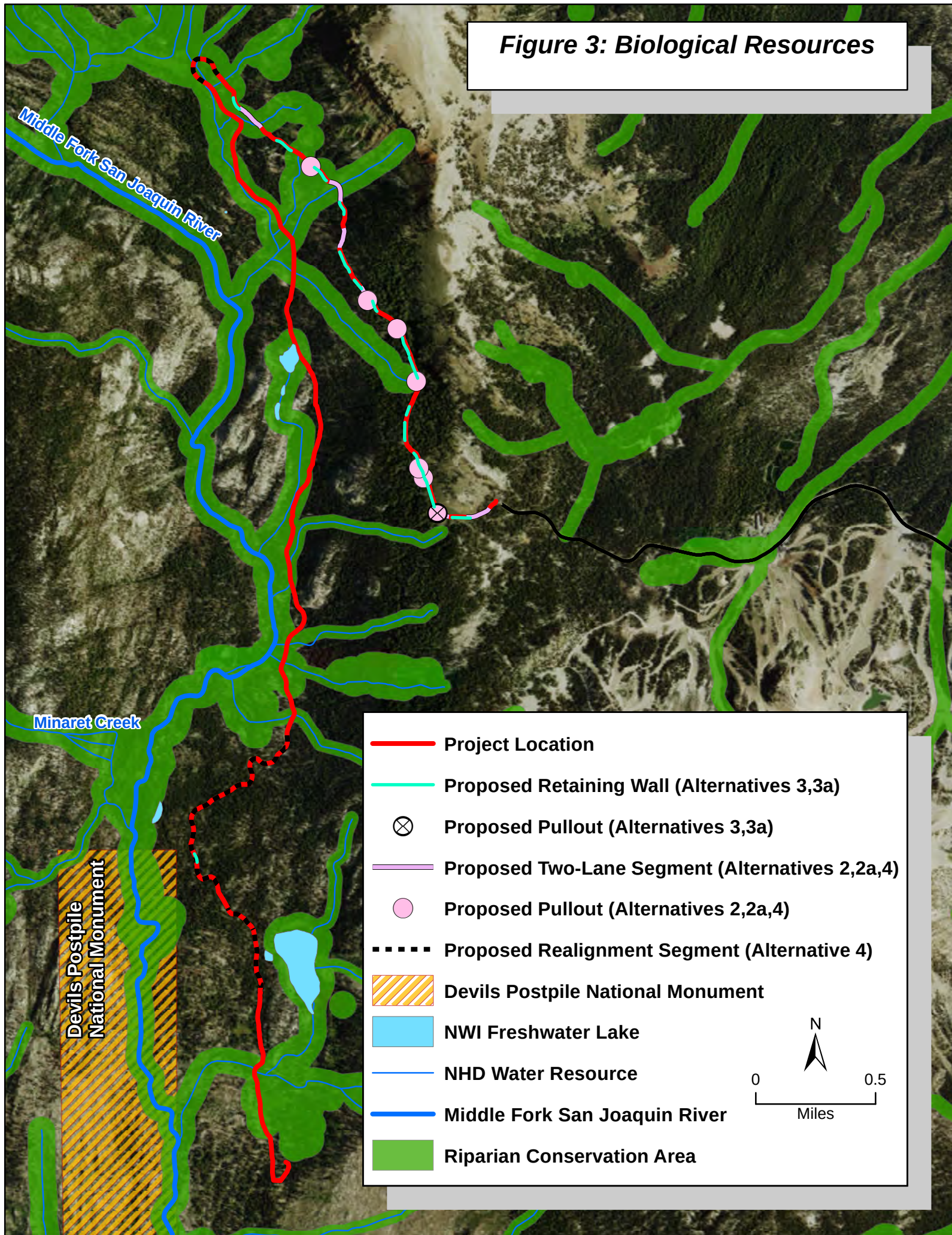


Figure 4: Wetlands and Water Resources

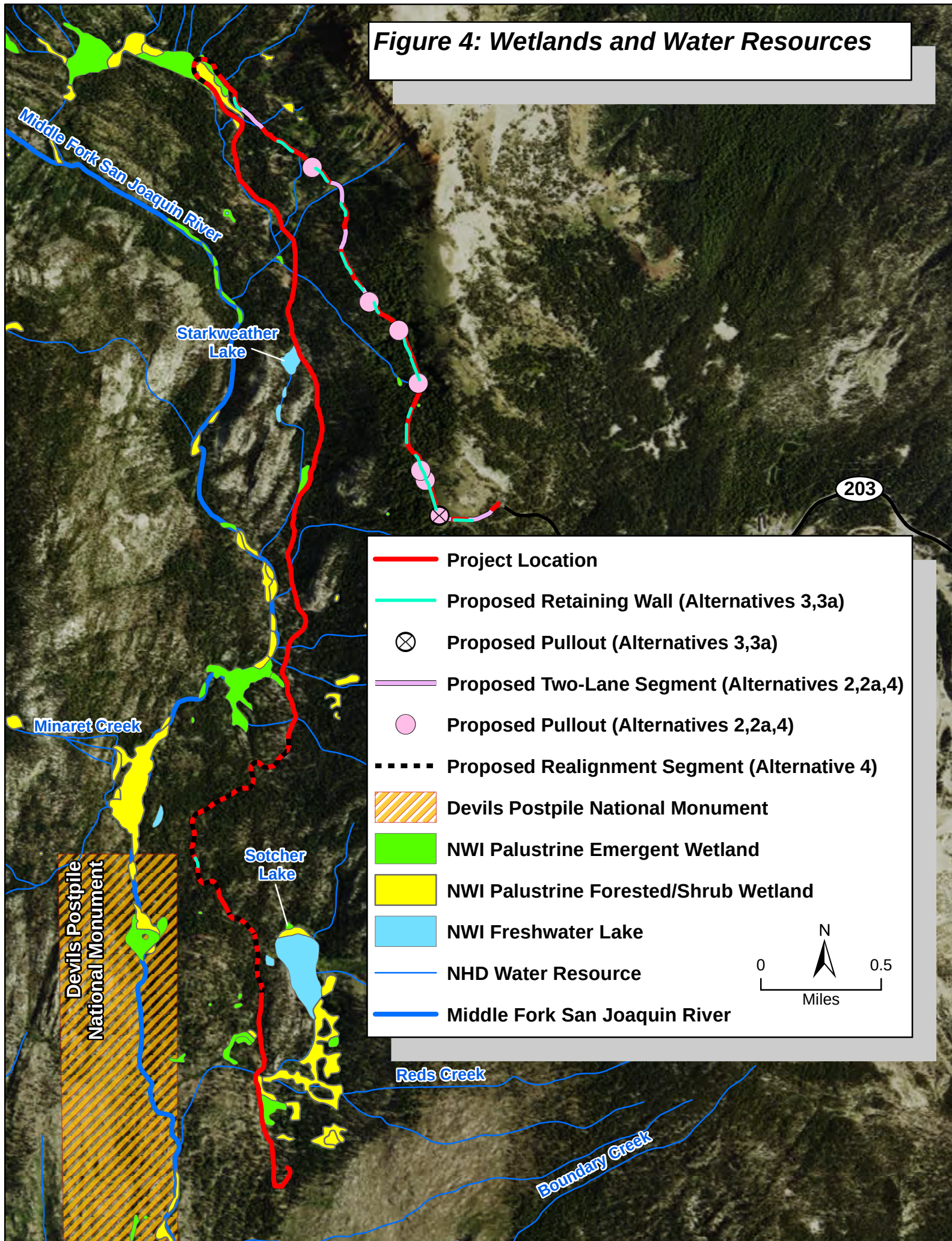
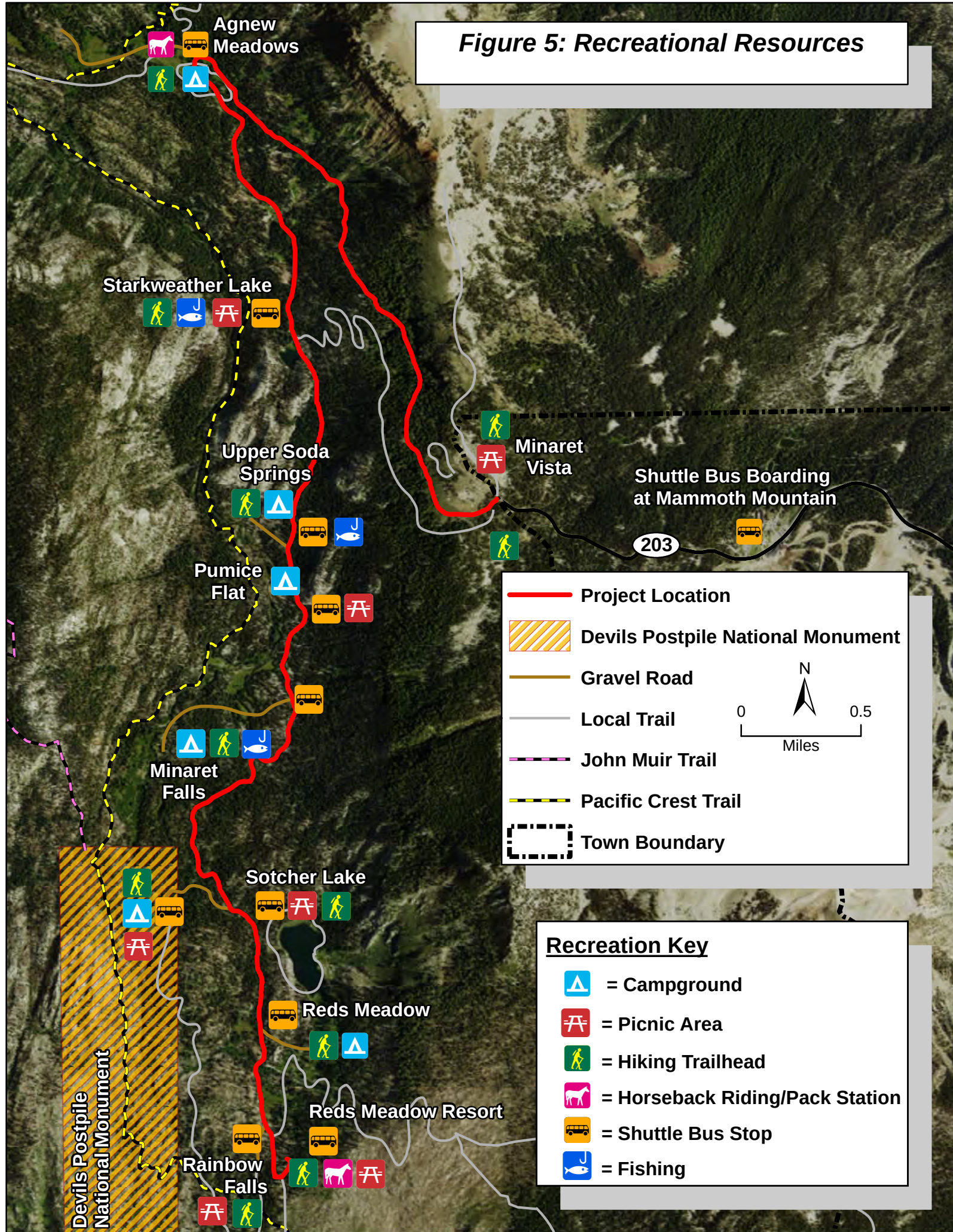


Figure 5: Recreational Resources



Appendix B

Alternatives Screening Matrix

APPENDIX B
Alternatives Evaluation Matrix
Reds Meadow Road PEL Study

Screening Criteria	No Build	Rehabilitate Entire Route	Combo 1-/2-Lane Upper, Rehabilitate Lower	Combo 1-/2-Lane Upper, No Build Lower	2-Lane Upper, Rehabilitate Lower	2-Lane Upper, No Build Lower	Combo 1-/2 Lane Upper, Rehabilitate Lower with Select Realignment Improvements	New Alignment Roadway	New Alignment Emergency Access Route
PEL Alternative	No Action Alternative	Alternative 1	Alternative 2	Alternative 2a	Alternative 3	Alternative 3a	Alternative 4	Alternative 5	Alternative 6
Fulfill Purpose and Need - Address roadway deterioration									
To what degree does the alternative improve roadway drainage?	No improvement.	Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure.	Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure.	Upper: Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure. Lower: No improvement.	Substantial improvement due to eliminating existing roadside swales on upper section and reduced subgrade infiltration; and culvert replacement on lower section - adequate culvert size, reduced risk of failure.	Upper: Substantial improvement due to eliminating existing roadside swales - reduces subgrade infiltration. Lower: No improvement.	Upper: Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure.	New roadway would eliminate any existing drainage concerns.	Although new emergency route has appropriate drainage design, there would be no improvement on existing road.
To what degree does the alternative improve the existing poor subgrade conditions?	No improvement.	Minor improvement due to recompaction of subgrade as part of the repaving process but no excavation of poor soils.	Minor improvement due to recompaction of subgrade as part of the repaving process but no excavation of poor soils.	Upper: Minor improvement due to recompaction of subgrade but no excavation of poor soils. Lower: No improvement.	Upper: Substantial improvement due to retaining wall excavation and backfill. Lower: Minor improvement due to recompaction of subgrade.	Upper: Substantial improvement as retaining wall construction would allow for excavation of poor soils. Lower: No improvement.	Upper: Minor improvement due to recompaction of subgrade but no excavation of poor soils. Lower: Minor improvement due to recompaction of subgrade throughout rehabilitation area, with significant improvement to realignment locations.	New roadway has appropriate subgrade conditions.	New emergency route has appropriate subgrade conditions. No improvement on existing road.
To what degree does the alternative improve slope stability?	No improvement.	No improvement because slopes won't be modified, except one location on lower section.	Upper: Improvements limited to areas of new turnouts and retaining walls. Lower: No improvement, except one location.	Upper: Improvements limited to areas of new turnouts and retaining walls. Lower: No improvement.	Upper: Full improvement due to retaining wall excavation and backfill. Lower: No improvement, except one location.	Upper: Full improvement due to retaining wall excavation and backfill. Lower: No improvement.	Upper: Improvements limited to areas of new turnouts and retaining walls. Lower: No improvement within rehabilitation area, realignment areas will have minor slope stability where applicable.	New roadway has appropriate slope stability.	New emergency route has appropriate slope stability. No improvement on existing road.
Fulfill Purpose and Need – Improve mobility									
To what degree does the alternative improve passing conditions on the upper section of roadway?	No improvement.	No improvement.	Improvements limited to additional turnout locations only, remainder of upper section would not improve.	Improvements limited to additional turnout locations only, remainder of upper section would not improve.	Substantial improvement as 2-lane roadway would provide adequate passing width along entire section.	Substantial improvement as 2-lane roadway would provide adequate passing width along entire section.	Improvements limited to additional turnout locations only, remainder of upper section would not improve.	New roadway has 2 lanes, providing 2-way travel.	No improvement to existing roadway.
To what degree does the alternative provide safer travel conditions for vehicles?	No improvement.	Improves conditions with new roadway surface. Minimal change to safety because no change in pavement width, passing conditions, curve safety, or sight distance.	Upper: Moderate improvement to safety due to additional turnouts and improved surface conditions, but no changes to curve safety or sight distance. Lower: Improves surface conditions, but no other changes to safety.	Upper: Moderate improvement to safety due to additional turnouts and improved surface conditions, but no changes to curve safety or sight distance. Lower: No improvement.	Upper: Substantial improvement to safety by allowing two-way traffic along full length of upper section coupled with new roadway surface. Lower: Improves surface conditions, but no other changes to safety.	Upper: Substantial improvement to safety by allowing two-way traffic along full length of upper section coupled with new roadway surface. Lower: No improvement.	Upper: Moderate improvement to safety due to additional turnouts and improved surface conditions, but no changes to curve safety or sight distance. Lower: Improves safety due to straightening out tight curves and improving sight distance; improves roadway surface conditions.	Provides the best improvement to safety because new roadway is designed and built to current standards.	No improvement to existing roadway.
To what degree does the alternative improve access for incoming emergency responders and outgoing evacuees?	No improvement.	Improves surface conditions only and likely results only minimal change in emergency response access.	Minor improvement due to additional turnouts providing more opportunities for emergency responders to pass through traffic.	Minor improvement due to additional turnouts providing more opportunities for emergency responders to pass through traffic.	Substantial improvement due to two-way travel for entire roadway length.	Substantial improvement due to two-way travel for entire roadway length.	Minor improvement due to additional turnouts providing more opportunities for emergency responders to pass through traffic.	Substantial improvement because new roadway provides two-way travel and is designed and built to current standards.	Substantial improvement because emergency access route provides dedicated route for emergency responders with no interaction with visitors on existing route.

APPENDIX B
Alternatives Evaluation Matrix
Reds Meadow Road PEL Study

Screening Criteria	No Build	Rehabilitate Entire Route	Combo 1-1/2-Lane Upper, Rehabilitate Lower	Combo 1-1/2-Lane Upper, No Build Lower	2-Lane Upper, Rehabilitate Lower	2-Lane Upper, No Build Lower	Combo 1-1/2 Lane Upper, Rehabilitate Lower with Select Realignment Improvements	New Alignment Roadway	New Alignment Emergency Access Route
PEL Alternative	No Action Alternative	Alternative 1	Alternative 2	Alternative 2a	Alternative 3	Alternative 3a	Alternative 4	Alternative 5	Alternative 6
Constructability									
What is the complexity, difficulty, and duration of construction?	Not applicable.	Standard construction methods for rehabilitation. Anticipated construction duration limited to one season.	Standard construction methods for rehabilitation. Anticipated construction duration limited to one season.	Standard construction methods for rehabilitation. Anticipated construction duration limited to one season.	Increased difficulty of construction to build retaining wall systems and improve roadway width and subgrade on upper section due to increased roadway width. As a result, anticipated construction duration likely to extend through two seasons.	Increased difficulty of construction to build retaining wall systems and improve roadway width and subgrade on upper section due to increased roadway width. As a result, anticipated construction duration likely to extend through two seasons.	Standard construction methods for rehabilitation. Anticipated construction duration limited to one season.	Increased difficulty of construction to build roadway on entirely new alignment. Extended construction duration, but would not affect existing roadway operation. As a result, anticipated construction duration likely to extend through two seasons.	Increased difficulty of construction to build roadway on entirely new alignment. Extended construction duration, but would not affect existing roadway operation. As a result, anticipated construction duration likely to extend through two seasons.
How does the alternative maintain visitor and emergency access to the valley during construction?	Not applicable.	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours.	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours.	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours. Lower: No construction, full access maintained.	Upper: Access maintained via complex traffic control due to work areas needed for retaining wall construction; requires installation of temporary K-rail and operation of one-way traffic signal system and minor traffic delays around the clock. Lower: Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours.	Upper: Access maintained via complex traffic control due to work areas needed for retaining wall construction; requires installation of temporary K-rail and operation of one-way traffic signal system and minor traffic delays around the clock. Lower: No construction, full access maintained.	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours.	No traffic control needed.	No traffic control needed.
Is construction of the alternative financially feasible?	Estimated construction cost: \$0	Estimated construction cost: \$7.5M	Estimated construction cost: \$9.2M	Estimated construction cost: \$3.9M	Estimated construction cost: \$29.5M	Estimated construction cost: \$24.2M	Estimated construction cost: \$9.6M	Estimated construction cost: Unknown	Estimated construction cost: Unknown
Does the alternative have the potential to improve operations and maintenance?	No potential for improvement.	Potential for moderate improvement due to improved pavement structural section and new culverts, thereby reducing maintenance costs and improving rideability.	Potential for moderate improvement due to improved pavement structural section and new culverts, thereby reducing maintenance costs and improving rideability.	Upper: Potential for moderate improvement due to improved pavement structural section and new culverts. Lower: No potential for improvement, existing yearly maintenance costs would continue to increase.	Upper: Potential for substantial improvement due to fully addressing slopes, subgrade, and drainage conditions and ability to easily conduct maintenance operations and maintain traffic on 2-lane road. Lower: Potential for moderate improvement due to improved pavement structural section and new culverts.	Upper: Potential for substantial improvement due to fully addressing slopes, subgrade, and drainage conditions and ability to easily conduct maintenance operations and maintain traffic on 2-lane road. Lower: No potential for improvement, existing yearly maintenance costs would continue to increase.	Potential for moderate improvement due to improved pavement structural section and new culverts, thereby reducing maintenance costs and improving rideability.	Potential for substantial improvement because new road would be constructed to current standards.	Potential for substantial improvement on new emergency route because road would be constructed to current standards. No potential for improvement on existing road.
Community Values									
How does the construction duration and/or closure plans impact businesses and recreation?	Not applicable.	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Longer construction duration likely to have more impact on visitation than other alternatives.	Longer construction duration likely to have more impact on visitation than other alternatives except rehabilitating lower, 2-Lane Upper.	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Construction duration not likely to impact visitation because does not affect existing road operation.	Construction duration not likely to impact visitation because does not affect existing road operation.
Is the alternative compatible with established local plans and visions?	Yes, will continue to allow visitation to valley.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.
Environmental Resources									
How much previously undisturbed land does the alternative impact?	0 acres	0 acres	4 acres	3 acres	9 acres	8 acres	8 acres	30 acres	15 acres

APPENDIX B
Alternatives Evaluation Matrix
Reds Meadow Road PEL Study

Screening Criteria	No Build	Rehabilitate Entire Route	Combo 1-1/2-Lane Upper, Rehabilitate Lower	Combo 1-1/2-Lane Upper, No Build Lower	2-Lane Upper, Rehabilitate Lower	2-Lane Upper, No Build Lower	Combo 1-1/2 Lane Upper, Rehabilitate Lower with Select Realignment Improvements	New Alignment Roadway	New Alignment Emergency Access Route
PEL Alternative	No Action Alternative	Alternative 1	Alternative 2	Alternative 2a	Alternative 3	Alternative 3a	Alternative 4	Alternative 5	Alternative 6
How does the alternative impact wetlands?	No impact.	Negligible wetland impact limited to culvert replacement only.	Some wetland impact likely, due to culvert replacement.	Some wetland impact likely, due to culvert replacement.	Some wetland impact likely, due to culvert replacement in lower section and wider cross section in upper section.	Some wetland impact likely, due to wider cross section in upper section.	Some wetland impact likely, due to culvert replacement and curve realignment.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.
How does the alternative impact sensitive plant and animal species?	No impact.	Least potential for impact on sensitive animal species due to light and noise from construction activities. No impact on critical habitat or migratory birds.	Minor potential impact on sensitive animal species due to light and noise from construction activities. Less potential for impact to sensitive plant species than 2-lane alternatives because of smaller footprint. Minor potential for impact to migratory birds due to vegetation removal.	Minor potential impact on sensitive animal species due to light and noise from construction activities. Less potential for impact to sensitive plant species than 2-lane alternatives because of smaller footprint. Minor potential for impact to migratory birds due to vegetation removal.	Moderate potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than alternatives without 2 lanes. Higher potential for impact to sensitive plant species due to larger footprint than other alternatives. Minor potential for impact to migratory birds due to tree removal.	Moderate potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than alternatives without 2 lanes. Higher potential for impact to sensitive plant species due to larger footprint than other alternatives. Minor potential for impact to migratory birds due to vegetation removal.	Minor potential impact on sensitive animal species due to light and noise from construction activities. Less potential for impact to sensitive plant species than 2-lane alternatives because of smaller footprint. Minor potential for impact to migratory birds due to vegetation removal.	Greatest potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than other alternatives. Highest potential for impact to sensitive plant species due to new alignment construction. Moderate potential for impact to migratory birds due to tree removal.	Greatest potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than most other alternatives. Highest potential for impact to sensitive plant species due to new alignment construction. Moderate potential for impact to migratory birds due to tree removal.
How does the alternative impact cultural and/or tribal resources?	No impact.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance. Roadway maintains current alignment.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.
What visual impacts does the alternative have?	No impact.	No visual impact because no change to roadway width or alignment.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Greatest potential for visual impact due to construction of new roadway and associated tree removal and cut and fill slopes.	Greatest potential for visual impact due to construction of new roadway and associated tree removal and cut and fill slopes.
How does the alternative impact designated wilderness and other sensitive areas?	No impact.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no major change in roadway alignment. Minor road reconstruction/realignment in the SJIRA near Minaret Falls turnoff.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.

Appendix C

Stakeholder Meeting Summary Notes and Associated Handouts

CA FTFS 03S11 (1) Reds Meadow PEL Study

Stakeholder Meetings Summary

Introduction -

A series of three stakeholder meetings were held February 10, 2016 at the Inyo National Forest Supervisor's Office in Bishop, California. The meetings were organized around the following groups: agencies and permit holders; tribes; and interest groups. The project team included representatives from the United States Forest Service (USFS), Federal Highway Administration FHWA - Central Federal Lands Highway Division of the (FHWA-CFLHD), and CH2M.

The purpose of the meetings was to brief the stakeholders on the progress made to date, continue to collect information and data on the roadway and surrounding resources, as well as gather feedback on purpose and need for the project and the alternatives and discuss next steps.

Agenda topics included the following:

- History and Purpose and Need for the Project – The USFS provided an overview of the history of Reds Meadow Road and its importance in not only providing sole access to Devil's Postpile National Monument but also to other recreational features in the valley. The key elements of the project Purpose and Need were also discussed.
- Project Development Process –The project team discussed the role of FHWA - CFLHD as a delivery agency that is partnering with Inyo National Forest to deliver the Planning and Environmental Linkage (PEL) Study. A brief overview of the elements of a PEL was provided as well as a summary of what work efforts have been accomplished to date. This included a discussion of the project scoping effort completed in June as well as the purpose and need, screening criteria and alternatives evaluation, as well as the draft design technical memo and cost estimates.
- Description of the Alternatives and Evaluation Results – A detailed review of the alternatives being considered including typical sections and alignments was provided to the attendees. The project team also discussed the screening criteria, including environmental constraints, used to evaluate the alternatives as well as the results of the screening documented in the evaluation matrix.
- Description of Project Funding Options and Requirements – FHWA-CFLHD discussed the current funding for the project and provided an overview of potential funding sources that are being currently being evaluated. This included a discussion of Federal Lands Access Program (FLAP) and USFS Federal Lands Transportation Program Funding (FLTP). FHWA-CFLHD also discussed Nationally Significant Programs funding as well TIGER Grants as well as potential partnering with other agencies.
- Next Steps – The project team concluded the presentation by discussing the next steps for the project. This included completion of the PEL study in spring 2016 as well as fieldwork for topographic survey, geotechnical analysis, and environmental surveys in summer of 2016. The project team also discussed beginning NEPA documentation and 15% design in fall of 2016 as funding allows.

The project team delivered a presentation covering the agenda items listed above followed by open discussion with the attendees. Handouts were provided at each of the meetings and included a project fact sheet, draft project purpose and need statement, alternatives evaluation matrix, examples of retaining wall types, and typical sections. A scroll plot showing the project alignment along with potential retaining wall locations was also provided.

Summary of Discussions –

This section lists a summary of comments received at each of the three meetings.

Agencies and Permit Holders – 9:00 Am to Noon:

Attendees:

- Shia Geminder/California Land Management
- Scott Burns/Mono County
- Bobby Tanner/Reds Meadow Resort
- Claudia Tanner/Reds Meadow Resort
- John Helm/Eastern Sierra Transit Authority
- Deanna Dulen/National Park Service
- Forest Becket/Caltrans
- Deanna Dulen/DPNM

Comments:

- The upper segment of the roadway will continue to deteriorate if not addressed. As it provides the only access to the valley, it represents an evacuation concern if the roadway fails.
- It is important to protect the rustic character of the roadway.
- National Park Service (NPS) discussed the significant values of the Reds Meadow valley, emphasizing the need to maintain access for users but also the need to consider resource protection.
- The proposed improvements should not alter current recreation management of the valley.
- An increase in capacity or change in roadway use may lead to conflicts between different user groups and result in resources damage.
- The aesthetics of the roadway are important to maintaining the character of the valley. Guardrail, which may be required in certain locations to address safety issues, and specifically at retaining wall locations, may detract from the visual setting.
- Bicyclists are a large interest group that should be considered. Mono County specifically requested consideration of an uphill bike lane.
- Implementing bike lanes will be a challenge and will be costly given the topography. While there is current bike use in the valley, it is limited. The addition of bike lanes may increase bike use in the valley, requiring additional infrastructure to support a new user group, which may not be feasible or desirable.
- There was general consensus of the group that bike lanes, concurrent with 2-lane widening in the upper section, are probably not feasible. There was overall acknowledgement that all action alternatives will improve access and safety for bicyclists. Concern was expressed by the group that 2-lane widening in the upper section of roadway would create safety issues as drivers would not be as careful and would drive at a higher speed.
- Representatives from the Reds Meadow Resort mentioned that most of the accidents along Reds Meadow Road occur in the valley at several specific locations with tight curves, limited

sight distance, and inverted superelevations. Locations of these curves were identified by the resort on a map (e.g. Starkweather Lake, Minaret Falls campground area, Devils Postpile entrance, and Agnew Meadows). Additionally, these tight curves in the lower section make it hard for buses to navigate. Alternatives should consider opportunities to improve bus movements, travel times, and safety.

- The project should consider a realignment of the hairpin turn at Agnew Meadows, utilizing the old roadway alignment.
- The resort was not aware of accidents within the top 2.5 miles, which in their opinion was due to the narrow roadway widths and steep grades.
- Reduced speeds or safety mirrors could also be used to improve safety at the tight curves.
- Currently buses are limited to 40 feet in length with a smaller wheel base, and there is no interest in increasing the allowable vehicle length. NPS is considering decreasing the allowable vehicle length within Devils Postpile National Monument.
- Additional safety features at bus stops may be needed to alert visitors of pedestrian activity. Features may include a wider roadway section, striping, and signage.
- Improvements to emergency access should be considered, specifically with regards to sight distance in the upper section. It was suggested that discussions with emergency responders may identify specific spacing of pullouts that would facilitate improved emergency response.
- There are at least 3 avalanche chutes in the upper section but no known global slides.
- An additional alternative was discussed that would widen the existing 1 lane roadway in the upper section where the existing topography allows, with additional widening in areas to improve sight distance. This hybrid alternative would also include minor realignments at select curves in the lower section as discussed above.
- For the project to be eligible for FLAP, the road needs to be maintained by a state or local municipality or agency.
- There were discussions on the potential to leverage USFS FLTP funds with NPS FLTP funds. NPS is not aware of situations where this has been successfully implemented but is open to further discussions.
- Caltrans indicated that they are not interested in taking over maintenance or ownership of Reds Meadow Road. Additionally, the roadway would need to be updated to current Caltrans standards if Caltrans was to take over ownership. Group consensus was that this scenario is not feasible or desirable.

Tribes – 1:00 to 4:00 PM:

Attendees:

- Danelle Gutierrez/Big Pine Paiute Tribe

Comments:

- The Tribe views Devils Postpile as an important part of their cultural history. Elders frequently visit the area with younger members to pass on the tribal history of the area so maintaining access is important.

- While Devils Postpile and the valley are ethnographically important, the Tribal Historic Preservation Officer did not identify specific sites of tribal significance along the roadway.
- Evacuation would be a concern during an emergency or if the roadway fails.
- Tribe would be against any off alignment alternatives.
- The USFS archaeologist indicated that consultation with Tribes on the west side of the Sierra Nevada Mountains would be required. She also mentioned that there is potential for Civilian Conservation Corps structures along the roadway as well as lithic scatters in the area.

Interest Groups – 6:00 to 9:00 PM:

Attendees:

- John Urdi/Mammoth Lakes Tourism
- Laura Beardsley/Friends of the Inyo
- John Wentworth/Town of Mammoth Lakes

Comments:

- The Town of Mammoth Lakes recognizes the safety issues along the roadway and the importance of needed improvements. They are in support of the project.
- One person asked if alternative modes of transportation (i.e. tram/train options) to get people into the valley had been evaluated, and if there was an opportunity to incorporate bike lanes.
- Keeping the road open during any construction is important.
- Adding bike lanes may increase usage of the area, thereby straining resources.
- The Devil's Postpile General Management Plan is a good resource.
- The project should minimize tree clearing in consideration of resource protection and aesthetics of the roadway and valley.
- It is important not to "freeway" the project by adding more lanes and wider shoulders.
- The proposed improvements need to focus on the purpose of the roadway and not get distracted into trying to solve unrelated issues.
- Attendees expressed support for a 1/2 lane combo alternative in the upper section with safety pullouts in select locations and other safety features for emergency access as needed. They did not support the 2 lane option in the upper section.
- John Wentworth invited the USFS to present the project at the March Local Transportation Committee Meeting.

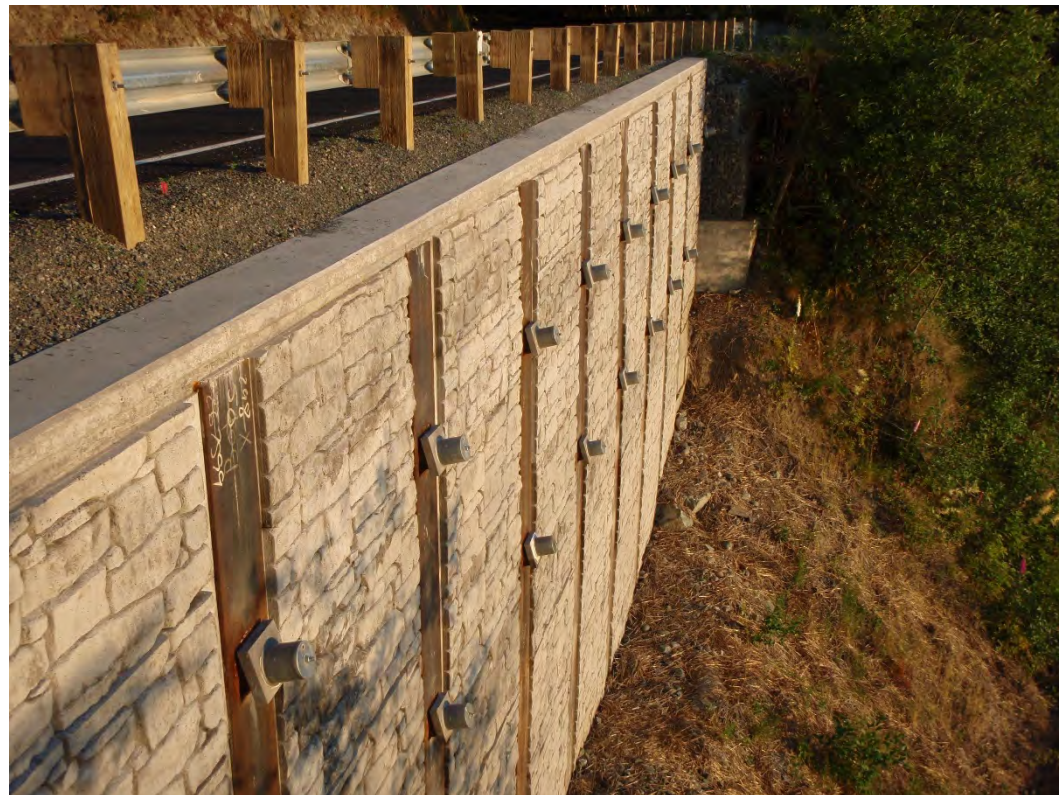
Reds Meadow Road PEL Study Stakeholder Meetings – Example Wall Types



Photograph 1. Caption



Photograph 2. Caption



Photograph 3. Caption



Photograph 4. Caption



Photograph 5. Caption



Photograph 6. Caption



Photograph 7. Caption



Reds Meadow Road PEL Study

CA FTFS 03S11 (1)

The US Forest Service (USFS) and the Federal Highway Administration, Central Federal Lands Highway Division (FHWA-CFLHD) are currently conducting a Planning and Environmental Linkage Study (PEL) to evaluate options to improve Reds Meadow Road, which provides access into Reds Meadow valley from State Route SR 203.

The purpose of the project is to improve the deteriorated condition of Reds Meadow Road and improve vehicular travel mobility. The roadway is deteriorated, and the steep one-lane roadway in the upper 2.5 miles hinders mobility because vehicles traveling in opposite directions cannot pass each other easily, resulting in long queues of waiting vehicles and safety concerns. Inadequate sight distance at curves and narrow shoulders also hinder passing and create safety risks. Without improvements, the roadway will continue to deteriorate and impede vehicular mobility.

As part of the PEL study and in coordination with the USFS, the project team has developed the purpose and need for the project as well as the initial range of conceptual alternatives and associated cost estimates for improvements along the approximately 8.3 mile roadway. Initial alternatives evaluated to date include primarily resurfacing improvements to the lower 5.8 miles with a combination of resurfacing and widening in the upper 2.5 miles. This information, along with a high level environmental review, will be used in conjunction with feedback received as part of the stakeholder meetings and agency coordination to help guide future efforts on the project.

Contacts

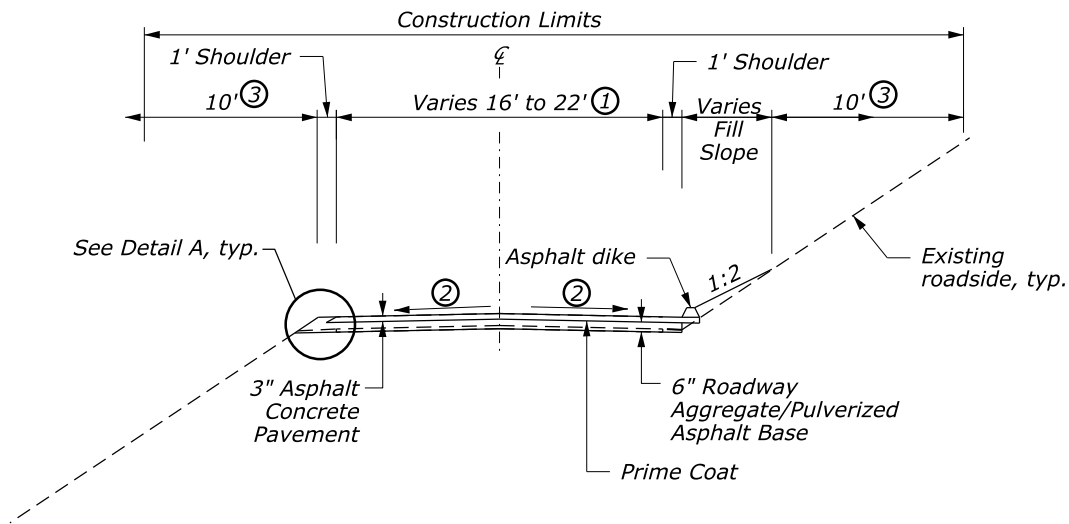
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12/7/2015 4:30:01 PM pw:\projectwise.ch2m.com:DEN001\Documents\663395 - FHWA-TO 27 REDS MEADOW PEL\Work in Progress\Reds Meadow Road WIP\Roadway\CADD_Sheets\A-Gen_sht\A03_TypeBtm_01.dwg

REG	STATE	PROJECT	SHEET NO.	TOTAL SHEETS
N/A	CA	FTFS 03S11 (1)	A3	A3



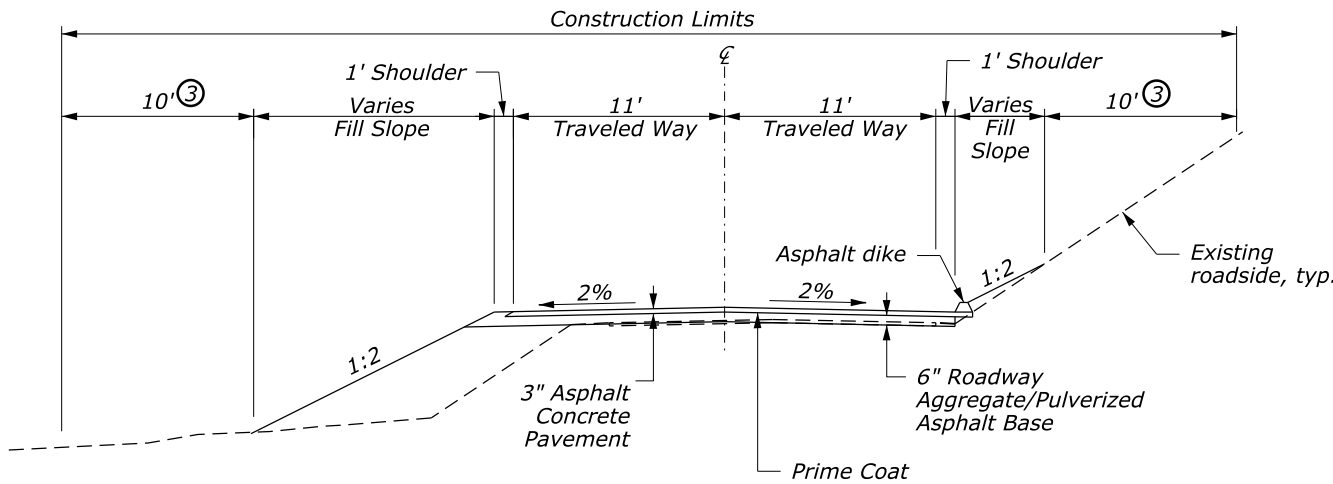
**PAVEMENT RECONSTRUCTION TYPICAL SECTION
REDS MEADOW ROAD**

ALTERNATIVE 1 9+00.00 TO 446+30.00

ALTERNATIVE 2 9+00.00 TO 446+30.00 ⑥

ALTERNATIVE 3 9+00.00 TO 11+00.00

ALTERNATIVE 3 138+00.00 TO 446+30.00



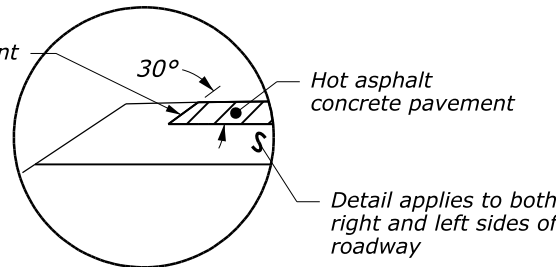
**ROAD WIDENING (FILL) TYPICAL SECTION
REDS MEADOW ROAD**

ALTERNATIVE 2 21+00.00 TO 134+00.00 ④

ALTERNATIVE 3 11+00.00 TO 138+00.00 ④

LENGTH OF PROJECT				
Location	Station to Station	Roadway (ft)		
		Alternative 1	Alternative 2	Alternative 3
Reds Meadow Road	9+00.00 to 446+30.00	43,730	43,730	43,730
	TOTAL (mi)	8.28	8.28	8.28

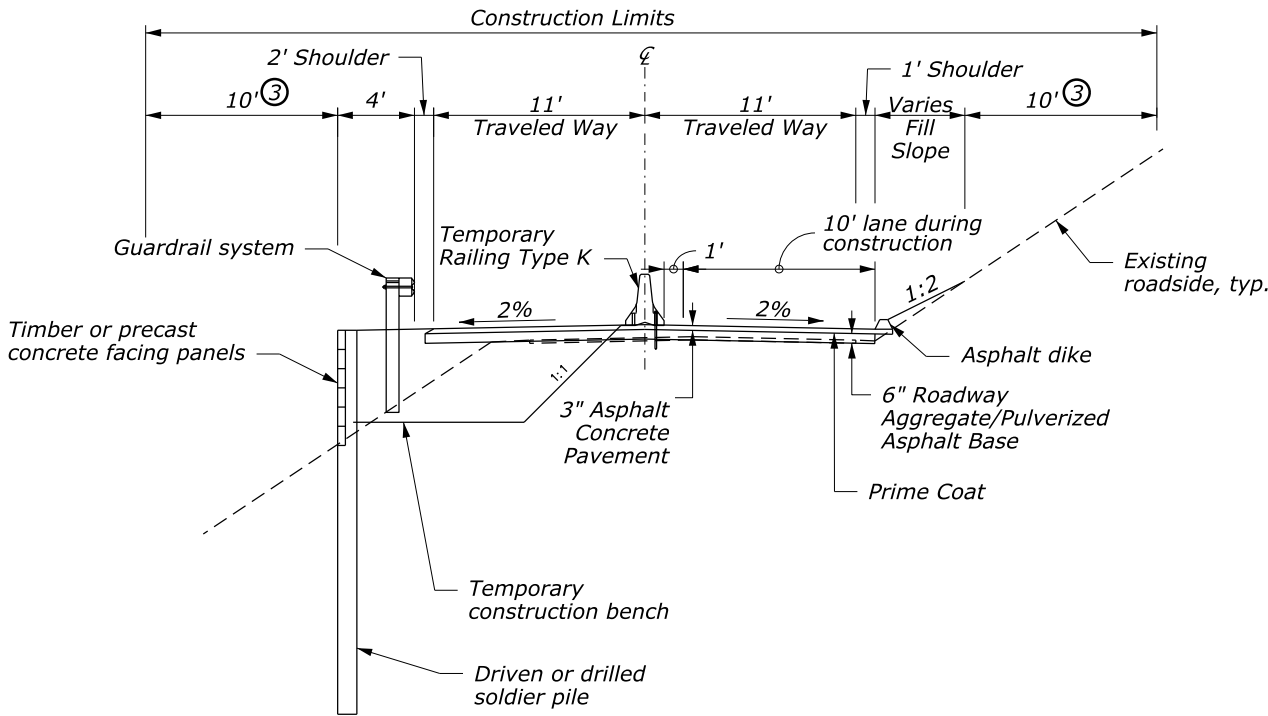
Construct 30° pavement edge (safety edge)



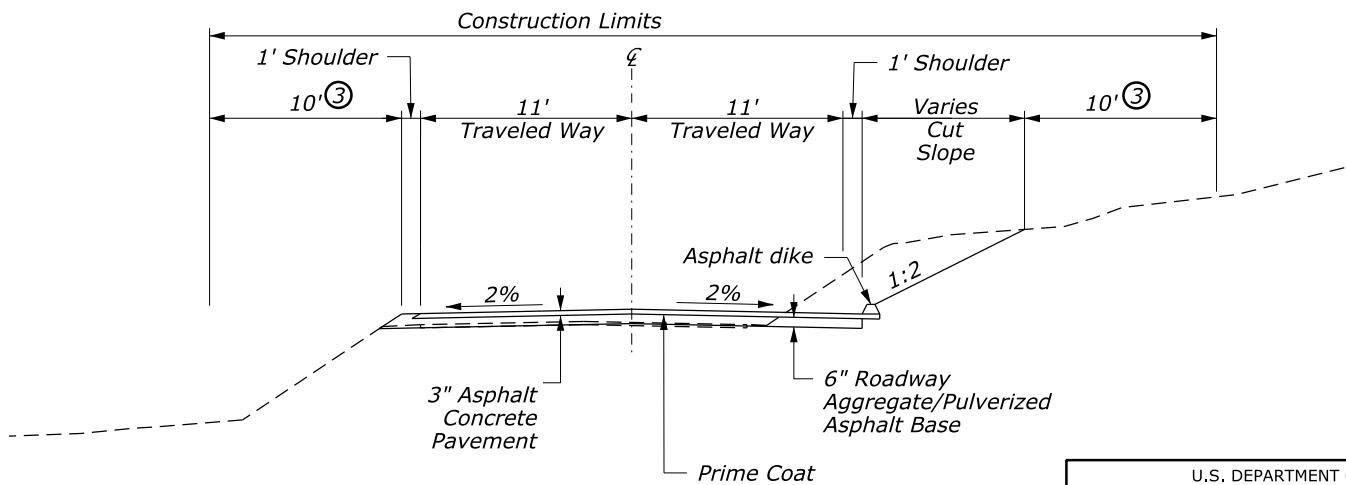
DETAIL A

NOTE:

- ① Match existing pavement width.
- ② Match existing cross slopes.
- ③ The contractor shall not remove vegetation or topsoil within the 10' wide area and shall only use this area for temporary construction access.
- ④ See C series for locations.
5. Where subgrade soils are composed of pumice, they should be sub-excavated 3-feet, reinforced with geotextile fabric and recompacted. See C-series sheets for approximate locations.
- ⑥ Except where road widening fill or cut is proposed, see Sheet C-1.



FILL WALL TYPICAL SECTION



**ROAD WIDENING (CUT) TYPICAL SECTION
REDS MEADOW ROAD**

ALTERNATIVE 2 12+00.00 TO 17+00.00

ALTERNATIVE 3 11+00.00 TO 138+00.00 ④

NO SCALE

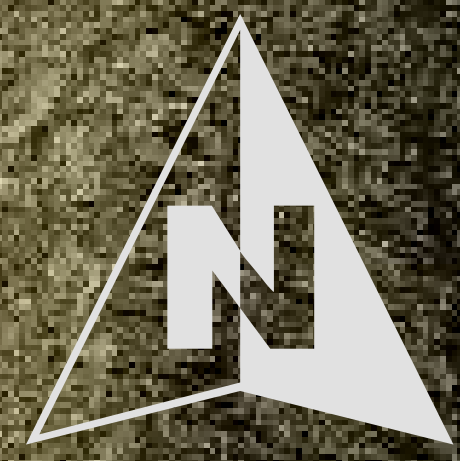
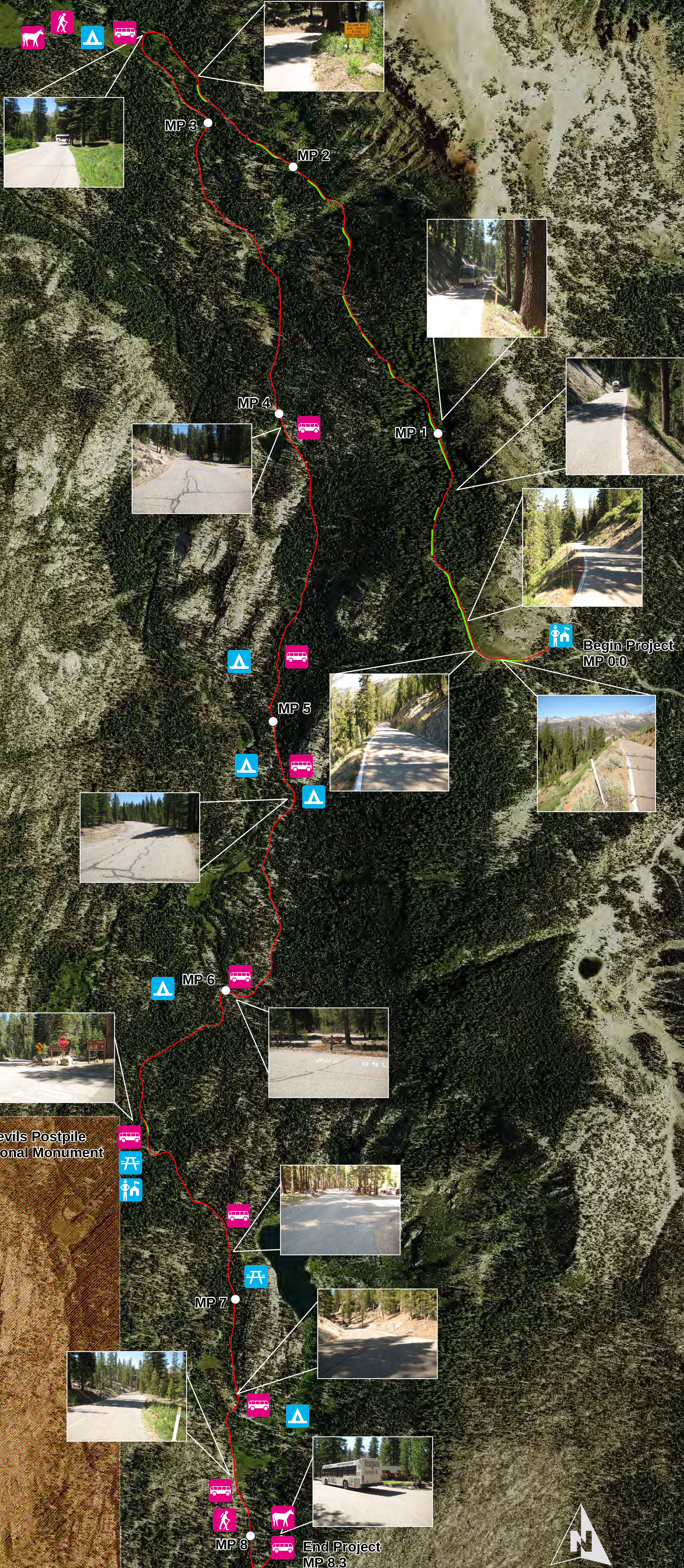
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

U.S. CUSTOMARY

TYPICAL SECTIONS

Sheet 1 of 1

CONCEPTUAL DESIGN SUBMITTAL - DECEMBER 11, 2015 - NOT FOR CONSTRUCTION



Reds Meadow Road PEL Study

Screening Criteria	No Build	3R Entire Route	No Build Lower, Combo 1-/2-Lane Upper	No Build Lower, 2-Lane Upper	3R Lower, Combo 1-/2-Lane Upper	3R Lower, 2-Lane Upper	New Alignment Roadway	New Alignment Emergency Access Route
Fulfill Purpose and Need - Address roadway deterioration								
To what degree does the alternative improve roadway drainage?	No improvement.	Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure.	Upper: Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure. Lower: No improvement.	Upper: Substantial improvement due to eliminating existing roadside swales - reduces subgrade infiltration. Lower: No improvement.	Improvements limited to culvert replacement only - adequate culvert size, reduced risk of failure.	Substantial improvement due to eliminating existing roadside swales on upper section and reduced subgrade infiltration; and culvert replacement on lower section - adequate culvert size, reduced risk of failure.	New roadway would eliminate any existing drainage concerns.	Although new emergency route has appropriate drainage design, there would be no improvement on existing road.
To what degree does the alternative improve the existing poor subgrade conditions?	No improvement.	Minor improvement due to recompaction of subgrade as part of the repaving process but no excavation of poor soils.	Upper: Minor improvement due to recompaction of subgrade but no excavation of poor soils. Lower: No improvement.	Upper: Substantial improvement as retaining wall construction would allow for excavation of poor soils. Lower: No improvement.	Minor improvement due to recompaction of subgrade as part of the repaving process but no excavation of poor soils.	Upper: Substantial improvement due to retaining wall excavation and backfill. Lower: Minor improvement due to recompaction of subgrade.	New roadway has appropriate subgrade conditions.	New emergency route has appropriate subgrade conditions. No improvement on existing road.
To what degree does the alternative improve slope stability?	No improvement.	No improvement because slopes won't be modified, except one location on lower section.	Upper: Improvements limited to areas of new turnouts and retaining walls. Lower: No improvement.	Upper: Full improvement due to retaining wall excavation and backfill. Lower: No improvement.	Upper: Improvements limited to areas of new turnouts and retaining walls. Lower: No improvement, except one location.	Upper: Full improvement due to retaining wall excavation and backfill. Lower: No improvement, except one location.	New roadway has appropriate slope stability.	New emergency route has appropriate slope stability. No improvement on existing road.
Fulfill Purpose and Need – Improve mobility								
To what degree does the alternative improve passing conditions on the upper section of roadway?	No improvement.	No improvement.	Improvements limited to additional turnout locations only, remainder of upper section would not improve.	Substantial improvement as 2-lane roadway would provide adequate passing width along entire section.	Improvements limited to additional turnout locations only, remainder of upper section would not improve.	Substantial improvement as 2-lane roadway would provide adequate passing width along entire section.	New roadway has 2 lanes, providing 2-way travel.	No improvement to existing roadway.
To what degree does the alternative provide safer travel conditions for vehicles?	No improvement.	Improves conditions with new roadway surface. Minimal change to safety because no change in pavement width, passing conditions, curve safety, or sight distance.	Upper: Moderate improvement to safety due to additional turnouts and improved surface conditions, but no changes to curve safety or sight distance. Lower: No improvement.	Upper: Substantial improvement to safety by allowing two-way traffic along full length of upper section coupled with new roadway surface. Lower: No improvement.	Upper: Moderate improvement to safety due to additional turnouts and improved surface conditions, but no changes to curve safety or sight distance. Lower: Improves surface conditions, but no other changes to safety.	Upper: Substantial improvement to safety by allowing two-way traffic along full length of upper section coupled with new roadway surface. Lower: Improves surface conditions, but no other changes to safety.	Provides the best improvement to safety because new roadway is designed and built to current standards.	No improvement to existing roadway.
To what degree does the alternative improve access for incoming emergency responders and outgoing evacuees?	No improvement.	Improves surface conditions only and likely results only minimal change in emergency response access.	Minor improvement due to additional turnouts providing more opportunities for emergency responders to pass through traffic.	Substantial improvement due to two-way travel for entire roadway length.	Minor improvement due to additional turnouts providing more opportunities for emergency responders to pass through traffic.	Substantial improvement due to two-way travel for entire roadway length.	Substantial improvement because new roadway provides two-way travel and is designed and built to current standards.	Substantial improvement because emergency access route provides dedicated route for emergency responders with no interaction with visitors on existing route.

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Screening Criteria	No Build	3R Entire Route	No Build Lower, Combo 1-/2-Lane Upper	No Build Lower, 2-Lane Upper	3R Lower, Combo 1-/2-Lane Upper	3R Lower, 2-Lane Upper	New Alignment Roadway	New Alignment Emergency Access Route
Constructability								
What is the complexity, difficulty, and duration of construction?	NA	Standard construction methods for 3R. Anticipated construction duration limited to one season.	Standard construction methods for 3R. Anticipated construction duration limited to one season.	Increased difficulty of construction to build retaining wall systems and improve roadway width and subgrade on upper section due to increased roadway width. As a result, anticipated construction duration likely to extend through two seasons.	Standard construction methods for 3R. Anticipated construction duration limited to one season.	Increased difficulty of construction to build retaining wall systems and improve roadway width and subgrade on upper section due to increased roadway width. As a result, anticipated construction duration likely to extend through two seasons.	Increased difficulty of construction to build roadway on entirely new alignment. Extended construction duration, but would not affect existing roadway operation. As a result, anticipated construction duration likely to extend through two seasons.	Increased difficulty of construction to build roadway on entirely new alignment. Extended construction duration, but would not affect existing roadway operation. As a result, anticipated construction duration likely to extend through two seasons.
How does the alternative maintain visitor and emergency access to the valley during construction?	NA	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours.	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours. Lower: No construction, full access maintained.	Upper: Access maintained via complex traffic control due to work areas needed for retaining wall construction; requires installation of temporary K-rail and operation of one-way traffic signal system and minor traffic delays around the clock. Lower: No construction, full access maintained.	Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours. Regular traffic flow outside of work hours.	Upper: Access maintained via complex traffic control due to work areas needed for retaining wall construction; requires installation of temporary K-rail and operation of one-way traffic signal system and minor traffic delays around the clock. Lower: Access maintained via standard traffic control using flaggers to direct one-way traffic during work hours.	No traffic control needed.	No traffic control needed.
Is construction of the alternative financially feasible?	Estimated construction cost: \$0	Estimated construction cost: \$7M	Estimated construction cost: \$2.5M	Estimated construction cost: \$24M	Estimated construction cost: \$7.5M	Estimated construction cost: \$29M	Estimated construction cost: Unknown	Estimated construction cost: Unknown
Long-Term Operations and Maintenance								
Does the alternative have the potential to improve operations and maintenance?	No potential for improvement.	Potential for moderate improvement due to improved pavement structural section and new culverts, thereby reducing maintenance costs and improving rideability.	Upper: Potential for moderate improvement due to improved pavement structural section and new culverts. Lower: No potential for improvement, existing yearly maintenance costs would continue to increase.	Upper: Potential for substantial improvement due to fully addressing slopes, subgrade, and drainage conditions and ability to easily conduct maintenance operations and maintain traffic on 2-lane road. Lower: No potential for improvement, existing yearly maintenance costs would continue to increase.	Potential for moderate improvement due to improved pavement structural section and new culverts, thereby reducing maintenance costs and improving rideability.	Upper: Potential for substantial improvement due to fully addressing slopes, subgrade, and drainage conditions and ability to easily conduct maintenance operations and maintain traffic on 2-lane road. Lower: Potential for moderate improvement due to improved pavement structural section and new culverts.	Potential for substantial improvement because new road would be constructed to current standards.	Potential for substntial improvement on new emergency route because road would be constructed to current standards. No potential for improvement on existing road.

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Screening Criteria	No Build	3R Entire Route	No Build Lower, Combo 1-/2-Lane Upper	No Build Lower, 2-Lane Upper	3R Lower, Combo 1-/2-Lane Upper	3R Lower, 2-Lane Upper	New Alignment Roadway	New Alignment Emergency Access Route
Community Values								
How does the construction duration and/or closure plans impact businesses and recreation?	NA	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Longer construction duration likely to have more impact on visitation than other alternatives except 3R Lower, 2-Lane Upper.	Single season construction duration likely to have limited impact on visitation compared to 2-lane upper alternatives.	Longer construction duration likely to have more impact on visitation than other alternatives.	Construction duration not likely to impact visitation because does not affect existing road operation.	Construction duration not likely to impact visitation because does not affect existing road operation.
Is the alternative compatible with established local plans and visions?	Yes, will continue to allow visitation to valley.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.	Yes, will continue to allow visitation to valley during both construction and operation.
Environmental Resources								
How much previously undisturbed land does the alternative impact?	0 acres	0 acres	3 acres	8 acres	4 acres	9 acres	30 acres	15 acres
How does the alternative impact wetlands?	No impact.	Negligible wetland impact limited to culvert replacement only.	Some wetland impact likely, due to culvert replacement.	Some wetland impact likely, due to wider cross section in upper section.	Some wetland impact likely, due to culvert replacement.	Some wetland impact likely, due to culvert replacement in lower section and wider cross section in upper section.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.
How does the alternative impact sensitive plant and animal species?	No impact.	Least potential for impact on sensitive animal species due to light and noise from construction activities. No impact on critical habitat or migratory birds.	Minor potential impact on sensitive animal species due to light and noise from construction activities. Less potential for impact to sensitive plant species than 2-lane alternatives because of smaller footprint. Minor potential for impact to migratory birds due to vegetation removal.	Moderate potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than alternatives without 2 lanes. Higher potential for impact to sensitive plant species due to larger footprint than other alternatives. Minor potential for impact to migratory birds due to vegetation removal.	Minor potential impact on sensitive animal species due to light and noise from construction activities. Less potential for impact to sensitive plant species than 2-lane alternatives because of smaller footprint. Minor potential for impact to migratory birds due to vegetation removal.	Moderate potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than alternatives without 2 lanes. Higher potential for impact to sensitive plant species due to larger footprint than other alternatives. Minor potential for impact to migratory birds due to tree removal.	Greatest potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than other alternatives. Highest potential for impact to sensitive plant species due to new alignment construction. Moderate potential for impact to migratory birds due to tree removal.	Greatest potential impact on sensitive animal species due to light and noise from long duration of construction activities in a larger construction footprint than most other alternatives. Highest potential for impact to sensitive plant species due to new alignment construction. Moderate potential for impact to migratory birds due to tree removal.
How does the alternative impact cultural and/or tribal resources?	No impact.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance.	Negligible potential for impact due to limited disturbance. Roadway maintains current alignment.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.
What visual impacts does the alternative have?	No impact.	No visual impact because no change to roadway width or alignment.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Although the addition of retaining walls and tree removal in areas of new pullouts may result in limited visual changes; there are few views of the road from the valley or nearby trails.	Greatest potential for visual impact due to construction of new roadway and associated tree removal and cut and fill slopes.	Greatest potential for visual impact due to construction of new roadway and associated tree removal and cut and fill slopes.

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Screening Criteria	No Build	3R Entire Route	No Build Lower, Combo 1-/2-Lane Upper	No Build Lower, 2-Lane Upper	3R Lower, Combo 1-/2-Lane Upper	3R Lower, 2-Lane Upper	New Alignment Roadway	New Alignment Emergency Access Route
How does the alternative impact designated wilderness and other sensitive areas?	No impact.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	No impact because no change in roadway alignment.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.	Greatest potential for wetland impact due to new alignment extending through previously undisturbed areas.

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