Chapter 2. Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

2.1. Land Use and Planning

2.1.1. Existing and Future Land Use

The unincorporated community of Lakehead is located at the north end of Antlers Bridge. Lakehead is bisected by I-5 and has a population of approximately 550 residents. The community is served by the Lakeshore Drive/Antlers Road and Riverside Drive interchanges.

Land use in the project vicinity is zoned for highway, public recreation, and commercial and residential development. Commercial development is concentrated near I-5. Many of the businesses cater to lake recreation and interstate travelers, which are vital to the local economy.

Shasta Lake is a component of the Central Valley Project, which is administered by the U.S. Department of the Interior, Bureau of Reclamation. The purpose of the lake is as follows according to priority: 1) flood control 2) irrigation, municipal and domestic water supply 3) hydro-electric power generation 4) recreation. A program called CALFED was established in 1995 to address environmental and water management issues associated with the bay-delta system. Through this program, State and Federal agencies coordinate their regulatory and/or management responsibilities over bay-delta resources. The Bureau of Reclamation is currently proposing a project to enlarge Shasta Dam to increase the storage capacity of Shasta Lake. Alternatives being evaluated by the Bureau include raising the height of the dam between 6.5 and 18.5 feet.

2.1.2. Impacts

During the construction and demolition processes, boat traffic and recreational activities on the lake in the vicinity of the bridge will be restricted to designated areas and routes to ensure the safety of the public and construction workers. Traffic control on the lake will include the use of speed restrictions, buoys, and signs in addition to the intermittent use of boats to direct and monitor lake traffic.

Realignment of the bridge and highway will require temporary lane closures and detours on I-5 during construction. This will involve speed reductions within the project limits and various types of lane cross-overs and lane closures to facilitate the highway improvement work.

The proposed bridge would accommodate an increase in the full pool elevation of Shasta Lake up to 18.5 feet as proposed by the Bureau of Reclamation. However, the northern bridge abutment would be located within the high water level of the lake. The Bureau of Reclamation's current proposal includes construction of a levee system to protect the Lakeshore area, including the highway and bridge abutment from inundation. Alternatively, moving the bridge abutment beyond the inundation zone would lengthen the bridge by 89 feet at an additional cost of approximately $4.5 million.

2.1.3. Avoidance, Minimization, and/or Mitigation Measures

A route will be maintained for boat traffic beneath the bridge during construction. The route will change as construction and demolition activities progress. The Antlers public boat ramp will not be affected by construction, but movement near the toe of the ramp may be restricted due to the proximity of the construction area.

A traffic management plan will be in place to ensure that traffic impacts on I-5 are minimized to the extent possible. Access to interchanges, local streets, businesses and public facilities will be maintained throughout the construction process.

Intermittent, short-term closures of the highway or lake area may be necessary for certain situations, such as blasting, moving large equipment or materials into place, etc. News releases will be provided immediately prior to and during construction to advise the public of construction activities and restrictions that may affect highway traffic or lake use.

2.1.4. Consistency with State, Regional and Local Plans

I-5 is part of the National Highway System, the Interregional Road System, and is designated as a high emphasis route in the 1998 Interregional Transportation Strategic Plan (ITSP). High emphasis routes are classified as being the most critical interregional road system routes for interregional travel and the state as a whole. Replacement of the existing structure is consistent with the ITSP. I-5 in the project vicinity is a bicycle route.

The proposed project is listed in the 2004 Shasta County Regional Transportation Plan (RTP). The project is also consistent with state transportation plans. The

Transportation Concept Report (TCR), which is maintained by Caltrans and is currently being updated, estimates future transportation needs on the state highway system. The proposed bridge will have a design life of 100 years and therefore should be designed to accommodate traffic needs for the next 100 years.

2.1.5. Impacts

The proposed project will provide three traffic lanes in the southbound direction, which will be sufficient for the life of the structure, and two lanes in the northbound direction. The Caltrans District 2 Division of Planning utilized traffic data from 1979-2003 to estimate future traffic volumes and lane requirements on I-5 in the vicinity of the Antlers Bridge. The future traffic projections are based on an average historic growth in average daily traffic of 436 vehicles per year during the twenty-five year period noted above. This growth trend is expected to continue at a steady rate as the population of California continues to grow. Based on this projection, it is estimated that an additional lane will be requried in the northbound direction in the year 2045.

2.1.6. Avoidance, Minimization, and/or Mitigation Measures

When the need arises, it will be necessary to provide the additional width, or, depending on highway design standards for shoulder width at that time, request a highway design exception for less than standard shoulder width.

Outside shoulder width will ultimately accommodate bicyclists. The bridge will also have bicycle railing on top of bridge railing and bicycle friendly grates on outside shoulders.

2.1.7. Parks and Recreation

The Antlers Bridge spans the Sacramento River arm of Shasta Lake and is located within the Shasta-Trinity National Recreation Area. STNF administers recreational use of the lake and surrounding forest, including several campgrounds, marinas, and a public boat ramp. The Antlers Boat Ramp and Campground are located immediately northeast of the bridge. The Gregory Creek Campground is located approximately 0.8 mile northeast of the bridge and the Lakeshore East Campground is located approximately 0.6 mile southwest of the bridge. These facilities experience heavy use during the summer months. There are no services or developed recreational facilities at the south end of the bridge.

2.1.8. Impacts

STNF estimates that an average of 30 feet of vertical clearance will be needed at the new bridge during full pool to provide passage for large houseboats. In addition, STNF requested that bridge piers be placed no closer than 300 feet within the toe of the public boat ramp to avoid conflicts with ramp activities. An attempt was made to locate piers at least 300 feet from the toe of the boat ramp. However, due to cost and structural limitations, the farthest pier #5 can be located from the toe of the boat ramp is approximately 250 feet, 50 feet short of the desired distance. Although it is less than the desired distance of 300 feet, neither Caltrans nor STNF foresee any adverse effects to boat ramp activities based on the proposed pier layout.

Construction of the proposed bridge and realignment of I-5 will require the acquisition of approximately 14.5 acres of new right-of-way from Shasta-Trinity National Recreation Area.

2.1.9. Avoidance, Minimization, and/or Mitigation Measures

The new bridge will be 1,936 feet in length and will have a design life of 100 years. With the exception of the northern span, the bridge will provide an average of 30 feet of vertical clearance for houseboat passage at full pool water level assuming a future maximum increase in full pool elevation of 18.5 feet as proposed by the Bureau of Reclamation. The proposed bridge has longer spans and two less piers in the lake than the existing bridge. Navigation and recreation on the lake will therefore be improved.

The Antlers boat ramp and Campground will remain open during construction. No use of these facilities will occur for construction of the proposed project.

New highway right-of-way will be acquired through a land exchange, as appropriate, between Caltrans and STNF.

2.2. Cultural Resources

The National Historic Preservation Act of 1966 (NHPA), as amended, sets forth national policy and procedures regarding historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places. Section 106 of NHPA requires federal agencies to take into account the effects of their undertaking on such properties and to allow the Advisory Council on Historic Preservation the opportunity to comment on those undertakings, following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800). On January 1, 2004, a Section 106 Programmatic

Agreement (PA) among the Advisory Council, FHWA, State Historic Preservation Officer (SHPO), and Caltrans went into effect for Caltrans projects, both state and local, with FHWA involvement. The PA takes the place of the Advisory Council's regulations, 36 CFR 800, streamlining the Section 106 process and delegating certain responsibilities to Caltrans.

Historical resources are considered in the California Environmental Quality Act (CEQA), as well as California Public Resources Code (PRC) Section 5024.1, which established the California Register of Historical Resources. PRC Section 5024 requires state agencies to identify and protect state-owned resources that meet National Register of Historic places listing criteria. It further specifically requires Caltrans to inventory state-owned structures in its right-of-way.

There is abundant evidence of prehistoric occupation in the project vicinity due to the geography and vast amount of natural resources associated with the Sacramento River. Subsequent land use activities included fur trapping, gold mining, railroad transport, timber harvesting, and mining for copper ore. Shasta Dam was completed in 1945, at which time the reservoir was filled. The existing Antlers Bridge was constructed by the Bureau of Reclamation in 1941. The bridge was evaluated (Lortie 2001) for eligibility for listing in the National Register of Historic Places but was determined to be ineligible because post construction alterations have compromised the integrity of the original structure.

2.2.1. Impacts

No historic properties will be affected by the project. Archaeological site CA-SHA-676 was identified within the project's area of potential effects (APE). This resource was not evaluated for inclusion in the National Register of Historic Places because it is located beyond the area of direct impact, below the ordinary high water level of Shasta Lake, and will be designated as an environmentally sensitive area (ESA) on the project plans. Stipulation VIII.C.3 of the Programmatic Agreement for implementing Section 106 of the National Historic Preservation Act provides that this archaeological site can be protected by an ESA and for the purposes of this specific undertaking be considered eligible for the National Register of Historic Places without formal evaluation (sub-surface excavation). Because this resource is being protected pursuant to the Programmatic Agreement, it will also be addressed in Appendix B "Resources Evaluated Relative to the Requirements of Section 4(f).

On April 7, 2006, Caltrans submitted the following project specific documentation to the SHPO for review in accordance with the PA: Historic Property Survey Report, Archaeological Survey Report, and Historical Resources Evaluation Report. In

response to the submittal, the SHPO issued a letter of concurrence on May 11, 2006, relative to the following items:

1. Historic site CA-SHA-3944H is not eligible for the National Register of Historic Places.

2. Caltrans is treating, for the purposes of this undertaking only, the archeological site CA-SHA-676 as eligible for the National Register of Historic Places pursuant to Stipulation VIII.C.3 of the PA and will establish an ESA to protect this historic property pursuant to Stipulation X.B.2a of the PA.

3. Caltrans has notified SHPO of the determination of a finding of No Adverse Effect with Standard Conditions/ESA as per Stipulation X.B.2.b of the PA, and has provided appropriate supporting documentation as per Stipulation XVI of the PA. Thereupon, this undertaking shall not be subject to further review under the PA.

2.2.2. Avoidance, Minimization, and/or Mitigation Measures

To protect cultural resource CA-SHA-676, the limits of the resource will be designated as an ESA. An ESA action plan has been developed, which prescribes protection measures. No work will be permitted within the ESA. During high water, buoys will placed at strategic locations to delineate the ESA. If the lake level recedes and the site becomes exposed, temporary fencing will be installed around the site boundary. In addition, routine monitoring by Caltrans archaeological staff will be conducted.

2.3. Visual/Aesthetics

The National Environmental Policy Act of 1969, as amended, establishes that the federal government use all practicable means to ensure all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings [42 United States Code 4331(b)(2)]. To further emphasize this point, the Federal Highway Administration in its implementation of the National Environmental Policy Act [23 United States Code 109(h)] directs that final decisions regarding projects are to be made in the best overall public interest taking into account adverse environmental impacts, including among others, the destruction or disruption of aesthetic values.

Likewise, the California Environmental Quality Act establishes that it is the policy of the state to take all action necessary to provide the people of the state

"with…enjoyment of aesthetic, natural, scenic, and historic environmental qualities." [California Public Resources Code Section 21001(b)]

The Antlers Bridge spans the Sacramento River arm of Shasta Lake on I-5. The existing bridge is a seven-span steel truss structure approximately 1,329 feet in length and is painted green. I-5 within the project limits is a four lane interstate highway with a southbound truck climbing lane beginning at the southern end of the bridge. A substantial highway cut is evident near the southwest corner of the existing bridge. The rural community of Lakehead is located at the north end of the bridge. Several public campgrounds and a boat ramp, administered by STNF, are located on the banks of Shasta Lake immediately east of the bridge. The outlying area is mountainous, forested terrain. Other notable features in the project area include a rock outcrop that flanks the public boat ramp, an ephemeral cascading stream located on the banks of Shasta Lake between the northern bridge abutment and the public boat ramp, and a pair of bridges spanning Doney Creek, northwest of the Antlers Bridge. The bridge in the forefront is a steel truss bridge for the railroad. Behind it is a concrete arch bridge on the county road system.

2.3.1. Impacts

The most obvious change in the landscape resulting from the project will be the introduction of a larger, modern concrete structure in place of the steel truss bridge, and the realigned section of highway. The proposed bridge is a five-span concrete structure supported by four sets of large diameter piles. The soffit of the bridge deck will have a gentle arch that gives the bridge deck a slender appearance and aids in the transition to the large piers. Several variations of the bridge design are being considered as shown in Exhibit 4. The variations focus mainly on pier treatments and the area where the piers meet the deck. Exhibit 6 shows close-up photo renditions of several options under consideration. The final bridge design may vary slightly from these photo renditions.

An addition to the newly aligned section of highway will be 0.5 mile of wire mesh deer fence on each side of the highway. The fencing will be six feet in height with steel posts every ten feet. The fencing will be located as far as possible from the traveled way near the right of way boundary.

Temporary impacts resulting from construction include land clearing and grading to create construction access and staging areas, cuts and fills associated with the roadway realignment, and the abandoned sections of highway. Construction access and staging areas that will require clearing and will be visible from the highway and the lake include the areas immediately east and west of the northern bridge abutment.

Albeit temporary, the scope of this transportation project will be readily apparent once the construction staging and access areas are occupied by large construction equipment and material stockpiles.

2.3.2. Avoidance, Minimization, and/or Mitigation Measures

Several options for pier treatment are being considered (Exhibit 6). The steel shells used to construct the piles function as forms and are not a structural element of the bridge. They can be left in place or removed once the concrete is cured depending on the desired aesthetic effect. Caltrans proposes removal of the steel shells for aesthetic reasons. Also under consideration for aesthetic reasons is the addition of concrete shrouds to enclose the piles of the two center pier groups. This gives the effect of the piers being comprised of two individual piles instead of four. The shrouds would add approximately $21 million to the cost of the bridge.

The abandoned section of highway south of the bridge will be obliterated and graded to conform with the adjoining topography. Native shrubs and trees will be planted in disturbed areas beyond the clear recovery zone of the highway, which is typically 30 feet from the edge of pavement. If rock slope protection is required to stabilize embankments or drainages, native rock from highway excavations will be used to match the color of the surrounding ground.

Removal of large trees within access and staging areas will be avoided to the extent practicable, i.e., they will be left in place if they do not interfere with construction activities. Typically the entire staging area would be cleared and grubbed to facilitate construction activities. However, an attempt will be made to preserve several of the larger pine and oak trees along the eastern edge and the southeast corner of the 12 acre staging site as a visual screen. Several large conifers adjacent to an osprey nest will be left in place to provide a screen and potential roosting site for the osprey. These trees will be designated as an ESA and delineated with temporary fencing. The vegetated segment of a small perennial drainage that bisects the proposed staging area will be protected with temporary ESA fence. The ephemeral stream between the boat ramp and bridge will also be protected with an ESA fence. Following construction, temporary construction access and staging areas will be restored in a manner similar to the abandoned sections of highway. The rocks creating the cascade will not be affected, nor will the rock outcrop at the public boat ramp.

2.4. Water Quality and Storm Water Runoff

The project is located within the Sacramento River Drainage Basin. The primary federal law regulating water quality is the Clean Water Act. Section 401 of the Act requires a water quality certification from the State Water Resources Control Board (SWRCB) or the Regional Water Quality Control Board (RWQCB) when a project: 1) requires a federal license or permit (a Section 404 permit from the U.S. Army corps of Engineers is the most common federal permit for Caltrans projects), and 2) will result in a discharge to waters of the United States.

Section 402 of the Act establishes the National Pollutant Discharge Elimination System (NPDES) permit system for the discharge of any pollutant (except dredge or fill material) into waters of the United States. To ensure compliance with Clean Water Act Section 402 the SWRCB has issued a NPDES Statewide Storm Water Permit to regulate storm water discharges from Caltrans facilities both during and after construction, as well as from existing facilities and operations. The Statewide Storm Water Permit requires Caltrans to comply with the requirements of the General Construction Permit issued by the SWRCB to regulate discharges from construction activities which includes clearing, grading, disturbance to the ground, such as stockpiling or excavation, that results in soil disturbances of at least one acre of total land area. Construction activity that results in soil disturbances of less than one acre is subject to the General Construction Permit if the construction activity is part of a larger common plan of development that encompasses one or more acres of soil disturbance or if there is significant water quality impairment resulting from the activity. The Statewide Storm Water Permit requires development of a Storm Water Pollution Prevention Plan (SWPPP) to address water pollution control. The SWPPP is prepared by the contractor and is subject to Caltrans' approval. The SWPPP identifies construction activities that may cause pollutants in storm water and the temporary best management practices (BMPs) that will be utilized to control these pollutants.

Additional laws regulating water quality include the Porter-Cologne Water Quality Act, Safe Drinking Water Act and Pollution Prevention Act. State water quality laws are codified in the California Water Code, Health and Safety Code, and Fish and Game Code Sections 5650-5656.

2.4.1. Impacts

The proposed project includes various earth disturbing activities that could affect water quality and storm water runoff. The primary constituent of concern is sediment both during and after construction. Another concern is the potential for spills and leaks of lubricants, oil, fuels, and other fluids associated with construction vehicles

and equipment. Each of the build alternatives will have the potential to adversely affect water quality if not properly managed. Based on the least amount of ground disturbance, Alternative A1, the preferred alternative, will have the lowest potential of the build alternatives to adversely affect water quality. Potential water quality impacts associated with the "no-build" alternative include the following:

- Maintenance work on the bridge deck and steel truss superstructure would be required more frequently, thereby increasing work activities over Shasta Lake, which increases the inherent risks of equipment leaks and material spills.

- The existing lead paint on the bridge superstructure would remain in place. The potential for deterioration and deformation of the lead paint would remain unchanged.

- The potential for spills from traffic accidents on the existing narrower bridge and road alignment would remain unchanged.

Approximately 19 acres of land will be cleared of vegetation to accommodate the bridge replacement and highway realignment. Cuts and fills associated with the highway realignment will generate approximately 236,700 cubic yards of material. Excess material will be used to restore the temporary construction staging areas and the sections of I-5 abandoned as a result of the highway realignment. Any excess material will be disposed of at an approved location within Caltrans right-of-way. Previously approved disposal sites are located adjacent to the northbound lanes of I-5, five miles north of the bridge at post mile 45.0 and adjacent to the southbound lanes between post miles 38.35 and 38.65.

Finish cuts on the new highway alignment will be 1:1.5 (vertical/horizontal) and fills will be from 1:4 to 1:6 depending on the surrounding topography. The highway storm water drainage system will need to be reconstructed where I-5 is modified or realigned. A preliminary estimate of the permanent impact to Army Corps jurisdictional waters is estimated to be approximately 0.042 acre or 1,245 linear feet of stream channel. The impact is limited to two small ephemeral streams in the vicinity of the proposed bridge's southern abutment. The channels of the two streams will be realigned to avoid scour near the bridge abutment and first bent (pier). Downstream of the bridge, the streams will converge into a single channel, previously occupied by one of the two streams, where it enters the lake. Drainage from the new bridge deck will discharge through scuppers directly into the lake. Rock slope protection will be placed on areas where erosion will be a factor due to the discharge from scuppers, such as near the bridge abutments.

Temporary easements will be obtained on STNF land and within Bureau of Reclamation jurisdiction for construction staging areas and lake access roads and ramps:

A. An area of approximately 8 acres with lake frontage is located near the northwest corner of the existing bridge. The upland area will be used for construction staging and storage of materials and equipment. An easement will be obtained on the lakeshore to provide the contractor with the option of constructing a temporary dock or ramp to gain access to the lake. A ramp would likely extend to the low water level. Construction of a ramp could require the importation of up to 119,000 cubic yards of rocky material. Suitable material will be available from excavations that will occur at Haycock Peak for the new highway alignment.

B. A smaller area of approximately 2.3 acres is available immediately east of the highway at the northern bridge abutment. This is the area where the northern abutment of the proposed bridge will be located. Consequently, extensive earthwork will occur at this location.

C. An easement is available for construction of a 30 foot wide temporary access road and ramp to access the lakebed immediately west of the Antlers boat ramp parking lot and northerly of the boat ramp. The ramp would be situated so it does not interfere with operation of the public boat ramp. This area is a supplemental access point for construction. Following construction, the area will be restored to pre-existing conditions or as directed by STNF.

At locations A and C, temporary access roads or ramps may be constructed on the lakeshore and within the full pool elevation of the lake for construction access to the lake during low water levels. It is likely that these access ramps would be required on the east and west sides of the northern bridge abutment. Construction of the ramps would require excavation and placement of fill within the dry portions of the lakeshore. An access ramp on the west side (A) may require the importation of approximately 119,000 cubic yards of clean rock. Suitable material may be available from the excavations at Haycock Peak, which are required for the realignment of I-5. Otherwise, clean rock will be obtained from a commercial source. Ramps would be in place for the duration of construction and would become inundated as the lake level rises each year. It would be necessary for the contractor to construct the ramps to withstand the erosive forces of wave action and the fluctuating lake level. Following construction, the ramps would be removed.

Various types and sizes of piles may be installed temporarily for various reasons such as earth retaining structures, trestles, piers, coffer dams, moorings and

anchorages, etc. Installation of piles will create temporary increases in turbidity as they are driven into the lakebed. Bridge piers will consist of large diameter piles. A bubble curtain will be used when driving large piles to reduce underwater pressure levels that can be harmful to aquatic life. The drafting effect created by the bubbles could cause turbidity or disperse turbid water depending on how close to the bottom the discharge of air occurs. After seating the large piles in the lakebed, an auger will be inserted in the steel shell to drill into the lakebed to the specified foundation depth. Dewatering of the shell may be necessary. The displaced drill cuttings will either be re-deposited on the lakebed through a flexible pipe or removed and disposed of at an appropriate upland disposal site. It is estimated that 3,000 to 7,300 cubic yards of spoils will be displaced by the twelve piles, ten of which are located within the full pool level of the lake. Removing the material from the lake and disposal at an upland site would require placing the material on barges, transporting to shore, removing the material and trucking to an upland disposal site, placement of the material within the disposal site. The cost of removing the material could be several hundred thousand dollars more than the cost of re-depositing the material on the lakebed. Re-depositing the material on the lakebed could result in considerable localized turbidity due to the fine consistency of the material.

Demolition of the existing bridge will include the removal of piers and abutments to an elevation of approximately one foot below original ground or lakebed elevation. The concrete piers are 10 feet thick, 40 feet wide, and approximately 150 feet in height. They contain hollow cells and substantial amounts of reinforcing steel. Removal would probably be accomplished by breaking the piers into smaller pieces using pneumatic or hydraulic impact hammers and/or explosives. The methods and timing of pier removal will depend upon water levels and available equipment. Demolition of the piers and abutments will result in approximately 4,063 cubic yards of concrete rubble, including reinforcing steel. Caltrans proposes to leave a portion of the PCC pier rubble on the lakebed to reduce the costs associated with retrieval and disposal of PCC waste. Reinforcing steel would be recovered and recycled or disposed of at an approved location. Abutments and piers located above the water level during demolition will be removed from the lake. Painted steel superstructure members that drop into the lake will be removed promptly and prior to subsequent demolition activities that could result in additional painted steel members entering the lake.

2.4.2. Avoidance, Minimization, and/or Mitigation Measures

The contractor is required to prepare a SWPPP, which will identify potential sources of pollution and temporary BMPs to protect water quality. In addition, the project includes permanent BMPs which are identified during the planning and design phase

of the project. The following permanent BMPs are proposed to prevent sediment transport and introduction of solids and/or chemical constituents: hydro-seeding, placement of RSP on disturbed stream banks and/or lakebed where vegetation cannot be expected to become established, drainage and conveyance systems including asphalt dikes, over-side drains, flared culvert-end sections, outlet protection, and velocity dissipation devices.

Perennial streams that bisect proposed construction staging areas A and B near the northern bridge abutment will be designated as ESAs. The stream in area A also has a small adjacent wetland. The ESAs will be delineated with temporary fencing to prevent access and inadvertent impacts during construction.

Any steel debris resulting from bridge demolition that enters the water, whether intentionally or accidentally, will be removed promptly and prior to beginning another operation.

The contractor is required to adhere to Caltrans' standard specifications and special provisions pertaining to water quality. The standard specifications pertaining to water quality include dust control, clearing and grubbing, earthwork, erosion control, and water pollution. In addition, the contractor is required to comply with the terms and conditions of regulatory permits issued by the California Department of Fish & Game, the RWQCB, and the U.S. Army Corps of Engineers. Appropriate regulatory guidelines will be followed for any dewatering, and if required, siphoning operations within live streams and lake waters.

Implementation of the above mitigation measures and adherence to Caltrans' contract plans, specifications and special provisions, including regulatory permit conditions, will ensure that water quality impacts are reduced to a level below significant with respect to CEQA and NEPA guidelines.

The contractor will be required to prepare a spill containment plan for operations on the lake.

2.5. Hazardous Waste

Hazardous materials and hazardous wastes are regulated by many state and federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health and land use.

The primary federal laws regulating hazardous wastes/materials are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The

purpose of CERCLA, often referred to as Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. RCRA provides for "cradle to grave" regulation of hazardous wastes. Other federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety & Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order 12088, Federal Compliance with Pollution Control, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

Hazardous waste in California is regulated primarily under the authority of the federal Resource Conservation and Recovery Act of 1976, and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. Proper management of hazardous material is vital if it is disturbed during project construction

2.5.1. Impacts

An Initial Site Assessment (ISA) was conducted to determine if potential sources of hazardous waste exist within the project limits. The ISA entailed a review of hazardous waste databases, as-built plan sheets, and a field review of the project limits. It was determined that the project limits are not listed on the April 1998 State List of Hazardous Waste Sites, also referred to as the "Cortese List." The following potential hazardous waste issues were identified:

- Lead Containing Paint
- Asbestos Containing Materials

Lead Containing Paint

Traffic striping paint and/or thermoplastic striping present on the road surface may contain heavy metals including lead. When the paint or striping is removed exclusive of the asphalt concrete by grinding or abrasive blasting, the residue may contain high concentrations of heavy metals.

Lead was a common ingredient of paints manufactured before 1978 and is still an ingredient of some industrial paints. A Preliminary Site Investigation (PSI) identified lead containing paint on the bridge and lead contaminated soils beneath the bridge due to sandblasting. Lead levels found in the bridge paint exceed state and federal thresholds for classification as hazardous waste. The paint system on the bridge was noted to be intact. Lead levels found in the soil beneath the bridge exceed state thresholds for classification as California hazardous waste.

Asbestos Containing Material

Asbestos Containing Material (ACM) has been commonly used in bearing pads and joint filler material for bridge abutment and expansion joints. The PSI revealed no ACM on the bridge. However, not all areas of the bridge were accessible for sampling, and therefore, the PSI cannot conclusively report an absence of ACM.

2.5.2. Avoidance, Minimization, and/or Mitigation Measures

Lead Containing Paint

The contractor shall prepare a project specific lead compliance plan in accordance with Cal/OSHA regulations to protect workers who may be exposed to LCP and lead contaminated soils. In addition, the contractor is responsible for characterizing and segregating wastes prior to disposal.

Traffic striping paint and/or thermoplastic striping, removed from the road surface exclusive of the asphalt concrete by grinding or abrasive blasting, shall be sampled and analyzed for lead content and managed accordingly.

Soils excavated from beneath the existing bridge, extending to a depth of at least 24 inches, should be stockpiled separately and re-sampled to confirm total and soluble

lead concentrations. Based on the sampling results, the soils should be managed, disposed of, or reused as appropriate.

Asbestos Containing Material

The U.S. Environmental Protection Agency's National Emissions Standards for Hazardous Air Pollutants (NESHAP) and the California Air Resources Control Board rules require written notification within ten working days prior to the commencement of any bridge demolition or renovation activity. If previously undetected ACM is discovered during construction, compliance with Cal/OSHA regulations pertaining to ACM must be followed.

2.6. Noise

Regulations pertaining to highway noise impacts to humans are found in the Code of Federal Regulations (23 CFR 772) and the California Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects.

A noise study was performed to assess potential increases in traffic noise levels that may result from the long-term operations of the proposed project. A separate bio-acoustic study was performed to assess potential noise levels that may result from proposed construction and demolition activities. The bio-acoustic study assesses airborne and underwater noise (pressure) levels.

2.6.1. Impacts

The primary source of ambient airborne noise in the project area is highway traffic on Interstate 5. Sensitive noise receptors within the project limits include the Antlers Campground, which is located approximately 0.26 mile northeast of the Antlers Bridge.

Table 2-1 gives a brief description of noise descriptors used in the noise studies.

Table 2-1 Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals and the reference pressure for water is 1 micro Pascal.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square

Term	Definitions
	meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressure exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A- and C-Weighted Sound Level, dBA and dBC	The sound pressure level in decibels as measured on a sound level meter using the A- or C-weighting filter network. The A-weighting filter de-emphasizes the low and high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. C-weighting only de-emphasizes sound levels at very low and very high frequencies (outside the normal human hearing range).
Equivalent Noise Level, Leq	The steady equivalent A-weighted noise level during the measurement period that results in the same acoustical energy as the time-varying level.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Peak Level	Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz.
RMS (impulse) Level	The maximum root-mean-square (RMS) sound pressure level measured “over the duration of the pulse.”
Sound Energy Level (SEL)	The noise exposure level of a single event measured over the time interval between the initial and final times for which the sound level of the single event exceeds the background noise level.

The peak-hour traffic noise level measured at the Antlers Campground is 56 dBA Leq(1hr). Based on predicted increases in traffic to the year 2030, it is estimated that noise levels will increase to 60 dBA Leq(1hr) at the Antlers Campground. Traffic noise receptors are considered impacted if estimated future noise levels increase by at least 12 dBA relative to existing conditions or if noise levels approach, within one decibel, or exceed 67 dBA. Based on the noise study, as presented in Table 2-2, no noise impacts are expected from the long-term operations of the project.

Table 2-2 Traffic Noise Impact Evaluation

Position	Location	Existing Noise	Design-Year Noise	Noise Impact
R1	Antlers Campground	56 dBA	60 dBA	None

Construction and demolition activities will result in temporary increases in both airborne noise levels and underwater pressure levels. Increases in airborne noise resulting from construction has the potential to affect the Antlers Campground and nesting raptors, such as the bald eagle and osprey, in the vicinity of the bridge. Increases in underwater pressure levels can potentially affect aquatic organisms in the vicinity of the bridge. The potential effects from noise upon fish and wildlife is discussed in Section 2.9.

Bridge and highway construction typically involves the use of heavy equipment including, but not limited to, excavators, scrapers, road graders, dump trucks, cranes, pile drivers, compressors, pavers, and concrete mixers. These types of equipment typically generate noise levels in the range of 70 to 100 dBA at a distance of 50 feet. Percussive pile driving often generates airborne peak noise levels well in excess of 100 dBA at 50 feet. The pile casings for the proposed bridge will be approximately 13.1 feet in diameter, requiring one of the largest pile drivers in the industry. It is estimated that driving these large diameter pile casings will generate an airborne noise level of approximately 108 dBA at a distance of 330 feet. This translates to a noise level in the range of 92-95 dBA at the Antlers Campground, which is approximately 1,373 feet from the bridge.

An example of airborne traffic and construction related noise levels potentially generated near the existing bridge location are shown in Exhibit 7.

Table 2-3 Typical Airborne Sound Levels Measured in the Environment and Industry

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dBA	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 300 m (1000 ft)		
	---100---	
Gas Lawn Mower at 1 m (3 ft)		
	---90---	
Diesel Truck at 15 m (50 ft),		Food Blender at 1 m (3 ft)
at 80 km/hr (50 mph)	---80---	Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime		
Gas Lawn Mower, 30 m (100 ft)	---70---	Vacuum Cleaner at 3 m (10 ft)
Commercial Area		Normal Speech at 1 m (3 ft)
Heavy Traffic at 90 m (300 ft)	---60---	
		Large Business Office
Quiet Urban Daytime	---50---	Dishwasher in Next Room
Quiet Urban Nighttime	---40---	Theater, Large Conference
Quiet Suburban Nighttime		Room (Background)
	---30---	Library
Quiet Rural Nighttime		Bedroom at Night, Concert
	---20---	Hall (Background)
		Broadcast/Recording Studio
	---10---	
Lowest Threshold of Human Hearing	---0---	Lowest Threshold of Human Hearing

Source: Technical Noise Supplement, California Department of Transportation, 1998

Geologic studies indicate that excavations for the highway realignment at the south end of the bridge will require blasting due to rocky, non-rippable material. Blasting is expected to generate airborne noise levels of approximately 83 dBA at a distance of 500 feet.

2.6.2. Avoidance, Minimization, and/or Mitigation Measures

Airborne noise produced by construction equipment shall conform to Caltrans' Standard Specifications, Section 7-1.01I (Sound Control Requirements). The project will include the following special provision: The airborne noise level from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dBA at a distance of 50 feet. The noise level requirement shall apply to equipment on the job or related to the job, including but not limited to trucks, transit mixers, or transient equipment that may or may not be owned by the Contractor. All internal combustion engines used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without a muffler. The

contractor shall also comply with all local sound control and noise level rules, regulations, and ordinances.

A special provision will be included in the construction contract to control the effects of blasting. The special provisions will control airborne noise, vibration and fly rock associated with blasting. If explosives are used to demolish bridge piers, a bubble curtain shall be used below the water line. In addition, other measures, including but not limited to the following, must be implemented if feasible to further reduce underwater pressure levels: use of blast suppression blankets, bore hole stemming, and charge delays.

2.7. Air Quality

The project is located within the Sacramento Valley Air Basin within the jurisdiction of the Shasta County Air Pollution Control District. Emissions and ambient air quality are the two standards by which air pollution is regulated. If there is at least one violation of a State standard, the area is designated "non-attainment" for that pollutant. If a State standard is not violated within a three year period, the area is considered "attainment." A pollutant is designated "unclassified" if the data are incomplete and do not support a designation of attainment or non-attainment. Shasta County is currently in attainment or unclassified for listed State and Federal pollutants except for the State standard for ozone and suspended particulate matter less than 10 microns in diameter (PM10) [California Air Resources Board, 2001]. Federal PM 2.5 conformity, including hot spot analysis, requirements do not apply to this geographical area.

2.7.1. Impacts

Bridge demolition and construction activities will result in temporary increases in airborne pollution. Pollution sources include the combustion engines of construction equipment, earth disturbance, and dust resulting from the demolition of the existing concrete bridge.

The new bridge will require substantial amounts of Portland Cement Concrete (PCC). Asphalt concrete (AC) will also be required for roadway improvements. For economic and scheduling purposes, the contractor may choose to establish a temporary PCC and/or AC batch plant on-site. It will be the contractor's responsibility to obtain an operating permit from the Shasta County Air Resources Board, which may require additional environmental studies to comply with CEQA. The contractor will be responsible for satisfying the need for additional studies if required. Studies needed for an operating permit may include air quality, noise

levels, traffic, and possibly other environmental factors. An environmental evaluation for a batch plant(s) was not performed for this project because the project does not require an on-site batch plant, therefore, pertinent information is not known, such as plant type, size, location, period of operation, etc.

2.7.2. Avoidance, Minimization, and/or Mitigation Measures

The Environmental Protection Agency's (EPA) National Emissions Standards for Hazardous Air Pollutants (NESHAP) and the California Air Resources Board (CARB) rules require the contractor to notify the CARB in writing prior to demolition or renovation of the existing bridge. Caltrans will implement mitigation measures required by the EPA and CARB. In addition, water will be used to suppress dust during construction activities and pavement will be swept and wet down as necessary to prevent tracking.

2.8. Vegetation

On February 3, 1999, President Clinton signed Executive Order 13112 requiring federal agencies to combat the introduction or spread of invasive species in the United States. The order defines invasive species as "any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, this is not native to that ecosystem whose introduction does or is likely to cause economic or environmental harm or harm to human health." Federal Highway Administration guidance issued August 10, 1999 directs the use of the state's noxious weed list to define the invasive plants that must be considered as part of the NEPA analysis for a proposed project.

The project area is situated 1,040 feet above sea level and has a Mediterranean climate with cool moist winters and warm dry summers. The average January temperature is 44° F; the average July temperature is 81° F. Roughly 80 percent of the total precipitation, which averages 70 inches annually, falls in the six-month period between November and April (USDA 1980). The predominant natural plant communities are mixed conifer series, Douglas fir-ponderosa pine series, and ponderosa pine series. Mixed chaparral communities occur on south-facing slopes at lower elevations. Canyon live oak series is common on steep rocky slopes with stony soils (USDA 1997). The project area is dominated by a sparse overstory of ponderosa pine, gray pine, Douglas fir, knobcone pine, black oak, and canyon live oak. The chaparral and forest understory is dominated by several species of ceanothus, white-leaf manzanita, poison oak, snowdrop bush, Himalayan blackberries, and wild grape. This habitat ranges in age between 30-80 years old

and is typified as early to mid-mature seral habitat. Late successional and old growth forest are not present (USDA 2005).

A federally listed noxious weed, Rush skeleton weed (*Chondrilla juncea*), is present within and adjacent to the highway corridor in the vicinity of the Antlers Bridge. The Shasta County Department of Agriculture (County), in a cooperative agreement with Caltrans, conducts a weed management program on the State highway system. Weed management within the project limits includes herbicide treatment and hand-pulling. Hand-pulling the weed prevents the formation of seed heads. However, it does not always kill the plant due to its vigorous root system. Herbicides include clopyralid (Transline), glyphosate (Round-up), and chlorsulfuron. STNF has been experimenting with various methods of mechanical weed control on an affected area adjacent to the highway near the south abutment of Antlers Bridge. The Rush skeleton weed population is confined to an area of approximately three acres in the vicinity of the bridge. Another noxious weed, Scotch broom (*Cytisus scoparius*), is located within the proposed construction staging area west of the northern bridge abutment.

2.8.1. Impacts

Approximately 19 acres of land will be cleared of vegetation and graded to accommodate the proposed new bridge and highway alignment. Additional areas in the vicinity of the bridge will be available for the contractor's optional use as temporary construction access and staging areas. If utilized, these sites will be cleared of vegetation and graded. The proposed temporary access and staging areas include:

- An 8 acre lakefront site located west of the north abutment of the Antlers Bridge.
- A 2.3 acre site immediately east of the northern bridge abutment. This is the footprint of the northern abutment and adjoining section of highway for the proposed bridge.
- An area adjacent to the Antlers public boat ramp. An easement is available for a 30 foot wide access road and boat ramp, and an area of approximately one acre for staging.
- The wide area adjacent to the traveled way, within the highway right-of-way, at the south end of the bridge.

2.8.2. Avoidance, Minimization, and/or Mitigation Measures

Abandoned sections of highway resulting from the highway realignment will be obliterated and restored to blend with the surrounding topography to the extent practicable. Native woody vegetation will be planted in these areas.

The staging areas located on the west and east sides of the highway adjacent to the northern bridge abutment are both bisected by streams. The streams and the associated riparian corridors or upland buffers will be designated as ESAs and delineated with temporary fencing. In addition, selected mature upland trees located around the perimeter of the northern staging areas will be preserved to the extent practicable, i.e., to the extent the trees do not interfere with construction operations. Following construction, all equipment and construction debris will be removed from the site. The staging and access areas will be ripped, graded and planted with native woody vegetation. Upland coniferous forest will be replanted in disturbed areas beyond the clear recovery area of the new section of highway. The clear recovery area extends 30 feet from the edge of the traveled way. Special provisions will be included in the project to salvage and stockpile select material (topsoil) during grading. This material will be used to dress areas that will be revegetated. A stockpile area for duff will be designated on the plan sheets.

Caltrans will enter into an agreement with STNF and the Shasta County Department of Agriculture (County) to expand efforts to eradicate Rush skeleton weed on and adjacent to I-5 in the project vicinity. Included in the treatment area is approximately 3.7 acres of STNF land adjacent to I-5 near the southern bridge abutment. This area has a substantial population of Rush skeleton weed and therefore will be designated as an ESA to prohibit access and disturbance during construction. The County will hand pull weeds and apply herbicides prior to, during, and following construction. Monitoring and treatment will occur for a period of two years following construction to ensure containment and eradication of the weed.

Designated locations for temporary stockpile and permanent placement or disposal of excavated materials will be designated in the contract plans to facilitate monitoring and treatment of Rush skeleton weed. In addition, equipment entering and leaving the construction site shall be washed to prevent the import and export of noxious weed seeds.

2.9. Fish and Wildlife

Shasta Lake supports cold water and warm water fisheries including, but not limited to, trout, salmon, bass, crappie, sunfish, sturgeon, and catfish. Coldwater species

such as trout and salmon are largely maintained by the California Department of Fish and Game through annual stocking.

Shasta Lake has a large population of bald eagles and osprey. There are currently active bald eagle and osprey nests in the vicinity of the bridge. An osprey nest is adjacent to the proposed construction staging area northwest of the bridge. A bald eagle nest is located within the Gregory Creek Campground, approximately 0.75 mile from the bridge site. Since the nest was discovered in 2003, the pair has produced two chicks each year. The bald eagle is a federally listed threatened species and is protected under Section 7 of the Federal Endangered Species Act. Caltrans prepared a Biological Evaluation to comply with Section 7 of the Federal Endangered Species Act. The U.S. Fish & Wildlife Service issued a letter of concurrence on November 9, 2005 to address Caltrans' determination of "not likely to adversely affect" the bald eagle.

Two species of bats utilize the interior cells of the concrete bridge piers for temporary night roosting. The bats gain entry to the piers through weep holes. Bat use was verified by daytime inspections, which revealed an absence of bats but substantial accumulations of guano within the piers.

Cliff swallows routinely attach nests to the bridge. Nests are constructed of mud and are usually located along the outside edge of the concrete bridge deck where acute angles are formed. Nesting typically occurs March through July.

Various types of small and large mammals cross Interstate 5 south of the Antlers Bridge to forage and obtain water. This section of Interstate 5 bisects a deer migration route. Consequently there is a high occurrence of deer versus vehicle incidents.

2.9.1. Impacts

The project will require pile driving to install various types and sizes of piles. Depending on the size and type of pile and the method of installation, pile driving can generate airborne noise that could disrupt nesting and foraging activities of adult and juvenile bald eagles and osprey, and underwater noise pressure levels that can kill or injure aquatic organisms.

Percussive pile driving often generates airborne peak noise levels well in excess of 100 dBA. It is estimated that pile drivers installing large (13.1 foot diameter) steel pile casings will generate airborne noise levels in the range of 108 dBA at a distance of approximately 330 feet, while noise levels at the eagle's and osprey's nests may reach 82-98 dBA (see Table 2-4).

Table 2-4 Maximum Sound Pressure Levels Resulting from Pile Driving

Condition	Predicted Sound Pressure Level	
	Eagle Nesting Area	Osprey Nesting Area
CISS Foundation Pile Driving – Pier 2	82-87 dBA	87-92 dBA
CISS Foundation Pile Driving – Pier 3	83-88 dBA	89-94 dBA
CISS Foundation Pile Driving – Pier 4	83-88 dBA	92-97 dBA
CISS Foundation Pile Driving – Pier 5	83-88 dBA	93-98 dBA

Underwater noise pressure travels more efficiently through denser materials such as rock and soil, compared to water or air. Therefore, even pile driving on the dry lakeshore can transmit noise and pressure that can potentially affect aquatic life. Table 2-5 provides definitions for underwater acoustical terms used in this report.

Table 2-5 Definitions of Underwater Acoustical Terms

TERM	DEFINITIONS
Peak Sound Pressure, unweighted (dB)	Peak sound pressure level based on the largest absolute value of the instantaneous sound pressure. This pressure is expressed in this report as a decibel (referenced to a pressure of 1 µPa) but can also be expressed in units of pressure, such as µPa or PSI.
RMS Sound Pressure Level, dB re 1 µPa	The average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy for one pile driving impulse[2].
Total Acoustic Energy, dB re 1 μPa^2 sec	Proportionally equivalent to the time integral of the pressure squared and is described in this report in terms of μPa^2 sec over the duration of the impulse. Similar to the unweighted Sound Exposure Level (SEL) standardized in airborne acoustics to study noise from single events.
Waveforms, µPa over time	A graphical plot illustrating the time history of positive and negative sound pressure of individual pile strikes shown as a plot of µPa over time (i.e., seconds)
Frequency Spectra, dB over frequency range	A graphical plot illustrating the distribution of sound pressure vs. frequency for a waveform, dimension in rms pressure and defined frequency bandwidth

[2] The underwater sound measurement results obtained during the Pile Installation Demonstration Project indicated that most pile driving impulses occurred over a 50 to 100 millisecond (msec) period. Most of the energy was contained in the first 30 to 50 msec. Analysis of that underwater acoustic data for various pile strikes at various distances demonstrated that the acoustic signal measured using the standard "impulse exponential-time-weighting" (35-msec rise time) correlated to the RMS (impulse) level measured over the duration of the impulse.

The most recent data indicates that injury and/or mortality may occur when underwater peak sound pressure levels exceed 208 dB re 1 µ Pa and a sound energy level (SEL) of 187 dB re 1 µ Pa^2-sec at a distance of 33 feet from the pile.

Specific underwater pressure levels expected during the Antlers Bridge replacement project cannot be accurately predicted due to varying factors such as size and type of pile, size of pile driving hammer, resistance of substrate and water depth. Based on data from similar bridge projects, the estimated underwater pressure levels at Antlers Bridge, expressed as both Peak and SEL are shown in Table 2-6.

Table 2-6 Estimated Underwater Pressure Levels at Antlers Bridge

Distance	Peak	RMS	SEL
10 meters	220	185	194
20 meters	215	203	190
50 meters	210	196	184

Demolition of the existing bridge may result in airborne and underwater noise and pressure impacts. It is unknown what method of demolition the contractor will use to remove the existing bridge. Blasting of the piers and superstructure are viable options for the contractor to consider. Uncontrolled underwater blasting is estimated to generate pressures of 190-220 dB Peak or 170-175 dB SEL.

Demolition of the existing bridge will eliminate an existing roosting and nesting structure for bats and swallows respectively.

2.9.2. Avoidance, Minimization, and/or Mitigation Measures

To avoid and minimize the effects of construction on the bald eagle and osprey, the following measures will be implemented:

- If percussive driving of large diameter piles and demolition blasting methods are used, they will be prohibited during the period of January 15 to August 15 to avoid nesting, rearing and foraging activities.
- Continuous, routine construction activities at the proposed northwest construction staging area must begin between August 15 and December 1. This will acclimate the birds to construction activities prior to nesting. A Caltrans biologist will monitor the osprey nest during construction.
- Tree removal throughout the project limits will be limited to the period of August 15 to December 31 to avoid impacting bald eagles and migratory

birds. No potential nest or perch trees will be removed for the highway alignment.

- An ESA fence will be installed along the western border of the 8 acre staging area to prevent access to the osprey nesting area.

- Funding in the amount of $71,500 will be provided to STNF to conduct the following activities relative to the bald eagle: 1) monitor the nest at Gregory Creek Campground during the three year construction period. 2) construct a nesting platform easterly of the existing nest to encourage the eagles to occupy a site outside of the campground, and 3) to enhance feeding opportunities for the eagle during construction, live fish will be placed in an open-top trap within the eagle's usual foraging area.

A bubble curtain will be required to attenuate underwater pressure levels when large diameter piles are driven with a percussive hammer. Based on the project design and environmental conditions at the project site, use of a bubble curtain is the best available technology to attenuate underwater noise pressure. A bubble curtain consists of a cylindrical arrangement of hollow pipes, either steel or plastic, with small holes through which air is pumped. The pipe assembly is placed around the pile. Powered by a large compressor, the bubbles create an air curtain. The pressure waves decrease in intensity as they travel through the air bubble curtain, which is less dense then the surrounding water and therefore does not convey the pressure waves as efficiently. It is anticipated that the bubble curtain will result in a reduction of 10-20 dB within a distance of 330 feet of the piles.

If explosives are used to demolish bridge piers below the water line, a bubble curtain shall be used. Measures to reduce underwater pressure levels resulting from blasting include, but are not limited to, use of blast suppression blankets, bore hole stemming, and charge delays.

Even thought the best available technology will be utilized to protect fisheries in Shasta Lake, impacts may not be fully avoided or minimized to an acceptable level. To offset these impacts, Caltrans will provide funds to the California Department of Fish and Game to be used to improve angling opportunities in the lake by repopulating game fish species.

To avoid impacts to bats that roost within the bridge piers, all points of entry into the piers will be blocked when the bats are not present prior to bridge demolition. A bat roosting "slot" will be incorporated into the new concrete bridge to provide permanent bat habitat. Monitoring surveys will be conducted for two seasons following

construction to determine if bats are utilizing the new structure, and if so, the number and species of bats.

If bridge demolition work cannot be scheduled to occur between the months of August 1 and March 1 when swallows are not nesting, an exclusionary device such as netting will be installed to prevent nest construction on the bridge. Prior to the installation of an exclusionary device, existing, unoccupied nests will be knocked down to discourage the birds from trying to occupy them

To minimize animal crossing conflicts on I-5, deer proof fencing will be installed on both sides of I-5 from the south abutment of the new bridge to a point approximately 0.5 mile south. A bench will be constructed under the south abutment to provide a safe passage across the highway. One-way deer gates will be installed at strategic locations to provide an exit should the deer enter the fenced portion of the highway.

2.10. Cumulative Impacts

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of this project. A cumulative effect assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor, but collectively substantial impacts taking place over a period of time.

Cumulative impacts to resources in the project area may result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive types of agricultural cultivation. These land use activities can degrade habitat and species diversity through consequences such as displacement and fragmentation of habitats and populations, alteration of hydrology, contamination, erosion, sedimentation, disruption of migration corridors, changes in water quality, and introduction or promotion of predators. They can also contribute to potential community impacts identified for the project, such as changes in community character, traffic patterns, housing availability, and employment.

CEQA Guidelines, Section 15130 describes when a cumulative impact analysis is warranted and what elements are necessary for an adequate discussion of cumulative impacts. The definition of cumulative impacts, under CEQA, can be found in Section 15355 of the CEQA Guidelines. A definition of cumulative impacts, under NEPA, can be found in 40 CFR, Section 1508.7 of the CEQ Regulations.

Projects planned or recently constructed in the vicinity of the Antlers Bridge that may affect water quality are discussed below:

The U.S. Department of the Interior, Bureau of Reclamation (Mid-Pacific Region), is studying alternatives to increase the capacity of Shasta Lake. The purpose of this project is to improve anadromous[3] fish survival and water supply reliability, habitat restoration, flood control, and to meet the growing demand for new energy sources. Five initial alternatives were developed that include raising the dam between 6.5 and 18.5 feet. The schedule for developing this project is as follows: the environmental scoping process was initiated in spring 2005; prepare draft EIR/EIS in winter 2007; prepare final EIR/EIS and approve project in fall 2008; project construction 2010 to 2015.

Caltrans implemented an emergency project in spring 2004 to replace the concrete deck on the Antlers Bridge due to severe, premature deterioration. The main cause for the accelerated deterioration of the deck was high truck traffic volumes. The deck replacement project was completed in fall 2004.

STNF, in conjunction with Seven Crown Resorts, proposes construction of a new marina at Turntable Bay to replace the existing Digger Bay Marina. The new marina would include increased public boat moorage, a four-lane boat launching ramp, boat rentals, paved parking areas, and picnic tables and trails. STNF published a Notice of Intent to prepare an Environmental Impact Statement, as required by the National Environmental Policy Act, on July 6, 2005.

In spring 2006, Caltrans began a roadway rehabilitation project on Interstate 5 from the Antlers Bridge to one mile south of the Dog Creek Bridge. The project entails reconstruction of the paved roadway, drainage improvements, and the removal of trees within 30 feet of the traveled way to create a “clear recovery” area for errant vehicles. It is anticipated that the project will be completed by spring of 2007.

The National Pollutant Discharge Elimination System, administered by the California Regional Water Quality Control Boards, regulates direct and indirect discharges to surface and ground waters. Due to the requirement to control discharges from construction sites, including storm water discharges, it is reasonable to say that the projects referenced above will not result in a cumulatively considerable effect upon water quality. Additional information regarding water quality regulations, potential impacts and mitigation measures related to the proposed bridge replacement project are included in Chapter 2 “Water Quality and Storm water Runoff.”

[3] Fish that migrate from salt water to fresh water or up rivers to spawn, e.g., salmon, shad, etc.