

Source: Base map: USGS DRG / CASIL Ownership // Site locations: Timberline Engineering, Inc. / EDAW 2006

Note: This map is for general locating purposes only.
Raker Act right of way boundaries not shown.

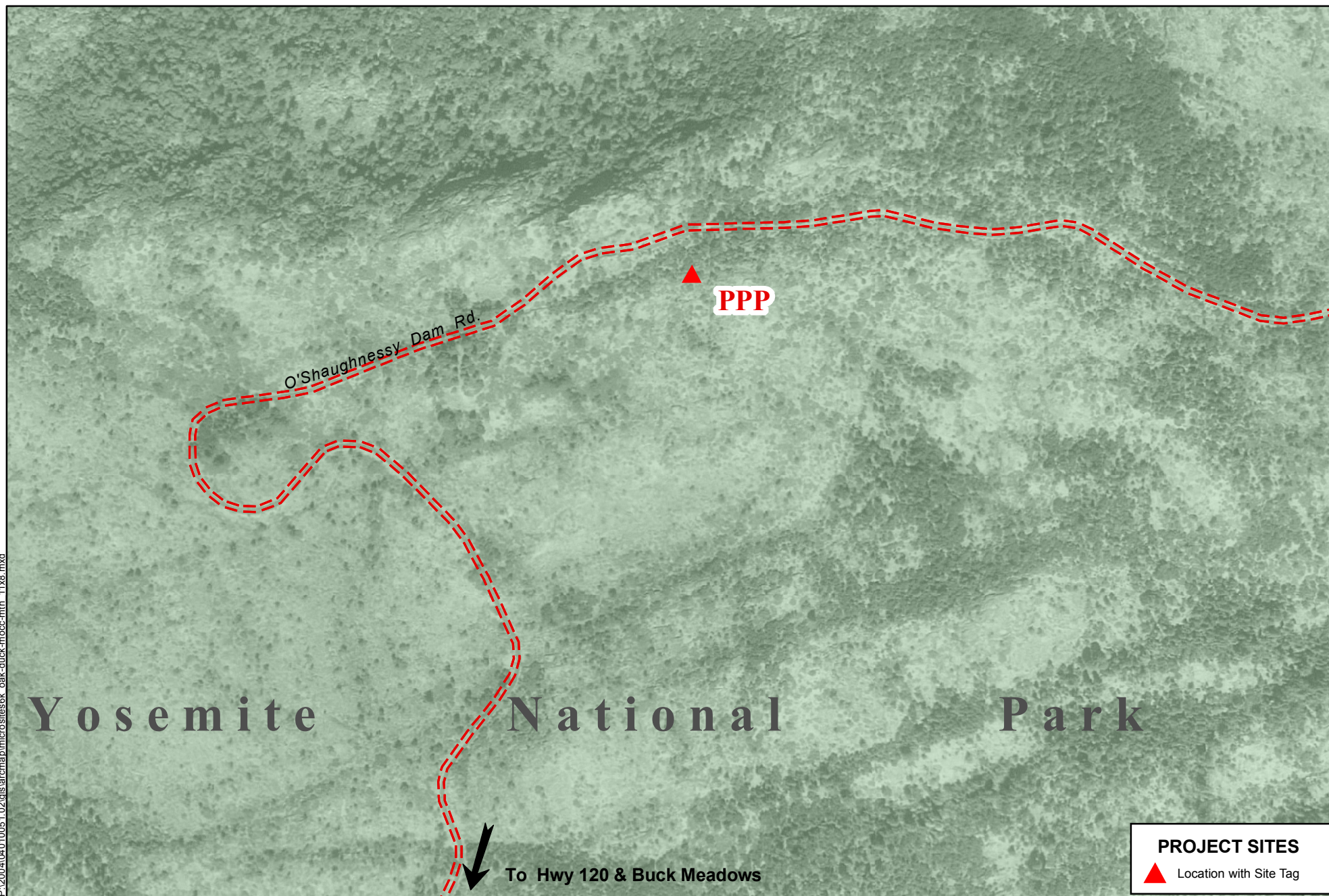


2,500 1,250 0 2,500
Feet

Scale 1 : 30,000
1" = 2500 ft

Project Sites
Poopenaut Pass & O'Shaughnessy Area
Figure 2-20

P:\2004\04\01\0051.02\airmap\microsites\6k oak-duck-mocc-mtn-11x8.mxd



Source: USGS DOQQ Imagery / CASIL Ownership / Timberline Engineering -- Site locations / EDAW 2006

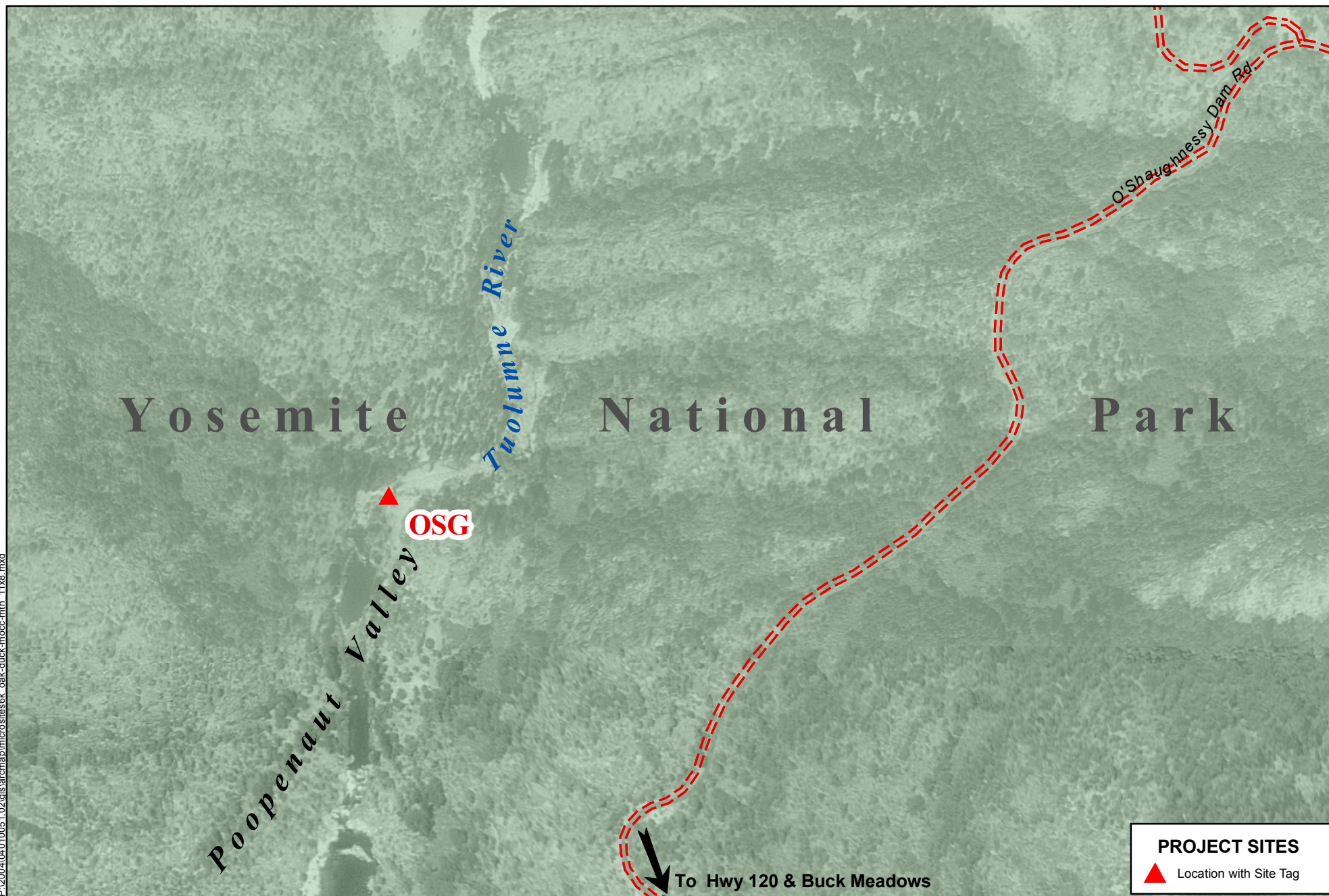


Scale 1 : 6,000
1" = 500 ft

*Note: This map is for general locating purposes only.
Raker Act right of way boundaries not shown.*

Project Sites
Poopenaut Pass (Aerial)
Figure 2-21

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Source: USGS DOQQ Imagery / CASIL Ownership / Timberline Engineering -- Site locations / EDAW 2006



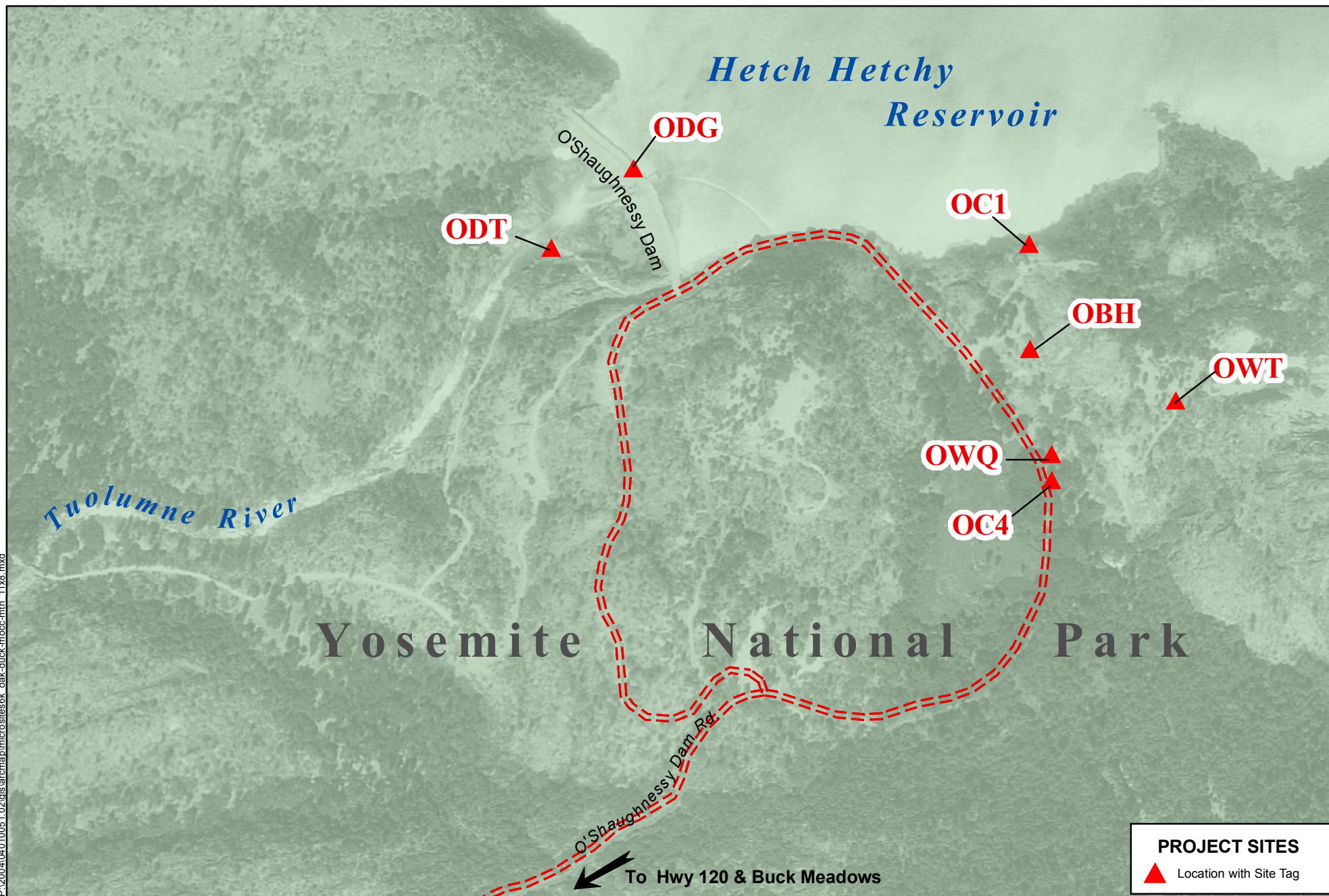
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Feet

Scale 1 : 6,000
1" = 500 ft

*Note: This map is for general locating purposes only.
Raker Act right of way boundaries not shown.*

Project Sites
Poopenaut Valley (Aerial)
Figure 2-22

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Source: USGS DOQQ Imagery / CASIL Ownership / Timberline Engineering -- Site locations / EDAW 2006



500 250 0 500
Feet

Scale 1 : 6,000
1" = 500 ft

Note: This map is for general locating purposes only.
Raker Act right of way boundaries not shown.

Project Sites
O'Shaughnessy Dam Area (Aerial)

Figure 2-23

7/10/07

HETCH HETCHY COMMUNICATION SYSTEM UPGRADE PROJECT EA/IS

2.2.1 Overall Construction Phasing and Schedule

There are three distinct construction aspects to the proposed project: (1) installation of the microwave system, (2) installation of aerial fiber optic cable in the Early Intake Area, and (3) campus communication work at O'Shaughnessy, Cherry, and Lake Eleanor. In order to simplify cut-over (i.e., transfer from the old to new system components) and testing, it is proposed that all work be completed before cut-over from the existing systems; therefore, the construction contractor would be given a fixed period of time to complete the entire project. Construction would be phased in order to avoid sensitive resources and time periods. It is estimated that all construction and installations would be completed within a period of approximately 18 months. However, construction at some of the sites could be affected by winter weather conditions that could limit access to the site as well as construction activities.

2.2.2 Construction Methods and Equipment

As noted previously, the Proposed Action would require work at existing facilities, development of new facilities, and abandonment of old facilities. This section outlines the work that would be required at each of these classes of facilities. Transmission lines may be de-energized while work is performed on the lines. While short-term outages are possible, it would likely be possible to de-energize only one circuit of dual-circuit transmission lines at a time, and outages would likely be allowed only during the winter months. The removal of or topping of some trees may be necessary at Intake Radio Site, Burnout Ridge, and Poopenaut Pass project sites.

A variety of construction equipment, ranging from earth moving equipment to electrician's hand tools, would be used at the various sites. The following is a brief description of the type of equipment that is likely to be used for construction activities at most of the sites.

2.2.2.1 Communication Tower and Shelter Installation

The sites where new communication towers and communication shelters would be installed require the construction of foundations, which would require various types of heavy equipment such as backhoes, augers, concrete trucks, and cranes. In addition, equipment used to prepare sites may include excavators, front-end loaders, graders, compactors, backhoes, and trenchers.

Concrete for foundations would be hauled to the sites from existing concrete batch plants. The concrete foundations for the towers would extend approximately one foot above the finish grade. Bridges and roads to all sites can accommodate concrete truck traffic. Finally, the towers and shelters would be set in place with a crane. For the Poopenaut Pass site in Yosemite National Park, a helicopter would be used to deliver equipment and material to the site due to access limitations, and to minimize environmental impacts.

2.2.2.2 Aerial Fiber Optic Cable Installation

Specialized equipment would be utilized for the installation of the aerial fiber optic cable on the transmission lines in the Early Intake Area, and on the distribution lines in the Cherry Lake Area. This equipment may include cranes, bucket trucks, stationary reel trucks/trailers, winch trucks/trailers, and

various temporary cable support equipment (cable chutes, cable blocks, etc.). Due to the nature of the terrain in the Early Intake Area, the contractor may opt to use a helicopter to set cable chutes/blocks and other tower hardware and to set the pull line that would be used to pull the aerial fiber between towers.

2.2.2.3 Other Construction Equipment

Exterior work requiring motorized equipment at all other project sites would generally be limited to trenching/backfill for the installation of underground conduit. Equipment that would be used in these operations includes trenchers, backhoes, compactors, and in the case where asphalt must be patched, asphalt laying equipment. All other exterior work would generally be performed with electrician's hand tools.

2.2.2.4 Electrical Power During Construction

A power source would be required at all sites during construction. For sites that do not already have electrical service, the contractor would use an on-site generator to provide power until utility service becomes available. On-site generators could be diesel, gasoline, or propane powered.

Most of the heavy equipment that would be used for the project would be diesel powered, although small incidental equipment, including personnel trucks, hand-held compactors, etc., may be gasoline or propane powered. All of the heavy construction equipment would be hauled to the site on flatbed trailers pulled by diesel, gasoline, or propane powered trucks. In addition to the actual construction equipment, a water truck for dust control and support equipment such as a fuel servicing truck and a lubrication/maintenance truck would likely be required.

2.2.2.5 Nighttime Lighting

The proposed communication upgrades do not require or include nighttime lighting, and no nighttime construction would occur.

2.3 PROPOSED PROJECT COMPONENTS

2.3.1 New Sites

The following section describes the purpose of the new sites, facilities required for each, and construction actions that would take place.

Burnout Ridge (BOR)

Burnout Ridge is located in the Stanislaus National Forest between Cherry Lake and Intake Switchyard (see Figures 2-1, 2-15, 2-16). The Burnout Ridge site would provide line-of-sight microwave connections to Moccasin Peak, Cherry Tower Site, Intake Radio Site, and Poopenaut Pass, and 900 megahertz (MHz) spread spectrum radio connection to Lake Eleanor Dam Level Gauge. As described in Section 2.2, this site would replace the FCC-licensed microwave radio repeaters on Duckwall Mountain and Jones Point, which have poor winter access and are served by solar and installed wind power. The improved access and more reliable power would reduce risk to employees who currently have poor winter access to

Duckwall Mountain and Jones Point, and improve reliability of the system. In addition, Burnout Ridge could be equipped with a voice radio repeater and two-way radio antennas in the future to provide improved two-way radio coverage into the Cherry Lake and Lake Eleanor areas. This would provide the foundation system to improve the safety and productivity of HHW&P personnel working in the area in the future. Additionally, USFS could install voice radio equipment and antennas in the future to improve radio coverage for management and emergency activities. While cellular communication coverage is not part of the purpose and need, or Proposed Action of this project, the installation of a communication tower may in the future support cellular telephone communication equipment. This project would not promote or limit such a future use.

Facilities

The Burnout Ridge site would require the construction of a communication tower and communication shelter, security fencing, utility power from a HHW&P distribution line, all-season access, and an emergency generator⁴ with associated propane tank in the event utility power is interrupted. Because this is a new, undeveloped site, an access road would also be required. The Burnout Ridge site has good access from Cherry Lake Road (Cherry Oil Road) and is reasonably close to an existing HHW&P electrical distribution line. This site would meet the operational criteria of a prominent location with line-of-sight to other project sites within its system, road access or foot access from a road turnout, and access to utility power. Burnout Ridge is a suitable site to provide the communication needs for the Cherry and Eleanor areas while providing a link between Moccasin Powerhouse and Intake Switchyard via Intake Radio Site and O'Shaughnessy Dam via Poopenaut Pass.

Construction

The removal of trees that may be hazardous to site workers and public safety, as well as those dead or dying trees in the immediate vicinity of the project site would occur along roadsides and landings. Dead and dying trees could be hazardous to site workers and public safety as they may have the potential to fall and possibly injure personnel in the area. Other trees may pose a hazard to site workers and public safety if they obstruct access to and from the site. Felled hazard trees would be left in place within log deficient areas, as identified by the wildlife biologist, or where there are insufficient down logs to comply with the USFS R-5, Soil Quality Standards. Hazard tree removal would occur adjacent to approximately 1,500 feet of USFS roads used in conjunction with this project, specifically Cherry Oil Road and Road 1N86. Removal of these trees will be in accordance with the guidelines of the Stanislaus National Forest Hazard Tree Procedures for Forest Plan Compliance.

The site would be cleared and prepared to accept a communication tower, modular communication shelter, emergency generator, propane tank, and pad-mounted electrical transformer. The foundations for the tower and communication shelter may be slab on grade, drilled piers, or foundation curbs, as

⁴ Emergency generator is defined as an electrical generator driven by an internal combustion engine designed to provide backup power in case of failure of the primary electrical source (in this case, the local electric utility company). The emergency generator and local electric utility company would be connected to the electrical loads at the site through an automatic transfer switch (ATS). In the event of failure of service from the local electric utility company, the ATS would signal the emergency generator to start and then connect the electrical loads to the emergency generator. For this project, the engine would be fueled via propane, stored in an aboveground storage tank.

determined by the equipment manufacturers. Ground disturbance at this site would be approximately 10,433 square feet (sq. ft.) for the communication site and tower area.

A 120-foot lattice-type communication tower would be installed. Several microwave dishes and small additional antennas would be mounted to the tower. The tower would be galvanized steel, and any antennas or other equipment on the tower would be painted grey to reduce visibility. In addition, small video camera units would be attached to the tower for security purposes. The maximum size of the square concrete cap foundation for the tower would be approximately 23 feet by 23 feet.

A 12-foot by 40-foot modular communication shelter with insulated walls made of high-strength, light-weight, steel-reinforced concrete with an exposed aggregate finish would be installed to house the communication equipment. Paint color would be selected to match the surrounding landscape – no white paint would be used on the building. Most of the ground surface around the shelter would be covered by gravel. A pad-mounted, self-contained emergency generator with an automatic transfer switch would be installed in the shelter to provide emergency power for the site in the event the main electrical distribution system is ever down. The generator would be served from a pad-mounted propane tank. In addition, this site would have batteries with capacity to allow operation in the event of prime power failure.⁵ The site would be surrounded by security fencing. The fence would be seven feet high galvanized fencing fabric topped with three strands of barbed wire on an outrigger. The fence gates would be self-closing. An intrusion alarm system would be installed in the communication shelter for site security.

There is a well-traveled existing logging road (Forest Road 1N86) on privately owned land from Cherry Lake Road (Cherry Oil Road) that passes within approximately 1,500 feet of the proposed Burnout Ridge site. From this location there is a remnant of an existing USFS road (either an abandoned logging road or perhaps a road created during fire-fighting operations) that links the logging road to the site. The existing privately owned logging road is sufficient for construction and maintenance access without need for upgrading. However, the aforementioned 1,500-foot “remnant” road would require upgrading to accommodate long-term maintenance access.

The “remnant” road would be an engineered, gravel road with a drainage swale along one side of the road. Preparation of the roadway would require the clearing of existing trees and stumps within the roadway alignment. Trees and stumps would be chipped and spread or hauled off-site and disposed of appropriately as directed by the USFS and HHW&P. Rock outcrops within the alignment would be leveled to the required sub-base elevation using rock-breaking equipment mounted to heavy equipment or by localized blasting.

Once cleared of major obstacles, the roadway would be stripped of all topsoil and organic material and lowered to a depth of four inches below finished grade and compacted with a vibratory, sheepsfoot roller where applicable. Those portions of the roadway that are primarily compacted earth would be tested for compaction and moisture content. A geotextile reinforcement fabric would be laid under those portions of the road base that are composed primarily of earth (as opposed to rock) to support the final gravel road

⁵ Prime power failure is the failure of the primary power source to a facility. The primary power source for a facility is the source from which it normally receives power. For a facility that receives power from the electric utility company the “prime” power source is the electric utility company.

surface. The road sub-grade would be sloped at one percent to two percent toward the swale so that stormwater is conveyed away from the road base to prevent washout of the gravel surface. The swale would be machine-compacted earth and would require occasional maintenance.

Approximately 6,752 feet of 22-kilovolt (kV) underground power line would be installed to the Burnout Ridge site from an existing overhead power line located parallel to Cherry Lake Road (Cherry Oil Road). The underground line would be extended approximately 200 feet from existing power pole #5/6 east to the intersection of Cherry Oil Road and the Burnout Ridge access road. Approximately 134 linear feet (approximately 1,340 sq. ft.) would be trenched from the existing power pole 5/6 to the edge of Cherry Oil Road for the power line installation. The line would then be installed within the dirt access road via trenching all the way to the project site. With the exception of the first 200 feet, the power line would be contained within the Burnout Ridge access road right-of-way. In order to limit disturbance beyond the access road, it is envisioned that the conductor would be installed in the centerline of the road. The power line would be direct-buried cable installed no less than 36 inches below finished grade. The direct burial conductor would be embedded in clean sand, a minimum of six inches on all sides. Locator type warning tape would be installed 12 inches below finish grade (24 inches above the conductor). In addition, a fiber optic communication cable would be in the same trench. At Burnout Ridge, a pad-mounted transformer would step the 22 kV distribution voltage down to 120/240-volt (V) utilization voltage. An underground secondary electrical service would be installed from the transformer to the communication shelter.

The road work at Burnout Ridge would require earth moving and roadway equipment such as motor graders, dozers, backhoes, scrapers, compactors, and haul trucks. Depending on the extent of rock outcroppings that must be reduced, the contractor may use a variety of rock-breaking equipment, such as backhoes, jackhammers, and track-mounted type jackhammers. Water would be used on native surface roads to maintain fine surface particles, minimize fugitive dust, and maintain surface compaction. If Cherry Lake Road were trenched (rather than bored), the asphalt would need to be patched, which would require the use of asphalt laying equipment. If the road were bored rather than trenched, then a utility boring machine would be used.

Poopenaut Pass (PPP)

Poopenaut Pass is located within Yosemite National Park south of the O'Shaughnessy Dam access road between the Hetch Hetchy Entrance Station and O'Shaughnessy Dam (see Figures 2-1, 2-20, 2-21). The Poopenaut Pass site would have a line-of-sight to O'Shaughnessy Dam Gallery to the northeast, and Burnout Ridge to the northwest, thus allowing for communication between Moccasin Powerhouse and O'Shaughnessy Dam. A tower at this site would repeat the microwave signal from Burnout Ridge to the O'Shaughnessy area and provide the foundation system for NPS and HHW&P with the bandwidth needed to eventually expand communications into the O'Shaughnessy area. While cellular communications coverage is not part of the purpose and need, or Proposed Action of this project, the installation of a communication tower may in the future support cellular telephone communication equipment. This project would not promote or limit such a future use.

Two site locations at Poopenaut Pass are analyzed in this EA/IS. HHW&P and NPS staff identified several sites during the internal evaluation phase of the NEPA process (See Section 2.4 Alternatives

Considered but Dismissed). Following the close of the public scoping process and review of comments from this process, HHW&P and NPS staff identified the sites that are formal alternatives for more detailed analysis: Poopenaut Pass Sites 7 and 9. Site 9 is identified as the preferred alternative for the Poopenaut Pass location, while Site 7 will be analyzed in this document as an alternate location.

Facilities

The Poopenaut Pass site would require the construction of a communication tower and communication shelter, utility power from a HHW&P distribution line, and all-season access. Because this is a new, previously undeveloped site, an access trail would be required. The proposed Poopenaut Pass site is located near an existing vehicular turnout at roadway marker H2 on the O'Shaughnessy Dam access road within the Park. The climb from the turnout to the site is an elevation change of approximately 115 feet. No formal trail exists, but a footpath is evident.

Construction

This site consists primarily of rock outcroppings on a relatively steep slope. Due to the slope and topography of this site, there is not a flat location in which to place the communication shelter. As such, it would be necessary to create a flat shelf by excavating/blasting into the hillside. The removal of several trees would be required at this site, including a clump of oak trees located between the proposed communication shelter site and the Wilderness Boundary. The oak tree trunks are located entirely outside of the Wilderness Area Boundary and would be completely removed.

The foundations for the tower and communication shelter may be slab on grade, drilled piers, or foundation curbs as determined by the equipment manufacturers. Preparation of the foundation at the Poopenaut Pass site would likely be performed with a combination of blasting, air-powered jackhammers, and air-powered drills. A 40-foot lattice-type communication tower would be installed. Several microwave dishes and small additional antennae would be mounted to the tower. In addition, small video camera units would be attached to the tower for security purposes. Due to the topography of this site, the foundation would not be a square concrete cap, but rather three individual circular piers (one for each leg of the tower). The maximum diameter of each of the circular piers would be two feet. The legs of the tower would likely vary in length to adjust for the site topography; and the maximum height of the piers would be no more than three feet above finished grade.

A 12-foot by 24-foot modular communication shelter with insulated walls and roof made of high-strength, light-weight, steel-reinforced concrete would be installed to house the communication equipment. Ground disturbance at this site would be approximately 2,238 sq. ft. for the communication site and tower area. The shelter would be finished such that it is "park-like" in order to be consistent with NPS architectural standards. There would be a three-foot wide maintenance footpath on the south side of the communication shelter. Steel grating steps/risers with handrails would be installed near the southwest corner of the communication shelter such that maintenance personnel can access the communication shelter. A retaining wall would be built south of the communication shelter. In addition, handrails would be installed along the entire length of the retaining wall for maintenance personnel safety. The communication shelter would be equipped with a manual transfer switch as a means of connecting to a portable emergency generator. An access trail, similar to a hiking trail would be established between the

shelter and a point near but not visible from the parking area and the road. Ground disturbance for the access trail would involve approximately 6,303 sq. ft. for the access trail.

The site would be surrounded by security fencing. The fence would be seven feet high galvanized fencing fabric topped with three strands of barbed wire on an outrigger. The fence gates would be self-closing. An intrusion alarm system would be installed in the communication shelter to ensure site security in accordance with NPS guidance.

It is anticipated that the tower sections and shelter sections would be delivered by truck to the vehicular turnout at marker H2 below the site and lifted by helicopter to the tower location where they would be assembled. It is also anticipated that helicopters would be used to transport a portable generator, air compressor, and other equipment and tools to the site for use in site preparation and construction.

A pole-mounted transformer would be installed on an existing electrical distribution line pole located east of the project site just off the O'Shaughnessy Dam Road. An underground secondary electrical service line would be extended west within the O'Shaughnessy Dam Road right-of-way. The line would continue from the existing H2 turnout and follow and be buried under the foot trail to the communication shelter at the site. Approximately 125 linear feet (approximately 1,250 sq. ft.) would be trenched from the H2 turnout to the proposed foot trail to install the secondary electrical line. This site would have batteries with capacity to allow operation in the event of prime power failure.

Cherry Tower Site (CTS)

The tower site at Cherry Dam would be located below and near the western edge of Cherry Lake Dam (see Figures 2-1, 2-15, 2-17). This site would communicate by a line-of-sight with the microwave backbone at Burnout Ridge and would be the distribution point for services available on the communication system to the various facilities located at Cherry Lake.

Facilities

The Cherry Tower Site would require the construction of a communication tower, construction of a communication shelter, security fencing, and utility power from a HHW&P distribution line. The proposed site would be accessed via an existing dirt road from the top of the dam along the face of the dam approximately 1/8 mile to the project site.

Construction

The proposed site would require minor clearing and preparation to accept a communication tower and modular communication shelter. The foundations for the tower and communication shelter may be slab on grade, drilled piers, or foundation curbs, as determined by the equipment manufacturers.

A 40-foot lattice-type communication tower would be installed. Several microwave dishes and small additional antennae would be mounted to the tower. In addition, small video camera units would be attached to the tower for security purposes. The maximum size of the square concrete cap foundation for the tower would be approximately 15 by 15 feet.

A 12-foot by 24-foot modular communication shelter with insulated walls made of high-strength, light-weight, steel-reinforced concrete with an exposed aggregate finish would be installed to house the communication equipment. Ground disturbance at this site would be approximately 3,483 sq. ft. for the communication site and tower area. The exposed aggregate finish color would blend in with the surrounding area and the roof would be brown. The site would be surrounded by security fencing. The fence would be seven feet high galvanized fencing fabric topped with three strands of barbed wire on a one-foot outrigger. The bottom of the fencing fabric would be separated from the ground by no more than one inch. The fence gates would be self-closing. Alarms and waveguides would be installed in the communication shelter to ensure site security. Most of the site within the fenced area would be covered by gravel. This site would have batteries with capacity to allow operation in the event of prime power failure. The communication shelter would be equipped with a manual transfer switch and means of connecting a portable emergency generator. A pole-mounted transformer would be installed on an existing electrical distribution line pole located just north of the site to the communication shelter. An underground secondary electrical service would be installed via trenching from the transformer to communication shelter.

2.3.1.2 Existing Sites

The following section will describe the purpose of the existing sites, facilities required for each, and construction actions that would take place.

Warnerville Switchyard (WSY)

The Warnerville Switchyard site is part of the communication system backbone and is currently connected to the Moccasin Peak site. It is located southeast of the City of Oakdale in a rural area (see Figures 2-1, 2-4, and 2-5). The existing microwave antenna at this site is located on a 20-foot tower, with the signal reflected off of a passive reflector located on the west side of the switchyard to Moccasin Peak. Passive reflectors are difficult to install and align and create a high probability of self-interference which would degrade system performance (Timberline 2004). For the Proposed Action, a tower at this site was designed tall enough so that a passive reflector is not needed at this site.

Facilities

The existing towers at the Warnerville Switchyard site would remain. Only the passive reflector on the 120-foot tower and the parabolic dish antenna on the 20-foot tower would be removed. A new 120-foot high, lattice-type communication tower would be installed adjacent to the existing control building, equipped with one parabolic dish antenna. Several microwave dishes and small additional antennae would be mounted to the tower. In addition, small video camera units would be attached to the tower for security purposes.

Construction

No site preparation such as grading would be required. The existing asphalt paving would be removed to allow for the construction of the new tower foundation. The maximum size of the square concrete cap foundation for the tower would be approximately 23 by 23 feet. This site would be accessed by an existing paved road. The construction of the concrete foundations would require the use of various types

of heavy equipment such as backhoes, augers, concrete trucks, and cranes. All project-related actions at Warnerville Switchyard would occur within existing developed areas. No new fencing is proposed.

Moccasin Peak (MPK)

The Moccasin Peak site is part of the communication system backbone currently connected to Warnerville Switchyard and to Moccasin Powerhouse via the Moccasin Powerhouse Passive Reflector. Passive reflectors are difficult to install and align and create a high probability of self-interference that would degrade system performance (Timberline 2004). For the proposed project, new towers at the Moccasin Peak and Moccasin Powerhouse sites would be tall enough so that the Moccasin Powerhouse Passive Reflector is not needed, and so that Moccasin Peak would connect directly to Moccasin Powerhouse.

Facilities

A new 60-foot high, lattice-type communication tower would be installed with three new parabolic dish antennas (see Figures 2-1, 2-6, and 2-7 for location). Several microwave dishes and small additional antennae would be mounted to the tower. In addition, small video camera units would be attached to the tower for security purposes. The new tower would be located adjacent to the existing tower and communication building at this site.

Construction

No site preparation such as grading would be required and all project-related actions at Moccasin Peak would occur within existing developed areas. The existing asphalt paving would be removed to allow for the construction of the new tower foundation. The maximum size of the square concrete cap foundation for the tower would be approximately 17 feet by 17 feet. The existing tower would remain at this site and the existing emergency generator would be replaced. The existing tower users include the Tuolumne County Sheriff, Tuolumne County Road Department, Don Pedro Recreation Agency, and other HHW&P radio equipment. This site would be accessed by an existing dirt road that would not require any grading. The construction of the concrete foundations would require the use of various types of heavy equipment such as backhoes, augers, concrete trucks, and cranes. Specific equipment that would be used will be determined by the contractor that is awarded the construction contract.

The existing fence around this site would be replaced with a new fence and contained within the existing fence footprint. The fence would be seven feet high galvanized fencing fabric topped with three strands of barbed wire on a one-foot outrigger. The fence gates would be self-closing.

This site would have batteries with capacity to allow operation in the event of prime power failure.

Moccasin Powerhouse (MPH)

Moccasin Powerhouse is part of the communication system backbone and currently connected to Moccasin Peak via the Moccasin Powerhouse Passive Reflector. Passive reflectors are difficult to install and align and create a high probability of self-interference which would degrade system performance

(Timberline 2004). For the proposed project, a new tower at this site would be tall enough so that Moccasin Powerhouse would connect directly to Moccasin Peak.

Facilities

The existing parabolic dish antenna and associated support structure would be removed from the roof of the existing powerhouse (see Figures 2-1, 2-6, and 2-8 for location). A new 80-foot high monopole type communication tower would be installed and equipped with one new parabolic dish antenna. Several microwave dishes and small additional antennae would be mounted to the tower. In addition, small video camera units would be attached to the tower for security purposes.

Construction

Site preparation activities would be limited to removing some of the existing asphalt paving to allow for the construction of the foundation for the new tower. No grading would be required. The maximum size of the concrete cap foundation for the tower would be a single circular pier with an estimated maximum dimension of six feet in diameter that would extend approximately one foot above the finish grade.

The new tower would be located north of the retaining wall of the powerhouse. A monopole was selected for this site as preliminary field investigation indicated that a lattice tower structure, which has an inherently larger footprint, cannot be located in the desired area without impact to vehicle traffic in the area. This site would be accessed by an existing paved road. The construction of the concrete foundations would require the use of various types of heavy equipment such as backhoes, augers, concrete trucks, and cranes. All project-related actions at Moccasin Powerhouse would occur within existing developed areas. No new fencing is proposed.

Moccasin Powerhouse Passive Reflector (MPR)

Moccasin Powerhouse Passive Reflector is part of the communication system backbone and currently connects Moccasin Powerhouse to Moccasin Peak. Passive reflectors are difficult to install and align and create a high probability of self-interference which would degrade system performance (Timberline 2004). For the proposed project, the passive radio antenna at this site would be removed.

Facilities

No new equipment or facilities would be required at this site.

Construction

The passive reflector located along the penstock right-of-way east of Moccasin Powerhouse would be removed (see Figures 2-1, 2-6, and 2-8 for location). This site would be accessed by an existing dirt road that would not require any grading. All project-related actions at Moccasin Powerhouse Passive Reflector would occur within existing developed areas. No new fencing is proposed.

Jones Point (JPT)

Jones Point is part of the current communication system and is the repeater site for the first connection out of Intake Switchyard. It is currently served by solar and installed wind power. This site has microwave equipment, shelter, communication tower, antennas, and antenna feed system.

Facilities

No new equipment or facilities would be required at this site. For the proposed project, this site would be decommissioned and the Special Use Permits associated with this site would no longer be needed. The decommissioning would include the removal of the existing microwave equipment, shelter, communication tower, antennas, and antenna feed system following the installation of equipment at the Burnout Ridge and Intake Radio Sites.

Construction

No new construction would occur at this site.

Duckwall Mountain (DWM)

Duckwall Mountain is part of the current communication system and is the repeater site to link Moccasin Peak to Jones Point. HHW&P is one of several tenants at this site. Duckwall Mountain is currently served by solar and installed wind power. This site has a communication shelter, communication tower, antenna feed system, and antennas.

Facilities

No new equipment or facilities would be required at this site. For the proposed project, the HHW&P FCC-licensed microwave equipment, antennas and antenna feed system would be removed. The communication equipment belonging to the other tenants on this site would remain.

Construction

No new construction would occur at this site.

Intake Radio Site (IRS)

For purposes of the new system, Jones Point would be replaced by Intake Radio Site (see Figures 2-1, 2-11, 2-12), which is already developed with utility power, though currently not an existing microwave communication site. Intake Radio Site is a developed site along the transmission line above Intake Switchyard on the route between Intake Switchyard and Moccasin Powerhouse. The site currently houses a voice radio repeater and a 900 MHz spread spectrum Supervisory Control and Data Acquisition (SCADA) radio. In addition, an existing transmission line connects Intake Radio Site and Intake Switchyard, allowing for the installation of fiber optic communications between these sites.

Facilities

The site would accommodate a new communication tower, modular communication shelter, emergency generator and associated propane tank, and installation of aerial fiber optic cable between Intake Switchyard and Intake Radio site.

Construction

The site would be accessed via the existing dirt road that would not require any grading. An area northeast of the existing site would need to be cleared and prepared for a new communication tower, modular communication shelter, emergency generator, and propane tank. While it would be avoided if feasible, the removal of and/or topping of trees may be necessary at this site to maintain line-of-sight with other communication project sites. The foundations for the tower and communication shelter may be slab on grade, drilled piers, or foundation curbs as determined by the equipment manufacturers.

Aerial fiber optic cable would be installed on the existing transmission line between Intake Switchyard and this site, and then routed underground in new conduit (via trenching) from the transmission line tower to the communication shelter at this site.

A 40-foot lattice type communication tower would be installed. Several microwave dishes and small additional antennae would be mounted to the tower. In addition, small video camera units would be attached to the tower for security purposes. The maximum size of the square concrete cap foundation for the tower would be approximately 15 by 15 feet. The construction of the concrete foundations would require the use of various types of heavy equipment such as backhoes, augers, concrete trucks, and cranes. In addition, equipment used to prepare this site may include excavators, front-end loaders, graders, compactors, backhoes, and trenchers. Specific equipment that would be used will be determined by the contractor that is awarded the construction contract.

A 12-foot by 24-foot modular communication shelter with insulated walls made of high-strength, light-weight, steel-reinforced concrete with an exposed aggregate finish would be installed to house the communication equipment. Ground disturbance for the site would be approximately 1,045 sq. ft. for the new tower and shelter. Most of the site would be covered by gravel, with the exception of the existing electrical transmission line tower area. The site would be surrounded by security fencing. The fence would be seven feet high galvanized fencing fabric topped with three strands of barbed wire on a one-foot outrigger. The bottom of the fencing fabric would be separated from the ground by no more than one inch. The fence gates would be automatically self-closing.

A pad mounted, self-contained emergency generator with an automatic transfer switch would be installed to provide emergency power for the site. The generator would be served from a pad-mounted propane tank. This site would also have batteries with capacity to allow operation in the event of prime power failure.

An underground secondary electrical service would be installed (via trenching) from an existing electrical distribution line located on this site to the communication shelter.

Intake Switchyard (ISY)

The upgrades at this site would replace existing radio and fiber optic equipment with new fiber optic equipment. Moccasin Peak would be connected to Intake Switchyard through a repeater at Burnout Ridge and a terminal at Intake Radio Site. The terminal at Intake Radio Site would transmit signals to the Intake Switchyard via fiber optic cable. Fiber optic connections would also serve to transmit video from Intake Switchyard, Holm Powerhouse, and Kirkwood Powerhouse to Intake Radio Site.

Facilities

The Intake Switchyard Site would include the installation of fiber optic cable to Intake Radio Site, Holm Powerhouse, and Kirkwood Powerhouse. An existing parabolic dish antenna and associated feed system would be removed and replaced by the fiber optic cable.

Construction

New OPGW fiber optic cable would be installed on the existing HHW&P transmission lines between Intake Switchyard and Intake Radio Site, Holm Powerhouse, and Kirkwood Powerhouse. It should be noted that there is an existing aerial fiber optic cable installed on a primary distribution line between Intake Radio Site and Intake Switchyard that provides service to the existing communication equipment (voice and SCADA radios) at Intake Radio Site. This line would be left in place as a potential backup to the new OPGW line.

Stringing operations would require equipment located on the ground within the existing right-of-way of the transmission line. A helicopter may be employed in this process, at the discretion of the construction contractor and the appropriate regulatory personnel.

The existing 30-foot communication tower would not be removed. With the exception of the aerial fiber optic service entrances from Intake Radio Site, Holm Powerhouse, and Kirkwood Powerhouse, all other work at this site would be internal to the switchyard control building and within existing developed areas. This site would be accessed by an existing paved road that would not require any grading. No new fencing is proposed.

Holm Powerhouse (HPH)

The purpose of the upgrade at this site would be to transmit communications as well as video from Holm Powerhouse to Intake Switchyard.

Facilities

The existing fiber optic equipment between Holm Powerhouse and Intake Switchyard would be replaced.

Construction

The existing fiber optic equipment communicating with Intake Switchyard would be replaced with new fiber optic equipment and interfaced to the new fiber optic cable discussed above. All work at this site, with the exception of the installation of a replacement aerial fiber optic cable service entrance from Intake Switchyard, would be internal to the powerhouse building (see Figures 2-1, 2-11, and 2-13 for location).

This site would be accessed by an existing paved road. All project-related actions at Holm Powerhouse would occur within existing developed areas. No new fencing is proposed.

Kirkwood Powerhouse (KPH)

The purpose of the upgrade at this site would be to transmit communications as well as video from Kirkwood Powerhouse to Intake Switchyard.

Facilities

The existing fiber optic equipment between Kirkwood Powerhouse and Intake Switchyard would be replaced.

Construction

All work at this site, with the exception of the installation of a second aerial fiber optic cable service entrance from Intake Switchyard, would be internal to the powerhouse building (see Figures 2-1, 2-11, and 2-14 for location). The existing fiber optic equipment communicating with Intake Switchyard would be replaced with new fiber optic equipment and interfaced to the new fiber optic cable discussed above. This site would be accessed by an existing paved road. All project-related actions at Kirkwood Powerhouse would occur within existing developed areas. No new fencing is proposed.

O'Shaughnessy Dam Sites

These are remote sites that require communications for HHW&P operations. The O'Shaughnessy Dam sites include O'Shaughnessy Dam Gallery, O'Shaughnessy Dam Diversion Tunnel, O'Shaughnessy Water Quality Building, O'Shaughnessy Chalet (Cottage 1), O'Shaughnessy Watershed Keeper's Office/Residence (Cottage 4), O'Shaughnessy Bunkhouse, O'Shaughnessy Water Tanks, and O'Shaughnessy Stream Gauge.

Facilities

The O'Shaughnessy Dam Gallery site would require the installation of a parabolic antenna to allow communication with the microwave backbone at Burnout Ridge via the repeater at Poopenaut Pass and would be the distribution point for services available on the communication system to the various facilities located at O'Shaughnessy. All sites at O'Shaughnessy Dam will be connected via fiber optic cable to the O'Shaughnessy Dam Gallery, with the exception of the O'Shaughnessy Stream Gauge, which will communicate with Poopenaut Pass via a 900 MHz spread spectrum radio connection.

Construction

All project-related actions at the O'Shaughnessy Dam sites would occur within existing developed areas with the exception of the actions at the O'Shaughnessy Stream Gauge which would require access via an existing hiking trail and tyrolean-style river crossing cable car. No new fencing is proposed at any of the O'Shaughnessy Dam sites (see Figures 2-1, 2-20, 2-22 through 2-23 for location).

At the O'Shaughnessy Dam Gallery site, a parabolic antenna would be installed behind the middle window of the dam gallery. This antenna would not be visible from outside of the dam gallery. This

would require replacement of the window with a new window frame covered with an opaque sheet of material designed to sheet water and not attenuate microwave signals. No outdoor infrastructure work would be performed at this site. This site would be accessed by an existing paved road.

At the O'Shaughnessy Dam Diversion Tunnel, fiber optic communication equipment would be installed inside the tunnel at this site, and would be served via fiber optic cable in new conduit installed inside the tunnel between the O'Shaughnessy Dam Gallery and the tunnel. As such, no outdoor infrastructure work would be performed at this site. This site would be accessed by an existing dirt road that would not require any grading.

At the O'Shaughnessy Stream Gauge site located along the Tuolumne River below the dam, a rigid galvanized steel (RGS) conduit antenna mast would be installed on the structure to support a solar panel and Yagi antenna. The mast would be attached to the existing stream gauge structure at this location and the new HHW&P radio equipment would be located inside this structure. This site would be accessed by an existing dirt road then a foot trail, and then a tyrolean-style river crossing cable car.

Communication equipment would be installed in a wall-mounted cabinet on the exterior of the building at the O'Shaughnessy Watershed Keeper's Office/Residence and O'Shaughnessy Bunkhouse sites. Fiber optic cable would be routed underground in new conduit around the perimeter of the Bunkhouse building via trenching in order to locate the cabinet in a less prominent location at the rear of the building. Wall-mounted cabinets would be installed on the interior of the building at O'Shaughnessy Water Quality Building and O'Shaughnessy Water Tanks sites. A wall-mounted cabinet would be installed in the building crawl space of the O'Shaughnessy Chalet (Cottage 1) site. With the exception of the wall-mounted cabinets, and the installation of conduit from the cabinet to the existing underground conduit system, no outdoor infrastructure work would be performed at these sites. The O'Shaughnessy Water Quality Building, O'Shaughnessy Watershed Keeper's Office/Residence, and O'Shaughnessy Bunkhouse sites would be accessed by existing paved roads. The O'Shaughnessy Chalet (Cottage 1) and O'Shaughnessy Water Tanks sites would be accessed by existing dirt roads.

Cherry Lake Sites

These are remote sites that require communications for HHW&P operations. The Cherry Lake Sites include Cherry Tower Site, Cherry Valve House, Cherry Pump Station, Cherry Water Tanks, Cherry Lake Garage and Warehouse, Cherry Lake Camphouse, Cherry Lake Cottage #1 (Watershed Keeper's House), Cherry Lake Cottage #2 (Watershed Keeper's Office), Cherry Lake Cottage #3, and Cherry Lake Cottage #4. The new Cherry Tower Site, discussed in Section 2.3.1, would communicate with the microwave backbone at Burnout Ridge and would be the distribution point for services available on the communication system to the various facilities located at Cherry Lake. The Cherry Lake Sites support the operation of Cherry Reservoir, which is an impound reservoir that is used to primarily satisfy inflow obligations to the Turlock Irrigation District and Modesto Irrigation District; maintain minimum streamflow releases below the reservoirs; produce hydroelectric power at Holm Powerhouse; and provide flows for recreational use (i.e. whitewater recreation) (SFPUC 2006b).

Facilities

Cherry Pump Station and Cherry Water Tanks would include the installation of antennas so that these sites can communicate with each other. Installation of communication equipment served by fiber optic cable would be required at Cherry Tower Site, Cherry Valve House, Cherry Lake Garage and Warehouse, Cherry Lake Camphouse, Cherry Lake Cottage #1 (Watershed Keeper's House), Cherry Lake Cottage #2 (Watershed Keeper's Office), Cherry Lake Cottage #3, and Cherry Lake Cottage #4.

Construction

All project-related actions at the Cherry Lake sites would occur within existing developed areas, with the exception of the Cherry Water Tanks, which would require a minor amount of native vegetation clearing for trenching and placement of fiber optic conduit. Trenching would occur along 175 linear feet from the existing power pole to the edge of the developed area of the Cherry Water Tanks to install the secondary electrical line. The area of disturbance would be approximately 1,750 sq. ft. for the clearing and trenching. No new fencing is proposed at any of the existing Cherry Lake sites (see Figures 2-1, 2-15, 2-17 and 2-18 for location).

An RGS conduit antenna mast would be installed at Cherry Pump Station and Cherry Water Tanks to support a Yagi antenna for communications between these two sites. At Cherry Pump Station, the mast would be attached to the existing pump station building and the communication equipment would be located inside the building. At the Cherry Water Tanks, the masts would be attached to the one of the existing tanks and the communication equipment would be located inside the control building at this site. The Cherry Water Tanks site would be connected to the proposed Cherry Tower Site via aerial fiber optic cable installed on an existing HHW&P overhead electrical distribution line between the sites. At the Cherry Water Tanks site, the aerial fiber optic cable would be routed underground (via trenching) in new conduit to the control building. The Cherry Water Tanks site would be accessed by an existing dirt road. The Cherry Pump Station site is seasonally accessed by vehicle, boat, or hiking trail. This site is accessible by vehicle when Cherry Lake's level is down. However, when it is above a certain levels, it would be accessed by foot via an existing trail or by boat via the lake.

At the Cherry Valve House and Cherry Lake Garage and Warehouse sites, communication equipment would be installed inside the buildings, and would be served via aerial fiber optic cable installed on an existing HHW&P electrical distribution line between these sites and the Cherry Tower Site. At these sites, the aerial fiber optic cable would be routed underground in new conduit to the Cherry Valve House and Cherry Lake Garage and Warehouse sites via trenching. With the exception of the riser conduit on the electrical distribution line pole and the installation of underground conduit from the riser to the valve house and warehouse, no outdoor infrastructure work would be performed at these sites. Cherry Valve house would be accessed by an existing dirt road and Cherry Lake Garage and Warehouse would be accessed by an existing paved road. New underground fiber optic cable in conduit would be installed via trenching to serve the four cottages and camphouse (see paragraph below).

Communication equipment would be installed in a wall-mounted cabinet on the exterior of the buildings at the Cherry Lake Camphouse, Cherry Lake Cottage #1 (Watershed Keeper's House), Cherry Lake Cottage #2 (Watershed Keeper's Office), Cherry Lake Cottage #3, and Cherry Lake Cottage #4. These

sites would be served via fiber optic cable in underground conduit from the Cherry Lake Garage and Warehouse. Conduit would be installed from the wall-mounted cabinet to the underground conduit system via trenching. These sites would be accessed by an existing paved road that would not require any grading.

Lake Eleanor Sites

These are remote sites that require communications for HHW&P operations. The Lake Eleanor Sites consist of the Lake Eleanor Dam Level Gauge and the Lake Eleanor-Cherry Lake Tunnel.

Facilities

Lake Eleanor Dam Level Gauge would include the installation of two antennas, one to communicate with Burnout Ridge and the other to repeat signals from Burnout Ridge to Lake Eleanor-Cherry Lake Tunnel. Lake Eleanor-Cherry Lake Tunnel would include the installation of an antenna to allow communication to Burnout Ridge via the repeater at Lake Eleanor Dam Level Gauge.

Construction

At the Lake Eleanor Dam Level Gauge, a pad-mounted communication cabinet would be installed with a RGS conduit antenna mast supporting a solar panel and two Yagi antennas. This site would be accessed by an existing dirt road (see Figures 2-4, 2-15, and 2-19 for location) that would not require any grading. All project-related actions at the Lake Eleanor Dam Level Gauge site would occur within existing developed areas.

At the Lake Eleanor-Cherry Lake Tunnel site, a pad-mounted communication cabinet would be installed with RGS conduit antenna mast supporting a solar panel and Yagi antenna (see Figures 2-4, 2-15, and 2-19 for location). Ground disturbance would be approximately 24 sq. ft. for the installation of the concrete equipment pad. This site is seasonally accessed by vehicle, boat, or hiking trail. This site is accessible by vehicle when Cherry Lake's level is down. However, when it is above a certain levels, it would be accessed by foot via an existing trail or by boat via the lake.

2.3.1.3 Operations and Maintenance

Once construction has been completed, HHW&P staff would visit all project sites at a predetermined frequency to perform maintenance work. None of the communication sites (other than sites that are already staffed; that is, powerhouses and the various buildings at O'Shaughnessy and Cherry Campuses) would be staffed facilities, as none of the equipment installed on this project would require staffed operation.

Warnerville Switchyard has a maintenance and operations facility just east of the site and therefore has staff in and out often. Burnout Ridge, Intake Radio Site, and Moccasin Peak would have emergency generators on-site. This would require propane trucks to refuel the generators as needed. Maintenance personnel would also visit these sites at a predetermined frequency to perform work.

Batteries would be located at Moccasin Peak, Burnout Ridge, Intake Radio Site, Cherry Tower Site and Poopenaut Pass to allow operation in the event of prime power failure. These sites would require annual visits during the summer to temporarily remove batteries for testing and/or replacement, and another site visit for maintenance work. Test equipment would probably include frequency generating equipment, frequency counters, data monitoring equipment, and a two-way radio service monitor.

Visits to any of the sites would be necessary in the event of problems (i.e. repair lightning damage); however, this likely would be an infrequent activity.

2.3.1.4 Burnout Ridge Access Road Maintenance

An estimated 1.5 miles of Road 1N86 would be subject to road maintenance to facilitate use associated with this project. Approximately 1.2 miles of Road 1N86 crosses privately owned land and 0.3 mile is on USFS land. On the USFS portion, most maintenance work would be confined to cutting or trimming of trees and brush for increased visibility of road signage, blading of roads to smooth road surface and opening ditches and culverts to maintain road drainage. Slash generated by the road maintenance work would be disposed by chipping, scattering, or piling and burning. Post-treatment monitoring of project areas would occur to detect any new or spreading of existing noxious weed populations, in accordance with the Noxious Weed Risk Assessment prepared for this project.⁶

2.4 OVERVIEW OF THE ALTERNATIVES

2.4.1 Alternative 1 – No Action

Under the No Action Alternative, the replacement and upgrade of the aging communication system would not occur. This alternative would result in:

- Continued insecure position of HHW&P's license to operate the communication system.
- Continued deterioration of the aging communication system and use of equipment no longer supported by its manufacturers.
- Continued need to upgrade the communication system and voice communications capabilities in very remote areas.
- Lack of video, control, and data channels to monitor and assess security, and no access to existing administrative and future control system networks.
- Continued need for improved radio communications vital to operation and security of HHW&P's utilities and support of USFS and National Park Service operational activities.
- No improved infrastructure to allow for possible future integration of HHW&P, NPS, and USFS communications.

⁶ This is on file at the San Francisco Planning Department, Yosemite National Park, and Stanislaus National Forest Groveland Ranger District and available for public review as part of the project file.

2.4.2 Alternative 2 – Preferred Alternative: Poopenaut Pass Site 9, Burnout Ridge, Cherry Tower Site

Alternative 2 proposes the replacement and upgrade of the aging and obsolete communication system with an improved system; vacating the 2 GHz band per FCC requirements; expansion of system coverage in the O’Shaughnessy, Cherry Lake, and Lake Eleanor areas beyond existing coverage; and to improve infrastructure to allow for potential future integration of HHW&P, NPS and USFS communications. The details of the Proposed Action/Preferred Alternative are described in detail in Section 2.2 of this document. The preferred alternative would locate the Poopenaut Pass site facility at Site 9.

2.4.2.1 USDA Forest Service Proposed Action

The Proposed Action of the USFS consists of a Forest Plan amendment and Special Use Permit for the Burnout Ridge site. Duckwall Mountain and Jones Point are sites outside of the Raker Act right-of-way and currently operating under a Special Use Permit from the USFS. The Forest Plan amendment would be in the form of a map that depicts the Burnout Ridge site and its boundaries as a designated telecommunications site. This map would be included as part of the decision document and would also be included in the Forest Plan.

The Proposed Action of the USFS also consists of the decommissioning of Jones Point and termination of the Special Use Permit associated with this site for HHW&P, which would no longer be needed. HHW&P is one of several tenants at the Duckwall Mountain site. Duckwall Mountain as a communication site would remain after the HHW&P FCC-licensed microwave equipment, antennas, and antenna feed system is removed. The USFS will work with HHW&P and the remaining Duckwall Mountain communication site tenants to determine who will become the new Special Use Permit Holder at that site. While HHW&P would no longer need a repeater at Jones Point and the existing microwave equipment, shelter, communication tower, antennas, and antenna feed system would be removed following construction and installation of equipment at the Burnout Ridge and Intake Radio Sites. Please refer to Table 2-1 and Section 2.3 for details of the project components.

Under the Special Use Management Non-Recreation (8-C) Land Management Practices in the Forest Plan as amended, the direction is to review and process applications and administer authorization for non-recreation special uses. This category is applicable for all special-use authorizations of a non-recreational nature, which includes water lines, electronic sites, power lines and telephone lines within established corridors or to individual sites, road uses and special events.

2.4.2.2 USDO National Park Service Proposed Action

The Proposed Action of the NPS consists of issuance of a land use entitlement (right-of-way permit) for the Poopenaut Pass site.

Please refer to Table 2-1 and Section 2.3 for details of the project components.

The overall operation and maintenance of the facilities in Yosemite National Park will be provided solely by HHW&P.

The NPS does not require an amendment to the Yosemite General Management Plan because the uses are consistent with the Natural Environment Subzone. This subzone specifies that roads, picnicking areas, and trailheads are permitted and that development will be minimal. As a result, the sole action of the NPS is to permit use of NPS sites for the proposed facilities and their operation.

2.4.3 Alternative 3 –Poopenaut Pass, Site 7

Alternative 3 proposes essentially the same system as the Preferred Alternative, except the Poopenaut Pass facility would be located at Site 7 as shown in Figure 2-24. As described in Section 2.5.6, nine possible sites were identified in the Poopenaut Pass area. Site 7 was selected as an alternative location for the Poopenaut Pass facility. Site 7 is located northwest of Site 9 (the Preferred Poopenaut Pass location), on a flat rock outcrop area across O'Shaughnessy Dam Road.

Site 7 is primarily a flat rock outcropping with sufficient flat areas for construction of both the communication shelter and tower foundations. As such, little site preparation would be necessary at this site. The foundation for the communication shelter may be slab on grade, piers, or a foundation curb and may be pinned to the rock outcroppings at the site.

It is anticipated that the tower and shelter sections would be delivered by truck to the existing H2 vehicular turnout and lifted by sky crane (helicopter) to the tower location where they will be assembled. It is also anticipated that helicopters would be used to transport a portable generator, air compressor, and other equipment and tools to the site for use in site preparation and construction.

The Proposed Action by the NPS and USFS would be the same as Alternative 2.

2.5 ALTERNATIVES CONSIDERED BUT DISMISSED

Several alternatives to the Proposed Action were considered during the planning process, but were not subject to detailed analysis because they would not feasibly meet the objectives of the Proposed Action. These alternatives are described below, along with the reasons they were dismissed from detailed analysis.

2.5.1 Alternative Site Locations

During early planning stages, HHW&P had identified three candidate sites, in addition to Burnout Ridge, as potential repeater sites. The sites were Duckwall Mountain, North Mountain and Woods Ridge. These sites are discussed individually below. The Inspiration Point site was originally identified as one of the new sites for the project but was replaced by the Poopenaut Pass site. Elimination of the Inspiration Point site is discussed below.

For a detailed description of the site selection process, as well as a comparison between a full fiber-optic system, a full microwave system, and the resulting combination fiber-optic/microwave system, see *Planning and Study Phase Report for Hetch Hetchy Microwave Replacement* (Timberline 2004).

The following alternative site locations were considered but dismissed for one of the following reasons:

- The action does not satisfy the project's purpose and need;
- The site did not have line-of-sight visibility to other areas;
- Not accessible year around; and/or,
- Repeater sites did not have access to utility power.

2.5.2 Duckwall Mountain

Duckwall Mountain is an existing microwave repeater site used by HHW&P and several other tenants. However, analysis indicated that the line of sight between Duckwall Mountain and the Cherry Tower Site and Lake Eleanor Dam Level Gauge are blocked and unusable. Therefore, Duckwall Mountain is not useful as a repeater into the Cherry and Eleanor areas. However, HHW&P equipment at Duckwall would remain in place and HH&WP would continue to act as site manager.

Burnout Ridge is the proposed site to replace Duckwall Mountain and provide coverage into the Cherry Lake and Lake Eleanor areas. This allows the selection of Intake Radio Site to replace Jones Point. These selections allow HHW&P to abandon two solar powered, FCC-licensed microwave sites currently in use at Duckwall Mountain and Jones Point, in favor of the one site, Burnout Ridge. With this configuration, all of the repeater sites would be more accessible year-round, and would have utility power rather than solar power.

2.5.3 North Mountain

North Mountain has an existing lookout tower and is a prominent feature in the general area of interest. Because the site has already been developed, further development as a repeater site was considered to have low impact on the environment. While North Mountain has line-of-sight to Poopenaut Pass, Intake Radio Site, and the Lake Eleanor area, it does not have line-of-sight to Cherry Tower Site. Therefore, North Mountain would not be useful as a repeater into the Cherry Lake area, and was dismissed from further consideration. Furthermore, North Mountain does not have line-of-sight to Moccasin Peak or O'Shaughnessy Dam, eliminating it from consideration for other paths.

2.5.4 Woods Ridge

Woods Ridge has an existing lookout tower and is a prominent feature in the general area of interest. While Woods Ridge has line-of-sight into Intake Radio Site and Moccasin Peak, it does not have line-of-sight into Cherry Tower Site or Lake Eleanor area; therefore, Woods Ridge would not be useful as a repeater into the Cherry and Eleanor areas, and was dismissed from further consideration.

2.5.5 Inspiration Point

The Inspiration Point site (subsequently identified as Site 8 of the Poopenaut Pass alternatives in Figure 2-24) was initially chosen as a site because it would provide communication into the O'Shaughnessy Dam area. This site was originally selected because it would have a line-of-sight to O'Shaughnessy Dam Gallery, Burnout Ridge, and Intake Radio Site with a 30-foot communication tower. It has suitable area to construct a communication tower and associated shelter. It is close to an existing electrical distribution

line, paved access road and vehicle turnout; and is not highly visible from the O'Shaughnessy Dam Road. However, subsequent research determined that the Inspiration Point site was located within the Yosemite National Park Wilderness boundary, and the NPS discouraged further consideration of the use of this site since the evaluation process regarding use of this site could be lengthy with an uncertain outcome. Ultimately, the Poopenaut Pass Site 9 was selected instead.

2.5.6 Poopenaut Pass Sites

Before determining the preferred Poopenaut Pass site, the NPS began with the identification of nine sites in the Poopenaut Pass Area (Figure 2-24). Siting criteria for the Poopenaut Pass site within Yosemite National Park included the following:

- Line-of-sight visibility to Burnout Ridge and O'Shaughnessy Dam
- Outside of Yosemite National Park Wilderness Area
- Large enough for a communication tower and equipment shelter
- Limited visibility from public viewing locations
- Proximity to existing electrical distribution line to avoid the need for further infrastructure; and
- Proximity to existing road and turnout to allow for easy maintenance access

In a report entitled "Poopenaut Pass Special Report for Hetch Hetchy Microwave Replacement" dated August 19, 2005 (August 2005 Report), Timberline Engineering, Inc. outlined the need for a microwave radio repeater site located in an area of Yosemite National Park generally described as the "Poopenaut Pass area." The report described several sites identified by SFPUC and NPS staff for consideration as the microwave radio repeater site. Subsequent to the issuance of the August 2005 Report and during a site visit to the Poopenaut Pass area on December 6, 2005, conducted as part of the internal scoping phase of the NEPA process, NPS staff identified another site for consideration. This site was initially described as "Steve #11" but was subsequently changed to "Site 5" to be consistent with nomenclature in the August 2005 Report. In early 2006, the project entered the public scoping phase of the NEPA process. After the public scoping process, another site was identified for consideration. This site was initially identified as Site 5C, but was subsequently changed to Site 9. Site 9 was not yet identified during the public scoping period. However, public comments indicated a preference for the least visually intrusive sites.

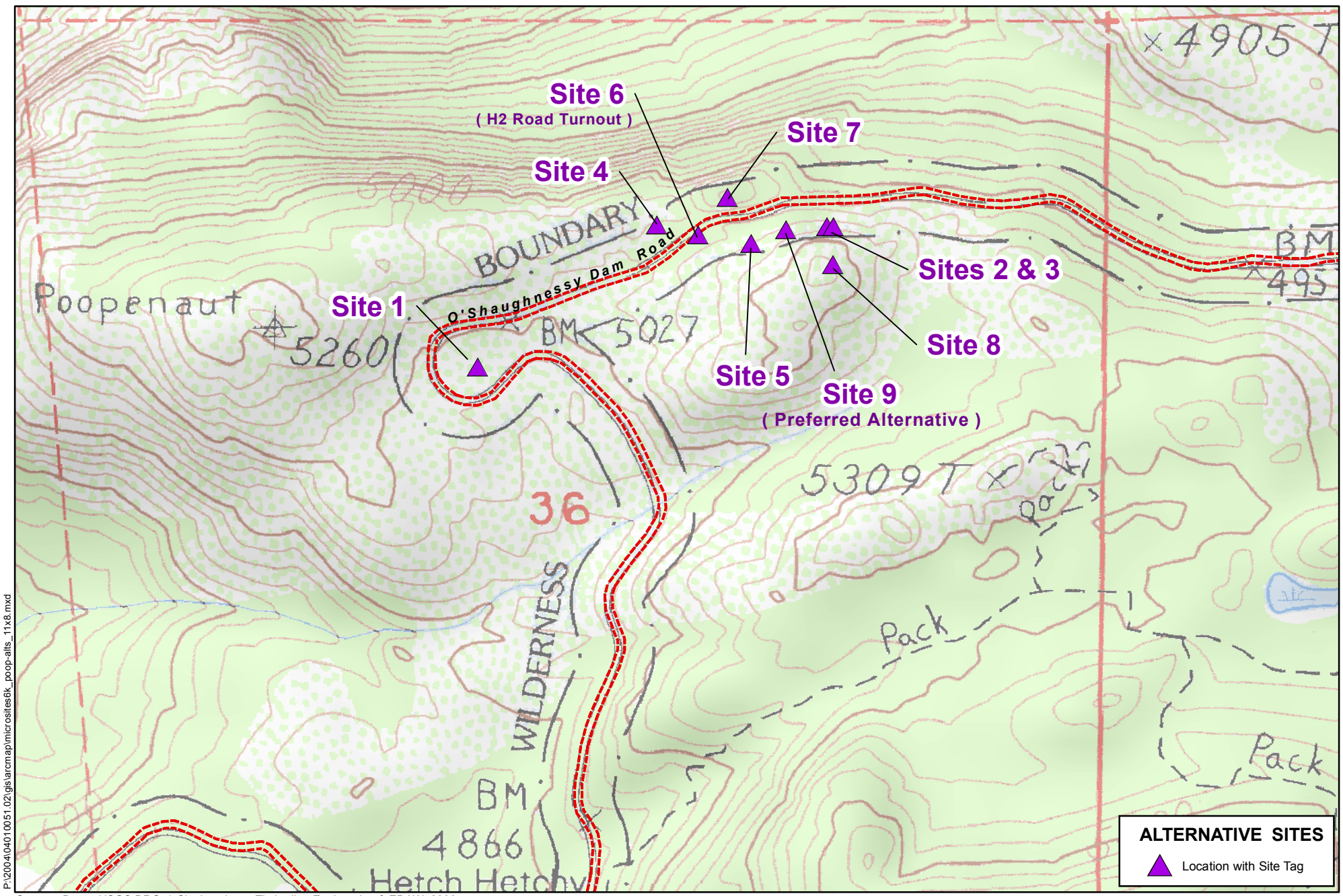
Following the close of the public scoping process and review of comments from this process, SFPUC and NPS staff identified the sites that would become formal alternatives for more detailed analysis. These sites were Site 7 and Site 9.

During a site visit to the Poopenaut Pass area on June 1, 2006, HHW&P and NPS staff determined that there were little or no advantages to Site 5 in comparison to Site 9, and since Site 9 was identified as

having slightly lower visibility, Site 5 was dismissed from further consideration. Accordingly, the three sites identified for more detailed analysis in the August 2005 report were Site 6, Site 7, and Site 9.⁷

Because this new site would be located within Yosemite National Park, the NPS Management Team was required to review the three sites to determine which site would be the preferred alternative. The NPS chose Site 9 as the preferred alternative because they felt it was the least visually intrusive of the feasible sites.

⁷ An additional report, *Poopenaut Pass Area Alternatives Supplemental Information for Hetch Hetchy Microwave Replacement Project*, (June 12, 2006) by Timberline Engineering was developed to provide additional information on Sites 6, 7, and 9 and as a supplement to the August 2005 Report.

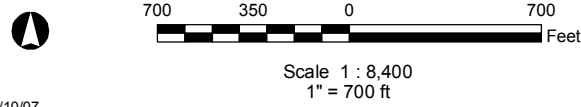


Source: Base: USGS DRG / Site locations: Timberline Engineering & EDAW 2006

Note: This map is for general locating purposes only.
Raker Act right of way boundaries not shown.

Poopenaut Pass Alternatives

Figure 2-24



2.5.7 Alternative Communication Systems/Technology

The use of fiber optics was considered a favored alternative by HHW&P at one point due to the high channel capacity provided by fiber optics (Timberline 2004). However, it was determined that the required channel capacity would be met with either microwave radios or fiber optics (Timberline 2004). Operational concerns about fire-related damage to aerial fiber optic cable were a factor in the selection between fiber optics and microwave systems based on life cycle cost (Timberline 2004). The use of underground fiber optics would be limited to short segments of the system where there is no option to install overhead fiber optic cables. The use of overhead fiber optic is also limited to routes that have transmission lines. This is due to the fact that transmission lines are kept clear of brush and provide the option of installing the fiber optic cable at a higher height than distribution lines.

2.5.8 Alternative Tower Designs

Alternative tower designs include lattice or monopole designs. Self-supporting lattice tower structures were identified to be preferable to monopoles in the Timberline report. Monopoles may be used at locations with footprint space limitations, but should be equipped with an external cable ladder to facilitate installation of antenna feed systems in the future (Timberline 2004). Several of the sites would require installation of a new tower. A monopole was selected for the Moccasin Powerhouse site because a lattice type tower structure would have a larger footprint and could not be located in the desired area without affecting vehicle traffic in the area (Timberline 2004). Cherry Tower Site, Burnout Ridge, and Poopenaut Pass are proposed to have lattice towers, as there is sufficient room to accommodate the structures.

2.6 COMPARISON OF ALTERNATIVES

The three alternatives (including No Action) in this document represent a reasonable range of options for the Hetch Hetchy Communication System Upgrade Project. Table 2-2 provides a summary comparison of the potential impacts associated with each of the alternatives, based on the environmental analysis provided in Section 3.0.

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
Geology, Geohazards and Soils			
	No new sites or construction -related ground disturbance would occur.	Implementation of this alternative would result in construction-related ground disturbance at Intake Radio Site, Poopenaut Pass, Cherry Tower Site, and Burnout Ridge. This includes trenching along the Burnout Ridge access road and Poopenaut Pass access trail. Implementation of construction BMPs and mitigation measures would reduce impacts to less than significant levels. Upgrades at most sites would be in existing developed areas.	Same impacts as Alternative 2.
Hydrology, Floodplains, and Water Quality Affected Environment			
	No new sites or construction-related ground disturbance would occur.	Implementation of this alternative would result in an increase in impervious surfaces from new sites. Implementation of construction BMPs and Mitigation Measures 1, 2, and 3 – Hydrology, would reduce hydrology impacts to less than significant levels.	Same impacts as Alternative 2.
Vegetation			
	No new sites or construction-related ground disturbance would occur. No impacts to vegetation would occur.	Implementation of this alternative would disturb vegetation where new sites would be built from ground disturbance and vegetation clearing. Vegetation to be cleared at Intake Radio Site is primarily non-native grassland	Same impacts as Alternative 2.

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
		with some interspersed native grasses and wildflowers. Vegetation to be cleared at Burnout Ridge consists of approximately seven trees, shrubs, and native and non-native grasses. Limited vegetation removal at the Poopenaut Pass site would occur. No significant impacts to vegetation would occur. Implementation of Mitigation Measure 1 – Vegetation, at these sites would prevent the introduction of noxious weeds.	
Wildlife			
	No new sites or construction-related ground disturbance would occur. No impacts to wildlife would occur.	Implementation of this alternative would result in short-term, direct impacts as a result of these activities which could include temporary disturbances to foraging, movement, and reproductive activities, and temporary displacement of wildlife species at the new sites. No impacts to wildlife habitat composition or structure would occur at existing developed sites. The new communication towers would meet US Fish & Wildlife Service (USFWS) guidelines for siting and design and therefore, the risk of avian collisions is expected to be low and not likely to affect the viability of common species.	Same impacts as Alternative 2.
Sensitive, Rare, Threatened, and Endangered Species			
	No new sites or construction-related ground disturbance would occur. No impacts to rare, threatened, and	Implementation of this alternative could result in impacts to special-status species. The new communication towers would meet USFWS	Same impacts as Alternative 2.

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
	endangered species would occur.	guidelines for siting and design and therefore, the risk of avian collisions is expected to be low and not likely to affect the viability of special-status species. Implementation of Mitigation Measure 1 - Vegetation: Protect Known Occurrences of Special-status Plant Species, and Mitigation Measure 2 — Wildlife: Protect Active Spotted Owl and Northern Goshawk Nest Sites, would reduce impacts to less than significant levels.	
Air Quality			
	Additional trips and construction would not occur. No impacts to air quality would occur.	Implementation of this alternative would result in short-term impacts to air quality from construction related activities. Implementation of BMPs and compliance with applicable regulations would reduce construction related impacts to less than significant levels.	Same impacts as Alternative 2.
Noise			
	Additional trips and construction would not occur. No impacts to noise would occur.	Implementation of this alternative would result in short-term impacts to noise from construction- related activities. Implementation of BMPs and Mitigation Measure 1 and 2 – Noise, would reduce construction related impacts to less than significant levels.	Same impacts as Alternative 2.

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
Cultural Resources			
	<p>No new sites or construction-related ground disturbance would occur. No impacts to archaeological resources would occur.</p>	<p>Implementation of this alternative would result in no effects to archaeological sites as the project sites do not contain known archaeological resources. Buried resources could be discovered during ground disturbing construction activities at the new sites. Implementation of Mitigation Measure 1 – Undocumented Cultural Resources, would reduce impacts to less than significant levels.</p> <p>Implementation of this alternative would result in the addition of communication equipment to existing structures. However, the proposed project would not have direct or adverse effects on historic buildings, structures, or landscapes. No mitigation measures for architectural resources are required.</p> <p>Buried resources could be discovered during ground disturbing construction activities at the new sites. Implementation of Mitigation Measure 2 – Human Remains, Compliance with US Forest Service Cultural Resources Management Practice would reduce impacts to less than significant levels.</p> <p>Implementation of Mitigation Measure 3 – Traditional Cultural Properties, would complete the Section 106 consultation process.</p>	<p>Same impacts as Alternative 2.</p>

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
Land Use			
	No new sites or construction-related ground disturbance would occur. No impacts to land use would occur.	Implementation of this alternative would result in the construction of new sites. Land uses at existing sites would not change. A Forest Plan Amendment for the new US Forest Service sites and implementation of a Mitigation Measure 1 – Land Use, to reduce impacts between the Poopenaut Pass site and the Wilderness Boundary area would reduce impacts to less than significant.	Same impacts as Alternative 2.
Visual/Scenic Resources			
	No new sites or construction-related ground disturbance would occur. No impacts to visual/scenic resources would occur.	Implementation of this alternative would result in construction of new sites and installation of new equipment. No significant visual/scenic impacts would occur. Implementation of Mitigation Measure 1 – Visual, would reduce visual/scenic impacts to less than significant levels.	Same impacts as Alternative 2 except at alternate Poopenaut Pass site. Implementation of this alternative would introduce a human-made feature into the visual landscape that would be more visible than Alternative 2.
Visitor Experience and Recreation			
	Parts of the existing communication system are obsolete now while other parts are aging; timely replacement and upgrades will ensure continued support of operational activities such as law enforcement, search and rescue, fire management, and visitor and staff safety.	Implementation of Mitigation Measure 1 – Visitor Experience and Recreation, would reduce visitor experience and recreation impacts to less than significant levels at the Poopenaut Pass and Cherry Tower Site areas during construction periods.	Same impacts as Alternative 2.

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
Transportation			
	No additional trips would be generated. No impacts to transportation would occur.	Implementation of the Proposed Action would result in a short-term increase in traffic at the new sites from construction related traffic. Implementation of Mitigation Measure 1 – Transportation, would reduce construction related impacts at the new sites to less than significant levels.	Same impacts as Alternative 2.
CEQA Specific			
Population and Housing			
	N/A	Implementation of the Proposed Action would not induce substantial population growth because new homes or businesses or extension of major infrastructure are not proposed or needed. Impacts to population growth would not occur.	N/A
Utilities and Service Systems			
	N/A	Implementation of the Proposed Action would not require wastewater treatment, sewer, or water supply system. The new sites would not require a significant amount of electricity to operate and would result in less than significant impacts to utilities service systems, specifically electricity.	N/A

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
Public Services			
	N/A	None of the upgrades would require new public service facilities, increased staffing, or result in the need for residential development; and therefore would not result in an increased demand for fire and police protection; or additional demand for schools, parks, or other public services.	N/A
Hazards and Hazardous Materials			
	N/A	Implementation of the Proposed Action would result in construction activities at all of the project sites that would require the use of certain potentially hazardous materials such as fuels, oils, and solvents. Construction activities could result in accidental spills. Implementation of mitigation measures would reduce impacts from hazards and hazardous materials to less than significant levels.	N/A
Mineral and Energy Resources			
	N/A	Implementation of the Proposed Action would not result in the loss of locally or regionally important mineral and energy resources. No impacts would occur to mineral resources and the project would not encourage activities that would result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner.	N/A

Table 2-1 Summary of Environmental Consequences

Resource Area	Alternative 1 No Action	Alternative 2 Preferred Alternative	Alternative 3 Poopenaut Pass Alternative Site
Agricultural Resources			
	N/A	Implementation of the Proposed Action would not convert any farmland or conflict with Williamson Act contracts. No impacts to agricultural resources would occur.	N/A

2.7 ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The Council on Environmental Quality regulations implementing NEPA, and the NPS and USFS NEPA guidelines require that “the alternative or alternatives which were considered to be environmentally preferable” be identified (CEQ Regulations, Section 1505.2). Environmentally preferable is defined as “the alternative that will promote the national environmental policy as expressed in NEPA, Section 101. Ordinarily this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources” (CEQ 1981).

Regarding the environmentally preferable alternative, Section 101 of NEPA states:

“... it is the continuing responsibility of the Federal government to ... (1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieve a balance between population and resource use, which will permit high standards of living and a wide sharing of life’s amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.”

Section 101 Requirement (1): fulfill the responsibilities of each generation as trustee of the environment for succeeding generations

Alternatives 2 and 3 would fulfill the responsibilities of NPS and USFS as trustees of the environment. The project components do not include actions related to natural resources such as hydrology or geology. However, both Alternatives would provide the foundation system that could allow for improved radio communications into areas currently not served, or adequately served. Most project actions would occur within existing developed areas and therefore would not result in impacts to natural resources. Construction at new sites would require implementation of BMPs and mitigation measures to reduce impacts to natural resources. Alternative 1 would not provide the benefit of an improved communication system that could help operational activities of NPS, USFS and HHW&P, nor replace aged and obsolete equipment, or provide the communication system needed to meet future operational needs.

Section 101 Requirement (2): assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings

Alternatives 2 and 3 would provide improved communication systems that would support operational activities for Yosemite National Park, Stanislaus National Forest, and HHW&P. This in turn would provide for improved safety and voice communications in remote areas. Trails, interpretive exhibits, or cultural resources would not be impacted by the Proposed Action and the visual impacts of the new sites are assessed in this document. The Poopenaut Pass site in Alternative 2 would be less visually intrusive than the Poopenaut Pass site in Alternative 3, since it would be located behind a popular viewpoint area

and thus would not obstruct views. Alternative 1 would not have any adverse aesthetic effects but also would not replace obsolete aging equipment or provide improved safety, security, and voice communications for NPS, USFS and HHW&P staff if it were to continue operating in the existing configuration.

Section 101 Requirement (3): attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences

Alternatives 2 and 3 would attain the widest range of beneficial uses of the environment. Alternative 2 would also have the less visually intrusive site at Poopenaut Pass, while providing an improved communication system that would protect the safety of visitors and staff. Alternative 1 would not provide these benefits if it were to continue operating in the existing configuration because the aged and obsolete communication equipment would not be replaced.

Section 101 Requirement (4): preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice

Project actions for both Alternatives 2 and 3 at the existing sites would occur within existing developed areas. Burnout Ridge, Poopenaut Pass, and Cherry Tower site would be new sites. Alternatives 2 and 3 include a cultural and biological resources study and the implementation of mitigation measures identified in this EA/IS which would reduce impacts to biological and cultural resources to less than significant levels. Alternative 1 would not impact these resources, but would not create any benefits in relation to the Purpose and Need of the proposed project.

Section 101 Requirement (5): achieve a balance between population and resource use, which will permit high standards of living and a wide sharing of life's amenities

Alternatives 2 and 3 would provide improved communication systems, which would support operational activities for Yosemite National Park, Stanislaus National Forest, and HHW&P. The Proposed Action would allow for voice communications to protect the safety of staff in very remote areas, and data communications to support the next generation of protective equipment. The support of operational activities include law enforcement, search and rescue, and fire management, which all play a role in visitor and staff safety and the protection of forest and park resources. Alternative 1 would not provide these benefits if it were to continue operating in the existing configuration.

Section 101 Requirement (6): enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources

The Proposed Action would not result in the depletion of resources. Construction waste would be required to be separated into recyclable materials, green waste, and other debris. Other mitigation measures for the Proposed Action would protect natural and cultural resource areas.

The environmentally preferable alternative for the Hetch Hetchy Communication System Upgrade Project would be Alternative 2 with the incorporation of mitigation measures. Alternatives 2 and 3 are similar in

terms of impacts to various resources. However, Alternative 2 would be less visually intrusive at the Poopenaut Pass site and therefore superior to the Alternative 3 Poopenaut Pass site.

2.8 ACTIONS COMMON TO ALL ACTION ALTERNATIVES

The actions below are common to all action alternatives for the project. Construction equipment and schedules are common to both action alternatives.

- The system would be upgraded from the current 2 GHz microwave radios to a combination of 6 GHz and 11GHz digital microwave radios and fiber optic cable.
- The microwave radio sites would have batteries with capacity to allow operation in event of prime failure. These include new battery systems at Burnout Ridge, Intake Radio Site, Poopenaut Pass, and Cherry Tower Site and replacement of the existing batteries at Moccasin Peak. The existing battery systems at Warnerville Switchyard, Moccasin Powerhouse, Intake Switch, and O'Shaughnessy Dam sites would remain.
- Propane-fueled emergency generators would be provided at Burnout Ridge and Intake Radio Site. Connections for portable emergency generators would be provided at Cherry Tower Site and Poopenaut Pass. The emergency generator at Moccasin Peak would be replaced. The existing generators at Warnerville Switchyard, Moccasin Powerhouse, Intake Switch, and O'Shaughnessy Dam sites would remain.
- Equipment would be removed at Moccasin Powerhouse Passive Reflector, Duckwall Mountain, and Jones Point sites. Existing FCC-licensed facilities would be removed from Jones Point.
- A new communication tower, modular communication shelter, and emergency generator would be installed in the undeveloped portion of Intake Radio Site.
- New sites within Stanislaus National Forest would include the Burnout Ridge and Cherry Tower Sites, which would consist of a new tower and communication shelter. Burnout Ridge would also require the upgrading of the remnant road leading to the site.
- A new communication facility in the vicinity of Poopenaut Pass.
- Upgrades at the Oakdale, Moccasin, Early Intake and Tuolumne, Cherry Lake, Lake Eleanor, and O'Shaughnessy areas as described in Section 2.2 would occur.
- Installation of new OPGW fiber optic cable on the HHW&P transmission lines between Intake Switchyard and Intake Radio Site, Holm Powerhouse, and Kirkwood Powerhouse.

2.9 MITIGATION MEASURES COMMON TO ALL ALTERNATIVES

Mitigation measures common to all action alternatives are listed in Section 4.0, Mitigation Measures.

2.10 MITIGATION MEASURES SPECIFIC TO ALTERNATIVES

Mitigation measures specific to alternatives are listed in Section 4.0, Mitigation Measures.

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