Nevada Tahoe Conservation District

Burke Creek Highway 50 Crossing and Realignment Project

Environmental Assessment

In Cooperation with

USFS Lake Tahoe Basin Management Unit
Nevada Department of Transportation
Tahoe Regional Planning Agency

February 2016

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The Nevada Tahoe Conservation District (NTCD) is now Nevada Lake Tahoe's local conservation agency and source for technical assistance. The District is a non-regulatory and grant funded agency that works closely with its Federal, State, and Local partners to deliver conservation programs to the Nevada Lake Tahoe Community. The District is guided by a Board of Supervisors made up of elected and appointed community leaders. The Board of Supervisors provides direction to the District's full time staff in carrying out the District's mission statement, vision, and guiding principles. To promote the conservation and improvement of the Lake Tahoe Basin's natural resources by providing leadership, education, and technical assistance to all Basin users. As described in our mission statement, the District seeks to provide its constituents with superior technical assistance, educational resources, and conservation leadership with the goal of protecting Lake Tahoe's natural resources.

Acronyms and Abbreviations

ANSI	American National Standards Institute
BABE	Biological Assessment/Biological Evaluation
BLA	Boundary Line Adjustment
BMI	Benthic Macroinvertebrate
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CIP	Capital Improvement Project
CMP	corrugated metal pipe
CNEL	Community Noise Equivalent Level
County	Douglas County
dB	decibel
dbh	diameter at breast height
EA	Environmental Assessment
ECAM	Existing Conditions Assessment Memorandum
EIP	Environmental Improvement Program
FONSI	Finding of No Significant Impact
Forest Plan	Lake Tahoe Basin Management Unit Land and Resource Management Plan
FWS	United States Fish and Wildlife Service
GHGs	greenhouse gasses
GID	General Improvement District
GIS	Geographic Information System
HEC-RAS	Hydraulic Engineering Center – River Analysis System
KGID	Kingsbury General Improvement District
LEED	Leadership in Energy and Environmental Design
Leq	Equivalent energy level
LOP	limited operating period
LTBMU	Lake Tahoe Basin Management Unit
LWD	Large Woody Debris
MDBM	Mt. Diablo Baseline and Meridian
MIS	Management Indicator Species
NRCS	Natural Resources Conservation Service
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Division of Wildlife
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NDOT	Nevada Department of Transportation
NDSL	Nevada Division of State Lands

NTCD	Nevada Tahoe Conservation District
PAC	Protected Activity Center
PPV	Peak Particle Velocity
ROS	Recreation Opportunity Spectrum
SEZ	stream environment zone
SHPO	State Historic Preservation Officer
SNFPA	Sierra Nevada Forest Plan Amendment Record of Decision
STRR	South Tahoe Refuse and Recycling
SWPPP	Storm Water Pollution Prevention Plan
TAC	Technical Advisory Committee
TEPCS	federally threatened, endangered, proposed, candidate and/or sensitive species
TRPA	Tahoe Regional Planning Agency
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFS	United States Forest Service

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Chapter 1
Introduction

1.1 Background

This is a cooperative project involving multiple agencies. Activities are proposed on lands under the jurisdiction of Douglas County (County), Nevada Department of Transportation (NDOT), private (Sierra Colina and Apartments 801) and the U.S. Forest Service (USFS), Lake Tahoe Basin Management Unit (LTBMU). The Nevada Tahoe Conservation District (NTCD) is acting on the behalf of NDOT and the County, as the recipient of a Federal Erosion Control Grant for the project, administered by the USFS. NDOT is also contributing funds to the project, as well as the Nevada Division of State Lands (NDSL) and Tahoe Regional Planning Agency (TRPA).

The project area is comprised of open space, roads, commercial development and parking lots owned by USFS, NDOT, the County, Sierra Colina LLC., and Apartments 801 LLC. The USFS LTBMU administers the USFS lands west of US 50. East of US 50 is commercial development owned by Apartments 801 LLC., Kahle Drive Community Center parking lots, ballfields and land owned by the County and vacant land along Burke Creek owned by Sierra Colina LLC. US 50, which runs through the project area, is owned and controlled by the NDOT. Single family residential and multi-family residential land use is found immediately to the south of the project area, on the south side of Kahle Drive. The entire project area drains to Lake Tahoe via surface drainage, mainly through Burke Creek. Stormdrain systems collect runoff from Kahle Drive, a portion of US 50 and the adjacent neighborhoods and route it to Burke Creek.

The County obtained a portion of the commercial parking lot north of the commercial complex (old Nugget Casino) located at 177 HWY 50 and adjacent to Burke Creek east of US 50 as part of the Boundary Line Adjustment (BLA) negotiated with Mr. Charles Bluth as recorded September 24, 2014 in the County recorded document numbers 0849812 through 0849815. As part of the BLA, the County also obtained easement on a portion of the parcel located at 179 HWY 50 for the construction and maintenance of Burke Creek Restoration Project. In return, Mr. Bluth obtained a portion of the parking lot located at 175 HWY 50 to the south of the commercial building and a non-exclusive parking easement for a portion of the County owned parking lot located at 181 HWY 50 (see Figure 1-3 Easements). Mr. Bluth sold the property to Apartments 801 LLC. in the spring of 2015.

NTCD and the County coordinated with the new owner of the commercial complex (Apartments 801 LLC.) to participate in the project and allow project improvements at the commercial complex. A brochure summarizing the project benefits titled Burke Creek Highway 50 Crossing and Realignment Project: Potential Area Enhancements August 2015 (Appendix A) was created and shared with Apartments LLC., but the owner was not interested in project participation by allowing improvements on the commercial complex property. The proposed improvements to

Apartments 801 LLC property are depicted on the 50% design plans but removed from further design.

1.2 Overview of the Existing Conditions

The approximate 16.5 acre project area is located in Stateline, Douglas County, Nevada, on the south shore of Lake Tahoe, within the Burke Creek Watershed (TRPA Priority 3 Watershed 39). It is bordered by Kahle Drive to the south, Shady Lane to the east, Lake Tahoe to the west, and Elks Point Road to the north (see Figure 1-1 Vicinity Map and Figure 1-2 Existing Conditions). The project area appears on the 1999 United States Geologic Survey (USGS) South Lake Tahoe 7.5-minute quadrangle in Sections 22 and 23 of Township 13 North, Range 18 East, of the MDBM, Latitude 38.9717°, and Longitude -119.9361°.

The project area includes a portion of the parking access to the Lam Watah Trail and the Rabe Meadow Multi-Use Trail. The Rabe Meadow Multi-Use Trail was built in 2012 and extended along Laura Drive in 2015. The trailhead facilities at the corner of Kahle Drive and US 50 provide popular recreation access and opportunity to diverse recreational pursuits. The trailhead parking lot and facilities were renovated during the bike path construction in 2013 to include 20 parking spaces, a restroom, a picnic area, and multiple interpretive signs/kiosks. The trailhead parking lot and Rabe Meadow Multi-Use Trail are managed by The County under Special Use Permit with the USFS. Shoreline Adventure Center offers bicycle, ski and snowshoe rentals from their location across the street from the trailhead. Pedestrians and bike riders travel through the meadow and enjoy meadow, forest, and stream environments as they travel to Nevada Beach or along the bike path to Round Hill Pines Resort. The Lam Watah Trail also starts at this trailhead and leads users past Jennings Pond, which supports waterfowl, lush vegetation and the occasional fisherman before terminating at the Nevada Beach campground. The Lam Watah Trail is managed by the USFS. The area's proximity to the concentrated Stateline hotels contributes to its popular recreation use.

The meadow adjacent to Burke Creek and the trailhead access has known infestations of invasive plants such as bull thistle, oxeye daisy, Canada thistle, and sulfur cinquefoil and does not contain desired montane riparian species.

Rabe Meadow and Burke Creek have been dramatically impacted over the last 100 years. The first major disturbance to the project area came from logging during the Comstock mining boom in the late 1800s. The area between Kingsbury Grade and Dagget Pass was heavily logged. During this time, roads were established throughout the area to support the logging, and other industries needed to service workers. Rabe Meadow was home to the Hobart Logging camp until a majority of the timber was depleted and mining in the area came to a close. After the end to the Comstock mining, the area became home to seasonal ranches and farms to support the resorts and

estates around the Lake. During this time the Rabe family owned a majority of the project area and it remained in the family for many generations. The family mainly used the meadow for cattle ranching and grazing until the 1980s.

Some of the most significant impacts to the meadow and creek occurred in the 1940s and 1950s. In the late 1940s Burke Creek was relocated to the western part of the meadow for the development of an airport which later was closed and urbanized as a residential neighborhood. In the 1950s the stream was moved and straightened to accommodate development of the Tahoe Nugget Casino (now Apartments 801 owned) within the historic floodplain. As a result, Burke Creek runs along a hillside via a berm. This hillside location affords little floodplain access and limited sinuosity and stream complexity.

Later, in 1978 the property at the corner of US 50 and Kahle Drive was sold to a casino developer. Construction of the Ted Jenning Tahoe Palace Resort and Casino was started but never finished. Remnants of the casino resort foundation can still be found. The property was sold to the USFS in the 1980s and the USFS quickly began restoration efforts, working to reverse some of the development impacts to the meadow and stream. Restoration conducted at that time included removal of the above ground structures, burial of some of the below ground foundation structure, as well as construction of Jennings Pond and channel restoration. The channel's location along the top of a knoll causes high flows to escape the channel and enter the urban environment. Burke Creek has flowed across the Lam Watah trail and trailhead sidewalk before entering the stormwater infrastructure along Kahle Drive.

At US 50, a 2 foot diameter metal corrugated pipe parallels the highway for 200 feet before conveying Burke Creek under the highway. HEC-RAS modeling suggests that the 2 foot diameter culvert is capable of passing 25 cfs which equates to a 5 year flow event. This undersized culvert has potential to backwater US 50 travel lanes according to HEC-RAS modeling. A drop inlet also conveys stormwater runoff directly into the culvert and Burke Creek as it crosses US 50. Runoff habitually inundates US 50 eastbound lanes adjacent to the Lake Village development. A drop inlet in this area also directs US 50 stormwater untreated into Folsom Spring.

Upstream of US 50 on Sierra Colina property, head cuts exist and are causing channel entrenchment, bank undercutting and erosion. The entrenchment also restricts floodplain access and lowers the water table. Stormwater runoff from the County ballfields at the Kahle Community Center is conveyed into Burke Creek via a swale just above the commercial parking lot. These stormwater flows have occasionally breached the conveyance swale and flowed down a steep slope and across the parking lot on private property. HEC-RAS modeling indicates that Burke Creek escapes its banks and overflows down the slope and into the parking lot near the ball field swale confluence. Numerous informal trails and unpaved relic roads are also in this

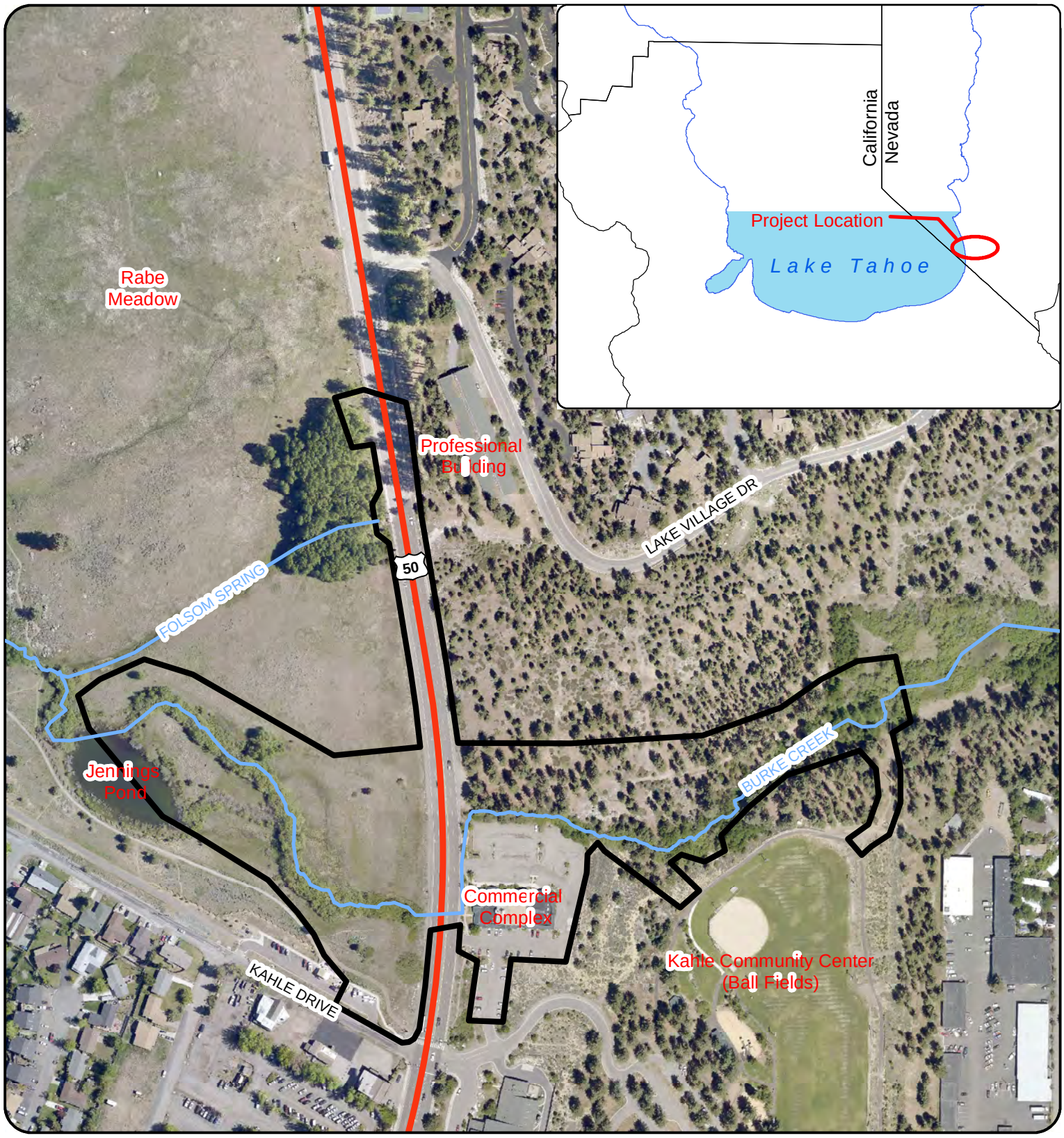
area and contribute to stream bank instability and erosion. Human generated trash is also apparent along the banks and floodplain including an automotive fuel tank lodged in the banks of Burke Creek and various construction debris within the floodplain.

Lakeside Casino has future redevelopment planned for their property along US 50 and Kahle Drive, while the Tahoe Beach Club is expected to begin construction of their redevelopment as early as 2016. Sierra Colina development near Lake Village is also expected to commence as early as 2017. The South Shore Area Plan (2013), South Shore Vision Plan (2011), Kahle Dive Vision Plan (2014) and the Draft Tahoe Douglas Area Plan (2014) detail additional potential development in the area.

Figure 1-1

Vicinity Map

Project area with Burke Creek Watershed
Location of PPRF Projects see Section 3.2



Legend

- Creeks
- US 50
- Project Area

FIGURE 1-1: VICINITY MAP

Burke Creek HWY 50 Crossing and Realignment

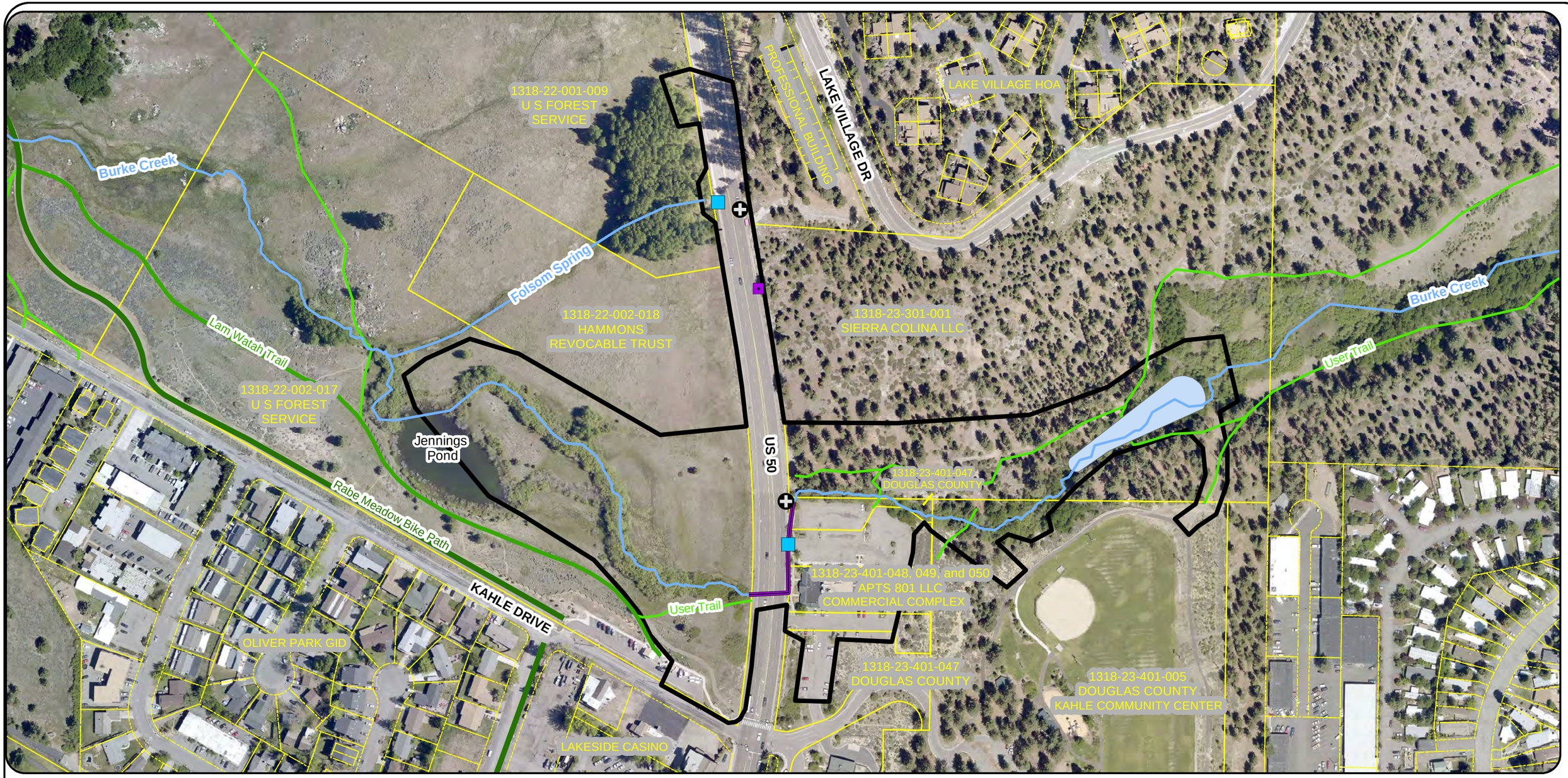
Scale - 1:3,500

0 70 140 280 420 560 700 Feet

NV West State Plane	NAD 83	horiz. units: feet
Prepared by NTCD	Nevada Tahoe Conservation District	December 2015

Figure 1-2

Project Area, Existing Conditions, No Action Alternative



- Channel Breach
- Direct Stormwater Input
- US 50 Flooding
- Degraded Channel
- Existing Drainage Inlet
- Existing Creek Culvert
- Existing Trench Drain
- Existing Creek Alignment
- User Trails
- Lam Watah Trail
- Rabe Meadow Bike Path
- Project Area

FIGURE 1-2 : EXISTING CONDITION & NO ACTION ALTERNATIVE
Burke Creek Highway 50 Crossing and Realignment

Scale - 1:2,500

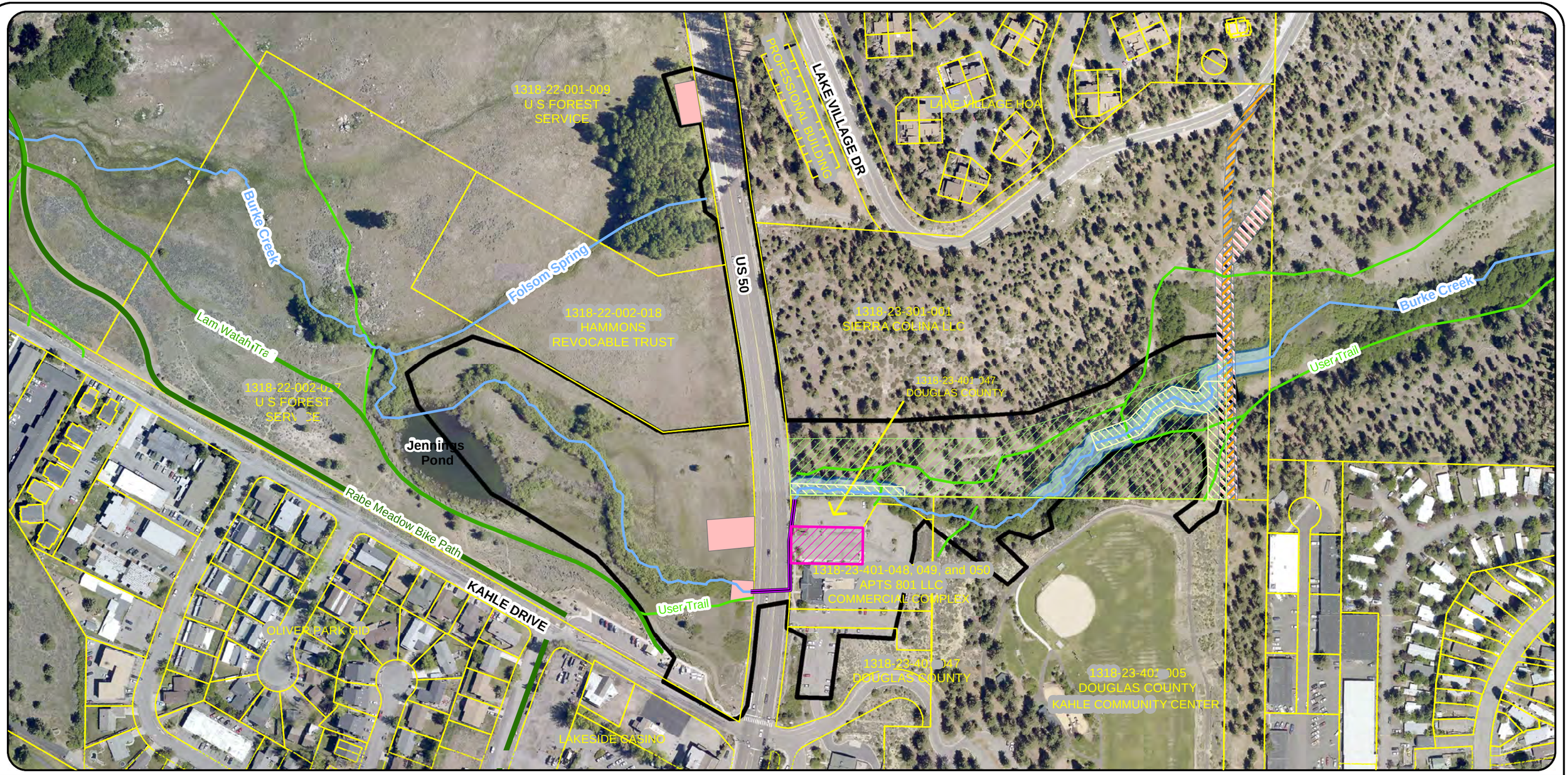
0 100 200 400 600 800 1,000 Feet

N W E S

NV West State Plane	NAD 83	horiz. units: feet
Prepared by NTCD	Nevada Tahoe Conservation District	December 2015

Figure 1-3

Easements



- Existing Culvert
- Existing Creek Alignment
- User Trails
- Lam Watah Trail
- Rabe Meadow Bike Path
- Sierra Colina Temporary Easement
- Sierra Colina Permanent Easement
- Commercial Complex Perm. Easement
- USFS Special Use Permit Easement (Perm & Temp)
- 50ft Douglas Co. Drainage Easement
- 20ft KGID Sewer Easement
- 40ft Sierra Pacific Power Easement
- Project Area
- Parcel Boundaries

FIGURE 1-3: EASEMENTS

Burke Creek Highway 50 Crossing and Realignment

Scale - 1:2,500

0 100 200 400 600 800 1,000 Feet

NV West State Plane	NAD 83	horiz. units: feet
Prepared by NTCD	Nevada Tahoe Conservation District	December 2015

1.3 Purpose and Need for Action

The purpose of the project is to stabilize portions of the Burke Creek channel and its adjacent floodplain, reduce pollutant loading from in-channel and urban sources areas to Lake Tahoe, and improve conveyance capacity of the Burke Creek culvert beneath US 50 and improve public safety on US 50 related to flooding and improve stormwater treatment and conveyance along US 50. This can be achieved by addressing the following needs (see Figure 1-2):

- Improve channel stability, reducing bed and bank erosion in the stream. Utilize channel restoration/floodplain design approach that will increase groundwater levels and restore natural surface flooding within the floodplain. Improved hydrology will expand area of montane riparian vegetation, providing channel and floodplain stability, and enhancing filtering of fine sediments and dissolved nutrients during over bank flow events.

- Improve drainage along US 50 and stream crossing for Burke Creek under US 50 that provides safe transport of flow and sediment to reduce the frequency of flooding of highway and private property and reduce level of maintenance needed. Construct stormwater treatment improvements to prevent pollutants from urban source areas (US 50 and adjacent commercial parking lots) from entering Burke Creek.

1.4 Proposed Action

To meet the purpose and need of the project as described above, the Proposed Action would implement the Burke Creek Highway 50 Crossing and Realignment Project Phase I and II. Throughout this document Phase I is described as “above US 50, and Phase II is described as “below US 50”. The Project will be designed and implemented in two phases. Phase I (2016 planned construction) would replace existing undersized culvert at US 50 with new culvert capable of safely conveying the 50 -year flow event; above US 50, remove approximately 9,000 square feet of parking lot, stabilize portions of existing Burke Creek channel, and construct new stream channel and floodplain; decommission legacy roads and trails on Sierra Colina property; install a stormwater conveyance and treatment improvements along the west side of US 50. Phase II (2017 planned construction) would recontour and excavate to abandon the existing unstable channel and replace with geomorphically stable channel to tie into the new US 50 stream culvert outlet on USFS land. Further details of the Proposeded Action are included in Section 2.1.2.

1.5 Decision Framework

The LTBMU Forest Supervisor would decide:

1. Whether or not to implement the project activities as described in the Proposed Action or select the No Action Alternative.
2. Whether or not a Finding of No Significant Impact (FONSI) can be supported by the environmental analysis contained in this Environmental Assessment (EA).

Implementation of the Proposed Action would require coordination and permitting through the TRPA, U.S. Army Corps of Engineers (USACE), Nevada Department of Environmental Protection (NDEP), and the County. Implementation could begin as early as summer 2016 and the project construction is anticipated to be completed in two years.

1.6 Public Involvement and Results of Scoping

Public scoping commenced in February 2015 with the printing of an article in the Tahoe Tribune and a public meeting attended by the Tahoe Tribune, Mountain Resort Television, 2 representatives of the Sierra Club and two members of the public. A letter seeking stakeholder input/comment was mailed to area agencies, stakeholders and adjacent property owners along with a project description and map of proposed improvements. NTCD toured the project site with Sierra Club representatives and described project improvements and impacts. One written comment letter was received from the Sierra Club as a result of public scoping.

A technical Advisory Committee to help guide the project from analysis of existing conditions through development of 100% design plans and construction was formed from the following agency representatives:

- United State Forest Service – Lake Tahoe Basin Management Unit (LTBMU)
- Nevada Department of Transportation (NDOT)
- Nevada Division of State Lands (NDSL)
- Nevada Department of Environmental Protection (NDEP)
- Douglas County (County)
- Tahoe Regional Planning Agency (TRPA)
- U.S. Army Corps of Engineers (USACE)

Several concerns were identified and addressed in the final Proposed Action that was part of the formal scoping process. A couple of these preliminary concerns included:

- The presence of invasive plants within the project area. Design features and a Weed Management Plan (USFS 2015e, Appendix I) will be implemented to treat existing occurrences and prevent the spread of these plants during project construction.
- Utility conflicts at the US 50 culvert crossing. Design takes into account the presence of gas, sanitary sewer, water, and multiple communication lines including a fiber optic line.
- Potential for nesting migratory birds. The construction timing will be such that nesting migratory birds will have fledged occupied nests resulting in no adverse impact to these species.
- The Chair of the Tahoe Area Sierra Club urged the NTCD to work with the NDOT to increase the size of the culvert under US 50 from a 50-year storm design to a 100-year storm design in order to adequately connect from the new floodplain to Rabe Meadow on the western side of the project.
- Per the TRPA Code, 60.4.6.D, drainage conveyances through a Stream Environment Zone (SEZ) shall be designed for a minimum of a 50-year storm, which is more conservative than NDOT, which recommends using the 25-year peak flows for design.

Chapter 2
Alternatives, Including the Proposed Action

2.1 Alternatives Considered in Detail

The range of alternatives considered for this analysis was bound by the purpose and need underlying the Proposed Action, the project area boundary, as well as by the issues that arose from Technical Advisory Committee (TAC) discussion and stakeholder input.

2.1.1 Alternative 1 – No Action

Under the No Action alternative, the existing conditions and resulting issues (Section 1.3 and Figure 1-2) would continue, and none of the objectives of the Proposed Action would be realized.

Specifically, drainage and water quality issues within the US 50 right-of-way would continue resulting in flooding along US 50 due an undersized culvert that cannot safely pass the 50-year event on Burke Creek, and untreated roadway stormwater runoff would continue to discharge into Burke Creek and Folsom Spring.

Unstable channel bank conditions along portions of Burke Creek above and below US 50 would continue to be a source for sediment entering the downstream Burke Creek-Rabe Meadow system and flooding due to channel overtopping along the commercial complex parking lot and the Kahle Drive trailhead facilities would continue. Upland vegetation dominated by non-native and some invasive species will continue to thrive in the existing riparian corridor.

2.1.2 Alternative 2 – Proposed Action

The following detailed actions as illustrated on Figures 2-1, 2-2 and 2-3, are proposed to meet the purpose and need described above in Section 1.6.

Phase I: Improvement to US 50 and Burke Creek above US 50 including stormwater improvements along the west side of US 50 *(NTCD).*

US 50 Drainage and Stormwater Treatment Improvements

- Remove 70 feet of existing 24 inch culvert pipe along US 50 adjacent to slated parking lot removal and install 125 feet of 57 inch x 38 inch plastic-encased corrugated metal arch pipe beneath US 50 to convey at minimum the Burke Creek 50 year stream flows (94 cfs). The proposed pipe is of a standard size capable of conveying 103 cfs.

- Install a rock dissipater (with flow splitter) at the US 50 Burke Creek culvert outfall to transition the stream approximately 7 to 9 feet in elevation down a slope.
- Install approximately 160 linear feet of trench drain, 55 linear feet of vertical curb, 300 linear feet of rolled curb and gutter, 200 linear feet of culvert, 2 drainage inlets, a double sediment trap and rock dissipation structures to the stormwater infrastructure supporting outfalls 1, 3 and 4 (see Figures 1-2; 2-2 and 2-3) along US 50 between Lake Village Drive and Kahle Drive to improve conveyance and treatment of urban stormwater runoff from US 50 and commercial complex. Decommission SW outfall 2 at Folsom Spring, as flow captured at this drop inlet will be conveyed to SW outfall 1 (which provides treatment through an existing 450 square foot vegetated depression.
- At SW outfall 4 across from commercial complex, remove approximately 10 trees (willow and alder) from approximately 35 feet of abandoned Burke Creek channel and recontour to create an approximately 600 square foot depressed vegetated area to promote infiltration and flow spreading.
- Establish access route for stormwater improvements construction within NDOT US 50 right-of-way.
- Install a viewing area, seating bench and educational signage on east side of US 50, adjacent to Burke Creek and newly installed arch pipe.

Burke Creek Channel and Floodplain Improvements

- Decommission approximately 9,000 square feet of parking lot adjacent to Burke Creek and the commercial complex owned by Apartments 810 LLC. Remove approximately 15 trees between 6 inch diameter at breast height (dbh) and 27 inch dbh to enable floodplain grading on the County and Sierra Colina property.
- Excavate area of removed parking lot area and additional approximately 4,500 square feet along existing channel to lower surface elevation of floodplain.
- Relocate the berm which confines Burke Creek to its existing hillside location to the south edge of the newly excavated floodplain. Berm height will remain the same, varying between 6 feet to 0 at surface grade. Install curb between the remaining parking lot and the berm.
- Construct approximately 250 feet of new geomorphically stable channel with approximately 11 rock or log grade control structures through the newly excavated floodplain area. Install flow splitter to direct main flows to newly constructed channel and high flows (above approximately 40 cfs; 7 year flow event) to an approximately 100 foot retained portion of the existing channel. Construct 40 feet of connector channel to direct high flows from the existing channel into the newly constructed channel just upstream of the US 50 culvert inlet. Backfill and recontour 80 feet of existing channel to be abandoned.
- Install approximately 15 headcut stabilization structures in the channel on Sierra Colina property to prevent further down and under cutting and promote channel aggradation over time. Many of these structures will be placed by hand in augered holes within the

entrenched channel confines. In areas close to existing trails and roads, a mini excavator may be used to complete some of the work. Remove several trees between 6 inch and 14 inch dbh on private property to enable construction/access.

- Perform minor grading to existing drainage swale from ballfields to restore function. Currently flow escapes the swale and runs down a steep slope and enters the commercial complex parking lot.
- Remove human generated trash within and adjacent to Burke Creek.
- Recontour approximately 300 square feet of floodplain adjacent to Burke Creek near the ball field swale confluence to lower surface elevation and lessen the frequency at which flows avulse down the steep hillside and enter commercial complex parking lot. Remove approximately 4 trees between 6 and 14 inch dbh on the County property.
- Establish access routes along existing utility easement from the Kahle Community Center ball fields and/or existing legacy roads on Sierra Colina property from US 50. Decommission approximately 950 feet of legacy roads and approximately 1,300 linear feet of trails, after project construction is complete.
- Utilize 600 feet of US 50 and Kahle Drive and 850 feet of Kahle Community Center sidewalk to access the Project area from the temporary staging area located in 7,750 square feet of the County parking lot on the northeast corner of Kahle Drive and US 50 as illustrated in Figure 2.1.

Phase II: Stream Restoration Below US 50

Burke Creek Channel Realignment (USFS)

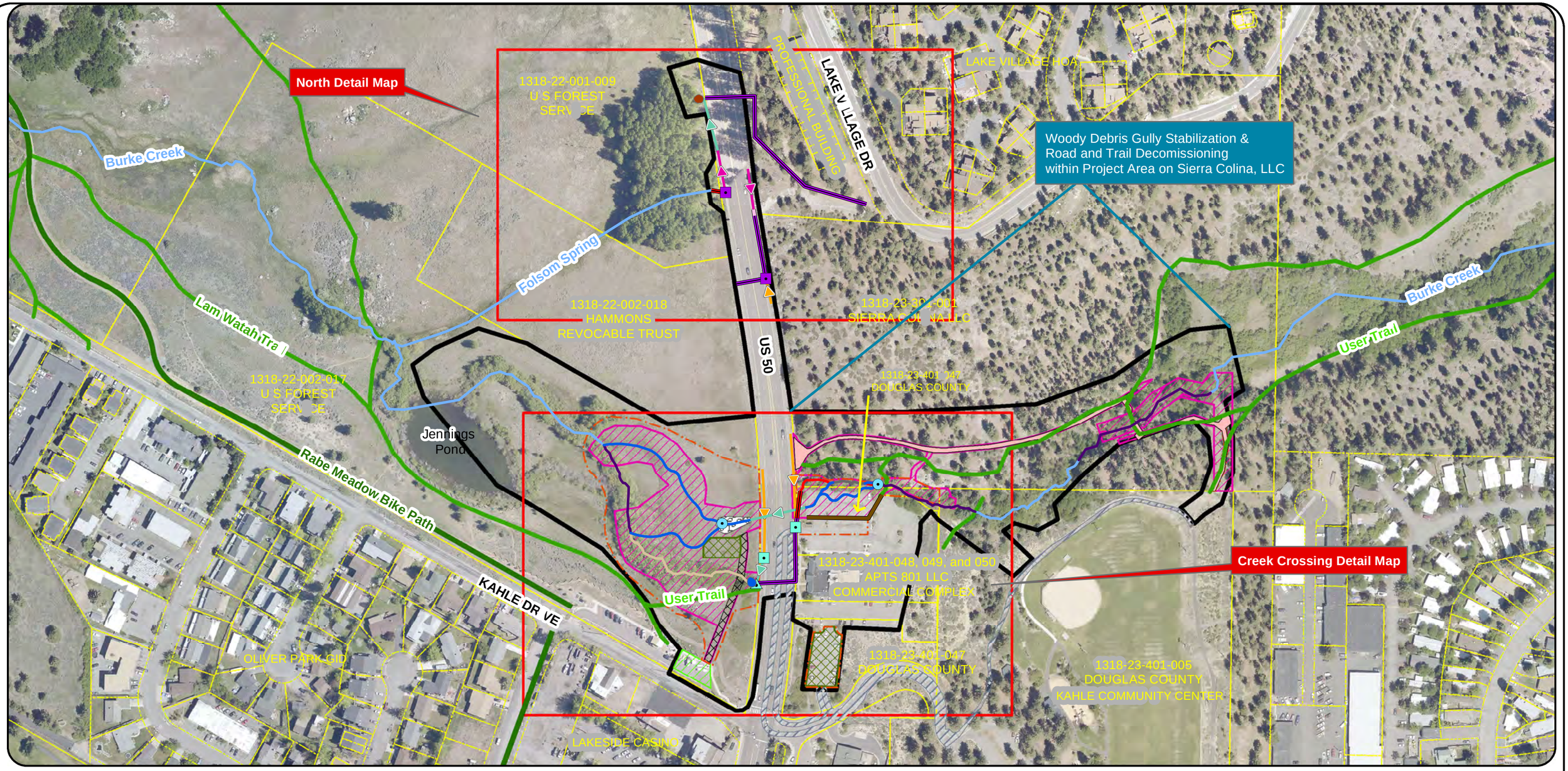
- Construct approximately 230 feet of new channel for the south fork and 400 feet of new channel for the north fork. Install several log and rock grade control and bank stabilization structures along both forks. Reconnect the north and south forks to the existing channel approximately 475 feet and 250 feet below the existing culvert respectively.
- Recontour approximately 250 feet of abandoned Burke Creek channel to accept NDOT stormwater overflow from approximately 600 square foot vegetated area (described above) for treatment via infiltration and flow spreading.
- Remove and salvage approximately half of the willow and alder along approximately 200 feet of existing channel to be recontoured for stormwater treatment for revegetation and stabilization of newly constructed channel and floodplain.
- Enforce temporary intermittent closure of the Kahle Drive trailhead parking lot entrance and first few parking spaces to mobilize equipment and import material.
- Establish an approximately 2,300 square foot materials and equipment staging area adjacent to the site of new channel construction as illustrated in Figure 2.1. Construct a 15 foot wide temporary encapsulated road from the Kahle Drive trailhead parking lot to

the staging area. In this access road foot print, cut shrubs down to ground surface, but leave roots intact to re-sprout.

- Infestations of non-native plants within and adjacent to proposed construction areas, staging areas and access routes will be treated or managed (e.g. flag and avoid, tarped during construction) prior to project construction. Manage for existing weed infestations throughout project area for at least three years post-implementation according to the project Weed Management Plan (USFS 2015e, Appendix I).

Figure 2-1

Alternative 2 “Proposed Action” Alternative



- Existing Drainage Inlet
- Existing Culvert
- Existing Trench Drain
- Abandoned Culvert
- Existing Stormwater Treatment
- Proposed Flow Split
- Proposed Drainage Inlet
- Proposed Double Sediment Can
- Proposed Culvert
- Proposed Curb & Gutter
- Proposed Trench Drain
- Proposed Berm & Curb
- Proposed Stormwater Treatment
- Proposed Rock Cascade

Burke Creek Adjustments

- Existing Creek Alignment
- Proposed Channel
- Abandoned Channel
- Temporarily Dewatered
- Overflow Channel
- Stormwater Overflow

- Staging Areas
- Temporary/Intermittent Closure
- Encapsulated Access Road
- Sierra Colina Access Road
- Limit of Disturbance
- Temporary Construction Fence
- Access Routes
- Project Area

FIGURE 2-1: PROPOSED ACTION
Burke Creek Highway 50 Crossing and Realignment

Scale - 1:2,500

0 100 200 400 600 800 1,000 Feet

NV West State Plane	NAD 83	horiz. units: feet
Prepared by NTCD	Nevada Tahoe Conservation District	December 2015

Figure 2-2

Alternative 2 North Detail

Existing Drainage Inlet
Existing Culvert
Existing Trench Drain
Culvert to be Abandoned
Proposed Culvert
Proposed Curb & Gutter
Proposed Trench Drain
Existing Stormwater Treatment
Folsom Spring
Project Area

FIGURE 2-2: PROPOSED ACTION - NORTH DETAIL

Burke Creek Highway 50 Crossing and Realignment

Scale - 1:850

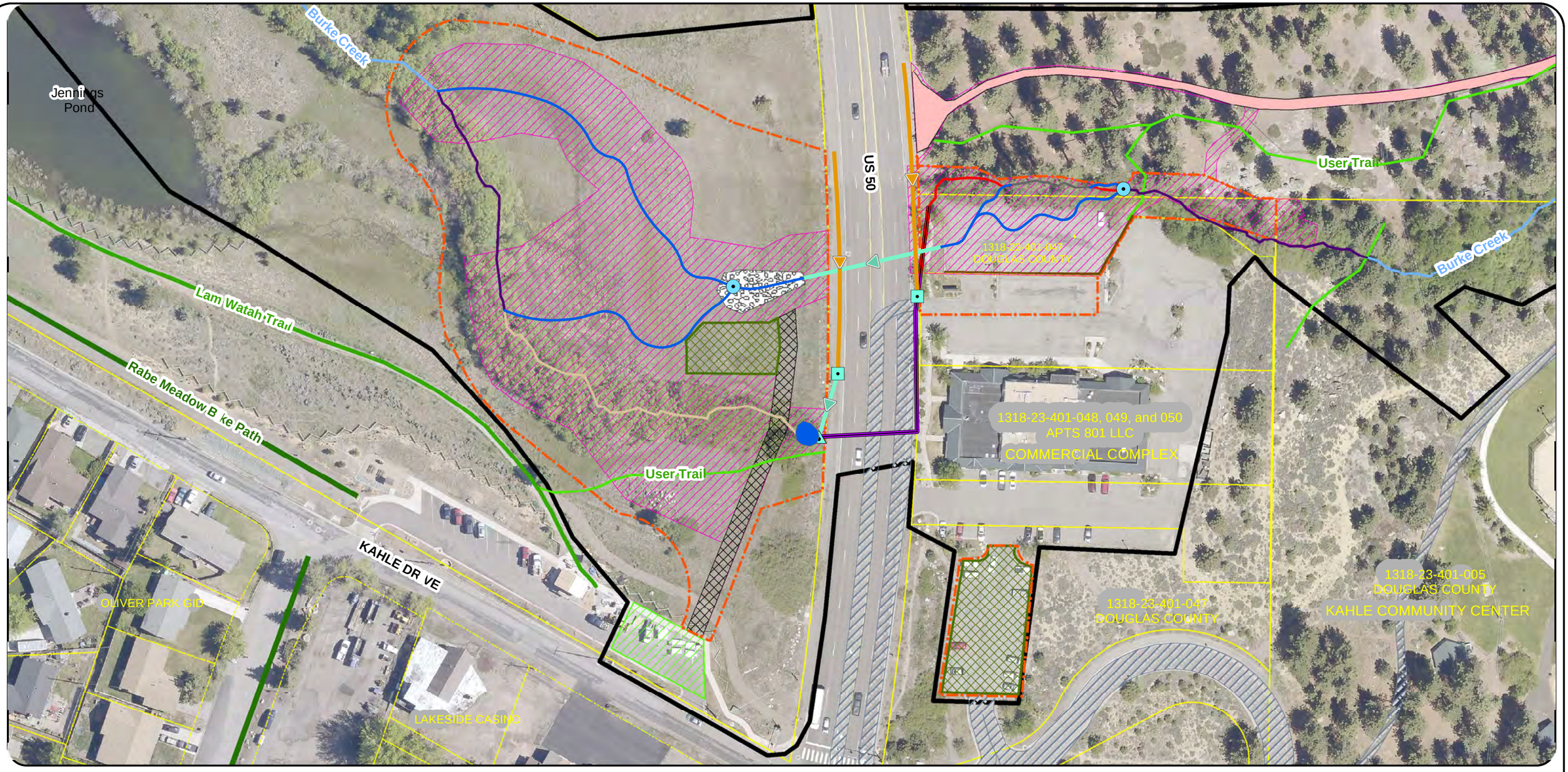
0 30 60 120 180 240 300 Feet

N W E S

NV West State Plane	NAD 83	horiz. units: feet
Prepared by NTCD	Nevada Tahoe Conservation District	December 2015

Figure 2-3

Alternative 2 Creek Crossing Detail



- Existing Drainage Inlet
- Existing Culvert
- Abandoned Culvert
- Proposed Flow Split
- Proposed Drainage Inlet
- Proposed Double Sediment Can
- Proposed Culvert
- Proposed Curb & Gutter
- Proposed Berm & Curb
- Proposed Stormwater Treatment
- Proposed Rock Cascade

Burke Creek Adjustments

- Existing Creek Alignment
- Proposed Creek Alignment
- Abandoned Channel
- Temporarily Dewatered
- Overflow Channel
- Stormwater Overflow

- Staging Areas
- Temporary/Intermittent Closure
- Encapsulated Access Road
- Sierra Colina Access Road
- Limit of Disturbance
- Temporary Construction Fence
- Access Routes
- Project Area

FIGURE 2-3: PROPOSED ACTION - CREEK DETAIL

Burke Creek Highway 50 Crossing and Realignment

Scale - 1:1,000

0 40 80 160 240 320 400 Feet

N W E S

NV West State Plane	NAD 83	horiz. units: feet
Prepared by NTCD	Nevada Tahoe Conservation District	December 2015

2.2 Desired Conditions

In order to properly address the main goal of improving the health, functionality, and water quality of the rain and snowmelt runoff from the Burke Creek-Rabe Meadow Complex, the project will be designed in accordance with the Lake Tahoe Basin Management Unit Forest Plan: Land Resource Management Plan, including the 1988 Land Management Plan and the 2010 Sierra Nevada Forest Plan Amendment. Of particular importance are the sections on water quality, fish and wildlife, cultural resource management, non-structural fish and wildlife habitat management, riparian and stream environment zone management. This design should also enhance or at minimum have no adverse impact on TRPA's nine environmental thresholds including water quality, soil conservation, wildlife, fisheries, scenic, air quality, vegetation, noise and recreation as outlined below.

- Water Quality and Soil Conservation: Desired condition is that floodplain function will be enhanced by increasing natural filtering of fine sediment and nutrients from stream channel flows. Channel stabilization will reduce sediment loading from in-channel sources, and construction of stormwater treatment infrastructure will reduce sediment and nutrient loading from US 50 runoff. Decommissioning of hard and soft coverage (parking lots, roads and trail) will restore soil function to these previously compacted areas. These actions will contribute to achievement of Lake Tahoe TMDL (NDEP, Lahontan Water Board 2011) targets, by reducing sediment and nutrients loading from Forested Uplands, as well as Urban Source areas.
- Wildlife and Fisheries: Desired condition is to have a neutral impact on fisheries and wildlife. Habitat downstream of the project will not be altered. Aquatic and riparian habitat will be improved in restored channels and floodplain, but because of a variety of existing anthropogenic impacts outside the scope of this project, fish and wildlife species are not expected to benefit from the project.
- Scenic Resources: Desired condition is that there will be either a beneficial or neutral impact to scenic resources. Some vegetation visible from US 50 will be removed and replaced with younger stock.
- Air Quality: the project improvements will have a neutral impact on air quality as temporary Best Management Practices (BMPs, Appendix B) and design features (Section 2.3) will be employed to minimize short term adverse impacts.
- Vegetation: Desired condition is conversion to native montane riparian vegetation, dominated by willows and alders, without substantial spread or establishment of invasive plant species. All vegetation removed as part of project construction will be replaced with native and adapted species plant material. Known infestations of invasive plants will be treated or managed and invasive plant prevention measures will be implementation.
- Noise: The project will have no impact on noise long term. Short term impacts will occur through use of heavy equipment during project construction, but will be limited to day time hours

- Recreation: Desired condition is that there will be positive long-term impacts to recreational resources. The project will alleviate Burke Creek flooding of the Lam Watah trail and trailhead sidewalks. Currently, this flooding presents safety issues in the winter as the flows freeze and ice over the trail and sidewalk. There will be short term negative impacts associated with project construction BMPs and design features will be employed to mitigate the negative impacts to the extent feasible.

2.3 Project Design Features and Best Management Practice

Activities associated with implementation of this project could have localized, short-term effects. The following design features have been incorporated into the Proposed Action and are intended to minimize or avoid effects on soils, water, vegetation, wildlife, fisheries, heritage resources, recreational resources, and air quality. In addition to the following design features, applicable BMPs (Appendix B) are identified in Water Quality Management for Forest System Lands (USFS 2012b). Adherence to these BMPs ensures compliance with the Clean Water Act. Detailed specification for these BMPs would be incorporated into the final design plans and any plans required for permitting (for example, a SWPPP (Storm Water Pollution Prevention Plan).

Botanical resources

- Although no sensitive plant species were documented to occur within the project area (Wood Rodgers 2015a, USFS 2015d), disturbance will be limited to only that necessary for project access, staging/storage and construction. If during project related activities, sensitive species are observed, the Forest Botanist will be notified and appropriate actions shall be implemented to protect sensitive species.
- In project areas that may impact suitable habitat, native wetland-associated plant species will be revegetated as needed to facilitate channel stabilization, water table maintenance, and erosion prevention.

Invasive Plants

- All equipment and vehicles (Forest Service and contracted) used for project implementation must be free of invasive plant material before moving into the project area. Equipment will be considered clean when visual inspection does not reveal soil, seeds, plant material or other such debris. Cleaning shall occur at a vehicle washing station or steam-cleaning facility before the equipment and vehicles enter the project area.
- When working in known invasive plant infestations or designated weed units, equipment shall be cleaned before moving to other National Forest Service system lands. These areas will be identified on project maps.
- Do not stage equipment, materials, or crews in invasive plant-infested areas.
- Where feasible, invasive plant infestations will be designated as Control Areas—areas where equipment traffic and soil-disturbing project activities would be excluded. If Control Areas are designated, they will be identified on project maps and delineated in the field with flagging.

- Equipment traffic and soil-disturbing project activities would be excluded from invasive plant infestations, unless otherwise specified in the Invasive Plant Management Plan. These areas will be identified on project maps and delineated in the field with flagging.
- Minimize the amount of ground and vegetation disturbance in staging and construction areas. Where feasible, reestablish vegetation on disturbed bare ground to reduce invasive species establishment; revegetation is especially important in staging areas.
- Any additional infestations discovered prior to or during project implementation should be reported to the Forest Botanist or their designated appointee for prioritization and assessment for treatment.
- All gravel, fill, or other materials are required to be weed-free. Use onsite sand, gravel, rock, or organic matter when possible. Otherwise, obtain weed-free materials from sources that have been certified as weed-free. If an LTBMU inspector is not available to inspect material source, then the project proponent will provide a weed-free certificate for its material source.
- Use weed-free mulches and topsoil. Salvage topsoil from project area for use in onsite revegetation, unless contaminated with invasive species. Do not use material (or soil) from areas contaminated by cheatgrass.
- If staging and construction areas cannot be revegetated (active or passive) or rehabilitated within the same growing season as construction, then they will be stabilized until such activities can be accomplished, unless revegetation of the area is deemed unnecessary by a staff hydrologist and botanist. Stabilization options include, but are not limited to, minimum of 4 inches wood chip mulch, landscape fabric, or erosion control fabric.
- Infestations prioritized for treatment will be treated in accordance with USFS management direction and the design features of the LTBMU 2010 Terrestrial Invasive Plant Species Treatment Project Environmental Assessment. Project leader will notify the Forest Botanist or their designated appointee at least one month prior to project initiation to coordinate invasive plant treatment.
- Specific species USFS preferred management and treatments measures are contained in the Invasive Plant Risk Assessment (Appendix G) and Weed Management Plant (USFS 2015e, Appendix I).
- After the project is completed the Forest Botanist should be notified so that (as funding allows) the project area can be monitored for invasive plants subsequent to project implementation.

Revegetation

- Seed and plant mixes must be approved by the Forest Botanist or their designated appointee who has knowledge of local flora.
- Invasive species will not be intentionally used in revegetation. Seed lots will be tested for weed seed and test results will be provided to Forest Botanist or their designated appointee.
- Persistent non-natives, such as timothy (*Phleum pretense*), orchardgrass (*Dactylis glomerata*), ryegrass (*Lolium spp.),* or crested wheatgrass (*Agropyron cristatum*) will not be used in revegetation.

- Seed and plant material will be from native, high-elevation sources as much as possible. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed, and at a similar elevation whenever possible.

Aquatic

- Salvage/recovery of fish will be conducted within anticipated construction dewatering or diversion zones operations by electro-shocking or other suitable means as developed through consultation with the Nevada Department of Wildlife (NDOW) and LTBMU fisheries staff. Fish will be moved approximately 500 -700 feet upstream or downstream of project activities, as determined by NDOW and USFS fisheries staff. Block nets will be installed to ensure fish do not move back into the project area.
- Nets will be cleaned one to two times daily to ensure the nets are functioning.
- Utilize BMPs in order to ensure implementation does not impact Folsom Spring.
- Western pearlshell mussel (*Margaritifera falcate*) surveys will be conducted by the LTBMU aquatic survey crew prior to implementation on USFS property.
- Mussels will be removed, where feasible, from the active Proposed Project reach prior to diverting channel flow into the newly constructed channel. Feasibility will be determined in the field by the USFS aquatic biologist and will take into consideration mussel population within and outside of the project area.
- Annual inventories for Sierra Nevada yellow-legged frog in suitable habitat may be required based on the forthcoming programmatic biological opinion. Required surveys shall be conducted by an LTBMU aquatic biologist or under the direction of an LTBMU aquatic biologist.
- Staging areas will not be in wet meadow, lakes, ponds, or any waterway.
- Equipment used in the project must be sanitized and free of non-native aquatic invasive species before moving into the project area to ensure that the equipment is free of soil, seeds, vegetative material, or other debris or water that could contain or hold seeds of non-native aquatic invasive species. It is recommended that all vehicles, especially large, off-road and/or earthmoving vehicles are cleaned and completely dry when they come into the LTBMU or come from an area known to contain non-native aquatic invasive species. Equipment will be considered clean when visual inspection does not reveal soil, seeds, plant material, standing water, or other such debris.
- Leave existing downed trees and large woody debris (LWD) that are in perennial or intermittent stream channels in place unless removal would enhance or maintain channel stability, as determined by a LTBMU Watershed Specialist or Aquatic Biologist.

Terrestrial Wildlife

- Retain snags, preferably larger than 15 inches diameter at breast height (dbh), for wildlife unless the snag would be hazardous to operations and/or human safety. Limit tree removal to that shown on 100% design plans.
- At this time the project area is not located inside or within 0.25 mile of a Protected Activity Center (PAC). If Northern goshawk and/or California spotted owl are detected within the

project area and determined to be nesting, a PAC will be delineated in accordance with the Sierra Nevada Forest Plan Amendment Record of Decision (USFS 2004). If a PAC is delineated within 0.25 mile of a project area prior to construction, an LOP would be implemented which would limit construction activities and vegetation treatments during the breeding season (March 1 through August 31 for California spotted owl; and February 15 through September 15 for Northern goshawk). The LOP may be waived if surveys confirm nesting is not occurring or if the activity is of such scale and duration that impacts to breeding California spotted owls or Northern goshawks will not occur.

- Inform implementation crew members of sensitive resources known to occur in the project area, their locations, and resource protection measures prior to implementation.
- Implementation crews will participate in a special status wildlife orientation prior to conducting work in the project area. During project activities, any detection of threatened, endangered, proposed, candidate species, FSS species, or TRPA special interest species or of nests, roosts, or dens of these species would be reported to the project biologist. These species would be protected in accordance with management direction for the LTBMU.
- Any sightings of threatened, endangered, candidate, proposed, or sensitive species would be reported to the project biologist and construction would be stopped immediately if the species is found within any disturbance footprint. If construction is stopped, the project biologist will be consulted within 24 hours. Based upon this consultation, the Responsible Official may adapt construction timelines or facility locations as determined necessary to provide adequate protection.
- Maintain Limited Operating Periods (LOP) for threatened, endangered, proposed, candidate species, FSS species, and/or TRPA Special Interest Species (SIS) if/when it is determined that permitted activities would occur within a disturbance or buffer zone. Current LOPs are based on the LTBMU Forest Plan (1988), SNFPA (2004), and TRPA Code of Ordinances (2013) and are included in Appendix B; if LOPs are updated prior to implementation, the project would maintain the most current LOPs. LOPS may be waived where a biological evaluation concludes that there would be no effects to breeding activities and according to conditions described in SNFPA (2004, e.g., S&G #77, 78, 79, 88). No LOPs are currently required.
- Where possible, remove willow clumps outside of the avian nesting season (April-September). In the case of willow clumps that need to be removed during the avian nesting season an LTBMU qualified biologist, or a biologist under the direction of an LTBMU biologist, will survey each willow clump for nests not more than three days prior to removal. Based upon the survey results, the Responsible Official may implement a LOP; adapt construction timelines or facility location as determined necessary to provide adequate protection.
- Where willow clipping is conducted, this activity should take place in a random fashion, taking more from larger clumps and less from smaller clumps. Clipping in a single willow clump should not be great enough to alter the visual shape or the overall structure of the

clump. No branches attached to a bird nest or within one meter of any part of a bird nest should be clipped.

- Retain known special status species nest/den/roost trees/snags if they are found within the project area.

Hydrology/Soils

- Temporary and permanent BMPs (Appendix B) will be implemented to meet water quality objectives and maintain and improve the quality of surface waters. Methods and techniques for applying the BMPs will be incorporated into the associated project plan and implementation documents, and temporary BMPs will be in place prior to commencing soil disturbing activities. Temporary BMPs may include but will not be limited to: water diversions, sandbag check dams, and diversion pipes and hoses, silt fences, straw wattles, coir logs, water filled berms, mulching, gravel/sand bags, and construction limit fencing.
- The USFS has recently developed technical guidance to provide uniform direction for BMP implementation on all USFS lands to protect water quality (FS-990a, 2012, Appendix B). The following National BMPs will be considered during project planning and design to develop site-specific BMP prescriptions/practices to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resource: AqEco-2 Operations in Aquatic Ecosystems; Road-5 Temporary Roads; Road-7 Stream Crossings; Road-9 Parking and Staging Areas; Road-10 Equipment Refueling and Servicing.
- Soil disturbing activities will not occur from October 15 to May 1 of each year unless an exemption request is applied for and approved from TRPA. Assure that permanent or temporary erosion control measures are in place for the winter season.
- Temporary access will be constructed for use during this project and will be designed with the least amount of soil disturbance and the fewest stream or water channel crossings.
- All disturbed soil areas, including temporary roads, staging and storage sites, will be fully restored following construction.

Recreation:

- Closures of the trailhead parking lot will be limited in duration and only in the instance of possible hazards to public safety from large construction equipment.
- Closures of the parking lot will not occur during high volume holiday weekends.
- Public notice of temporary daily closure of a portion of the parking area and pathway in vicinity of the work area would be published in the local newspaper. In addition, public notice will be posted and updated daily at the trailhead to notify users of unavoidable inconvenience.
- All signage and postings will meet applicable USFS universal accessibility guidelines (Architectural Barriers Act Accessibility Standards and Forest Service Outdoor Recreation Accessibility Guidelines).
- Sections of any existing fencing that need to be temporarily removed during construction activities will be replaced in-kind following project activities.

- Temporary construction fencing will be placed in a manner such that it does not block existing pedestrian travel routes adjacent to US 50 except during times when work is being conducted in that immediate vicinity.

Utilities:

- Relocate gas, water and communication utility lines as needed to maintain serviceability.

Public Safety and Disruption to Commercial and Public Use:

- Install signage and temporary barriers as needed during the intermittent closures.
- Implement traffic control as needed on all public roads. Design access routes, staging areas and time of use to minimize impacts to commercial businesses, public roads, and public access to recreational lands.

Restore Damaged Urbanized Infrastructure:

- Replace /repair sidewalks, landscaped area, and parking areas temporarily removed or damaged as a part of installing stormwater improvements.

Long Term Maintenance:

- Obtain easement and permits as necessary to install and provide for long term maintenance of constructed improvements, on lands not owned by the County or NDOT.

2.4 Monitoring

The purpose of project monitoring is to track the implementation of the project design features and the prescribed BMPs (Appendix B) and, in some cases, to measure their short-term effectiveness at protecting resources. The monitoring types are defined as follows:

- Implementation monitoring consists of inspections of project areas and roads to ensure that all project and design features are implemented as prescribed, including soil and water best management practices designed to prevent sediment delivery and protect water quality.

- Effectiveness monitoring consists of inspections of the project to evaluate the effectiveness of the prescribed design features and management practices at meeting their objectives. It includes evaluating the effectiveness of management practices designed to prevent sediment delivery and protect water quality.

2.4.1 Required Monitoring

- Implementation of the monitoring plan as detailed in *Burke Creek Highway 50 Crossing and Realignment Project Monitoring Plan* has commenced and will be used to measure Project effectiveness.
- Monitoring and testing will be performed during construction to ensure contractor compliance with the design plans and specifications.
- During active construction within the stream channel, daily water turbidity monitoring is required to comply with the NDEP Working in Waterways Permit.

2.5 Alternatives Considered, But Not in Detail

Prior to and during scoping, the TAC developed an Alternative Evaluation Report (Wood Rodgers 2014). The report described the Development of Capital Improvement Projects (CIP) and documented the Alternatives Evaluation process which prioritized the Capital Improvement Projects for the Burke Creek-Rabe Meadow Complex Master Plan. The restoration of Burke Creek around US 50 had been identified by TRPA as Environmental Improvement Program (EIP) project # 01.02.03.01 and ranked by the TAC during the Alternatives Evaluation process as the highest priority. The end result of this process was the election of a preferred alternative that focuses on the project area addressed in this EA. The preferred alternative was borne out of several factors including: the TAC prioritization ranking, the opportunity to coordinate with other agencies (NDOT, USFS), and available funding.

Elements of the Burke Creek Restoration Project CIP as detailed in the Alternative Evaluation Report that were not carried forward for 30 percent design and not analyzed in this EA are summarized below.

- Two sections of boardwalk trail, because this area is private property and encourages trespassing through private property.
- Improvements to an existing drainage channel that runs from the County ball fields to Burke Creek, because subsequent analysis indicated that major channel improvements in this area were not necessary. Minor improvements could restore functionality to the existing drainage channel. These minor improvements are included in the Project.
- Guardrail on either side of US 50 at the proposed culvert crossing, and because NDOT standards to protect a roadside hazard were met by extending the culvert inlets/outlets to fall outside of the clear zone and not be considered a roadside hazard.
- The removal of soil in the floodplain that slumped down from the adjacent ballfield slope because subsequent evaluation of the area by a project geomorphologist indicated that this area is not causing degradation.

Chapter 3
Existing Conditions and Environmental Consequences

The Council on Environmental Quality (CEQ) regulations directs that agencies succinctly describe the environment that may be affected by the alternatives under consideration (40 CFR 1502.15). This chapter describes the existing conditions of the project area that have the potential to be affected by implementing the Proposed Action alternative (i.e., the existing conditions). Each description of the existing conditions is followed by a description of the environmental effects (direct, indirect, and cumulative) that would be expected to result from undertaking the Proposed Action.

Direct effects are caused by the actions to implement an alternative, and occur at the same time and place. Indirect effects are caused by the implementation action and are later in time or removed in distance, but are still reasonably foreseeable (i.e., likely to occur within the duration of the project).

Cumulative effects are the result of the incremental direct and indirect effects of any action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor, but collectively significant actions, taking place over a period of time.

3.1 Projects Considered for Cumulative Effects

3.1.1 Past Projects

In order to understand the contribution of past actions to the cumulative effects of the Proposed Action and No Action alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior actions that have affected this project area and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. In addition, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the CEQ issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.”

The analysis of past actions in this section is based on current environmental conditions. Past actions which make up the current conditions include: Comstock Mining Era logging, formalization of US 50 and drainage paths, cattle ranching, airport construction, urbanization, and casino construction.

Specific past projects that have been constructed within proximity to the project area include:

- The acquisition of Rabe Meadow by the USFS in 1978 provided the opportunity for the USFS to end the seasonal cattle grazing in Rabe Meadow and restore the Jennings Casino site. In 1981, the USFS restored the casino site by breaking up and burying the foundations, reshaping and restoring Burke Creek in the upper one-third of the meadow where it had been previously diverted into a concrete lined ditch. USFS also transformed an excavated borrow pit into an in-stream sediment pond (Jennings Pond) and performed revegetation of the disturbed areas.
- In 1992, The County implemented the Burke Creek/Kahle Ditch Restoration Project. The Project implemented stormwater conveyance and treatment infrastructure along Kahle Drive and backfilled Kahle Ditch, which conveyed Burke Creek along Kahle Drive during the 1960s and 1970s.
- In 1992, the USFS implemented the Burke Creek Channel Restoration Project, which reconstructed 2,000 feet of channel in the Nevada Beach Campground area.
- In 1998, the USFS performed maintenance and improvements on the Burke Creek Channel Restoration Project (1992) to address channel instability by reconstructing rock check dams, recontouring and armoring eroded channel banks, and stabilizing a head cut.
- NDOT implemented Water Quality and Erosion Control Project along US 50 in The County beginning at Kahle Dr., north to Elks Point Rd. The Project was completed in 2005 and installed improvements along the NDOT right of way consisting of curb and gutter, retaining walls, riprap slope stabilization, conveyance piping, drainage inlets and sediment traps.
- In 2007, The County implemented the Kahle Drive Water Quality Improvement Project, which installed stormwater conveyance infrastructure and constructed wetlands in the Oliver Park General Improvement District (GID).
- Lake Village Phase I and Ib WQIP (EIP # 679) was completed in 2007. This project was broken into two phases. The majority of work was completed in the 2006 Phase I effort. This phase addressed significant water quality and erosion control issues throughout Lake Village. Phase 1b was a limited effort during the 2007 construction season to install rock slope protection of the steep eroding slope, associated curb and gutter, a linear detention basin, and revegetation of a 20 foot tall 1:1 cut bank along Lake Village Drive between Echo Drive and US 50.
- In 2010, USFS improved the Lam Watah hiking/biking trail consisting of 1.1 miles of trail through Rabe Meadow, from parking area on the east side of Kahle Drive at the intersection of US 50 to Nevada Beach. The trail whose name is derived from the Washoe Indian phrase meaning permanent mortar by the stream includes the following features: willow-lined pond, a meadow of wildflowers, a perennial stream, stands of pines and interpretive signage along the trail to Nevada Beach.
- Lake Village Phase II and IIa WQIP (EIP # 679) was completed in 2012. This project was split into two phases due to title issues on adjacent private property. Phase II installed erosion control and water quality improvements to improve the stormwater quality

generated and discharged from The County right-of-way within Lake Village. The project specifically addressed Lake Village Drive, Echo Drive and flows entering the public right-of-way from adjacent drainage areas. Erosion control improvements include: revegetation, retaining walls, rock slope protection, storm drain inlets, AC swales, valley gutters, and Amorflex swales. Water quality improvements include: a treatment train composed of several dry basins, storm vaults and storm filters installed for the purpose of reducing peak flows and treating stormwater runoff for sediment less than 16 microns and nutrients. Phase IIa involved the installation of Armorflex swale and rerouting stormwater culvert on Professional Building property.

- The first segment of the Nevada Stateline to Stateline Bikeway South Demonstration Project was completed in 2012. This segment installed 1.1 miles of separated shared-use path from Kahle Drive to Elks Point Road through Rabe Meadow. With few exceptions, the bike path is 10-feet wide with 2-foot wide shoulders on both sides. The Project also included renovations to the trailhead parking lot along Kahle Drive.
- The second Segment of the Nevada Stateline to Stateline Bikeway South Demonstration Project was completed in 2013. This segment installed 1.3 miles of path from Elks Point Drive through USFS lands to Round Hill Pines Resort. This Phase also improved the Kahle Drive Trailhead parking lot and facilities by expanding the existing parking lot and adding a restroom, educational kiosk and picnic table.
- The third segment was completed in 2015. This segment reconfigured Laura Drive to allow for installation of 0.1 miles of path along Laura Drive (Kahle to 4H Road).

3.1.2 Present Projects

- In response to U.S. Environmental Protection Agency requirements, KGID has almost completed the construction of the relocated water treatment plant and pump station. The facilities are scheduled to come on line in October 2015. This project is located at the east end of the Tahoe Shores Mobile Home Park.
- The Beach Club at Lake Tahoe Project will be the first and only multi-family residential development approved in the Tahoe Basin in 25 years. The project will be constructed on a 20 acre parcel located on Kahle Drive at the site of the Tahoe Shores Mobile Home Park. The project will restore two acres of meadow area as part of the project. Construction began in summer of 2014 with improvements to the pier. In 2015, the project also initiated relocation and upgrade to the Kingsbury GID Water Treatment Plant (described above). The Water Treatment Plant was relocated within the Beach Club project area to allow for subsequent Beach Club development. Construction of the Beach Club development is expected to continue in 2016 dependent on funding and permitting.

3.1.3 Projects in the Planning Stage

- The Oliver Park GID has completed the first part of an Evaluation of Existing Conditions Memorandum (ECAM) to determine if the existing wet basin installed in 2007 as part of the Kahle Drive Water Quality Improvement Project is sufficient for treating the private property neighborhood runoff as an area wide water quality treatment. Much of Oliver Park is constrained for BMP implementation due to high ground water and slow soil infiltration rates.
- Kahle Basin Redesign Project is currently in the conceptual design process. NTCD is coordinating with the County, NDOT and private property owners whose stormwater is directed to the basin to create a stormwater collective. Construction of the project is not expected to begin until 2018 at the earliest.
- Sierra Colina Village is designed to be a single and multi-family residential neighborhood that will provide a mixture of Leadership in Energy and Environmental Design (LEED) Green Certified and Energy Star rated sustainable market-rate and deed-restricted moderate-income homes. Sierra Colina Village is filing permit applications for construction beginning in 2017.

3.2 Biological Resources

3.2.1 Wildlife

This section analyzes the Proposed Action and No Action alternatives to determine whether they have the potential to affect any federally threatened, endangered, proposed, candidate and/or USFS sensitive terrestrial and aquatic wildlife species (TEPCS) and their habitats (FSM 2670.5), USFS Management Indicator Species (MIS)(USFS 2015b), as well as other wildlife resources, such as TRPA Special Interest Species. Effects to sensitive species are also discussed in the USFS Wildlife Biological Evaluation and Biological Assessment (BEBA) (Appendix C).

3.2.1.1 Existing Conditions

FWS/USFS TEPCS

In accordance with the FS Manual (FSM 2670.5 the USFS completed a BEBA to determine how the Proposed Action may affect) any threatened, endangered, proposed, candidate, or sensitive species and their habitats. The species lists were based on the November 16, 2015 FWS species list generated for this project by the FWS online tool "Information for Planning and Conservation" (IPAC; http://ecos.fws.gov/ipac/; consultation code #:08ENVD00-2016-SLI-0013 (Appendix C) for all federally threatened, endangered, proposed, and candidate species. Per requirements in the IPAC species list, the primary consultation office for the LTBMU has been designated as the Nevada Fish & Wildlife Service (FWS) field office in Reno, NV. And the Pacific Southwest Regional Forester's sensitive species are based on the list that was

updated on July 3, 2013 (USDA 2013). Table 3-1 includes the species and their habitas evaluated for potential affect.

Table 3-1. The Threatened (T), Endangered (E), Proposed (P), Candidate (C) and/or FSS Terrestrial and Aquatic Wildlife Species Potentially Occurring in the LTBMU and/or Occurring within the Analysis Area.

WILDLIFE SPECIES	LEGAL STATUS[a]	KNOWN TO OCCUR IN ANALYSIS AREA	SUITABLE HABITAT IN ANALYSIS AREA	REASON WHY HABITAT NOT CONSIDERED SUITABLE (OR RATIONALE FOR NO EFFECT)
Birds				
Northern goshawk (*Accipiter gentiles*)	S	Yes	Yes	Considered in detail.
Willow flycatcher (*Empidonax traillii*)	S	No	Yes	Considered in detail.
Bald eagle (*Haliaeetus leucocephalus*)	S	Yes	Yes	Considered in detail.
Great gray owl (*Strix nebulosa*)	S	No	No	The LTBMU is outside of the current known range of the great gray owl.
California spotted owl (*Strix occidentalis occidentalis*)	S	No	Yes	Considered in detail.
Mammals				
Pallid bat *(Antrozous pallidus)*	S	No	Yes	Considered in detail.
Townsend's big-eared bat (*Corynorhinus townsendii*)	S	No	Yes	Considered in detail.
Fringed myotis (*Myotis thysanodes)*	S	No	Yes	Considered in detail.
North American wolverine (*Gulo gulo luscus*)	S	No	No	North American wolverine is not known to occur in the LTBMU.
Pacific marten (*Martes caurina*)	S	No	Yes	Considered in detail.
Amphibians				
Sierra Nevada yellow-legged frog (*Rana sierrae*)	E, PC, S	No	Yes	Considered in detail.
Invertebrates				
Western bumble bee *(Bombus occidentalis)*	S	No	Yes	Considered in detail.
Great Basin rams-horn (*Helisoma newberryi newberryi*)	S	No	Yes	Considered in detail.
Fish				
Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*)	T	No	Yes	Considered in detail.
Cui-ui *(Chasmistes cujus)*	E	No	No	The LTBMU is outside the current and historical range of the Cui-ui.
Lahontan Lake tui chub (Gila bicolor pectinifer)	S	Yes	Yes	Considered in detail.

a Status explanations
E = USFWS listed as "Endangered" under the ESA
T = USFWS listed as "Threatened" under the ESA
PC = Proposed Critical Habitat
S = USFS LTBMU Sensitive Species, Regional Forester's Sensitive Species List, amended 9 September, 2013

The LTBMU is outside the geographic range of the cui-ui, and great gray owl. North American wolverine is not known to occur on the LTBMU. Therefore, effects to these species would not occur. These species were not further evaluated in the BE and this EA, and thus have a determination of "No Effect" for the Proposed Action.

Sierra Nevada Yellow-legged frog and Proposed Critical Habitat

Sierra Nevada (mountain) yellow-legged frog (SNYLF, *Rana sierrae*) is an Endangered Species with Proposed Critical Habitat under the Endangered Species Act (ESA) and a Region 5 FSS (USFS 2015a).

The anaysis area contains up to 242 acres of suitable SNYLF habitat as defined by the FWS and the USFS Region 5: all areas within 25 meters (82 feet) of perennial or intermittent streams, lakes, meadows, and ponds that are also within 305 meters (1,000 feet) of the project area and all habitat downstream of the project area (Appendix C, Figure 6) (USFS 2015a).

The proposed SNYLF critical habitat is in desolation wilderness and in the vicinity of Echo Lakes, both of which are more than 15 kilometers southeast of the analysis area (USFS 2015a).

Lahontan Cutthroat Trout

Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) (LCT) was listed as an endangered species in 1970 (Federal Register Vol. 35, p.13520). In 1975, under the Endangered Species Act of 1973 as amended (ESA), LCT was reclassified as threatened to facilitate management and to allow for regulated angling (Federal Register Vol. 40, p.29864). In 1995, the U.S. Fish and Wildlife Service (FWS) released its recovery plan for LCT, encompassing six river basins within LCT historic range, including the Truckee River basin. Endangered Species Act specific recovery targets related to down listing (i.e. number of self-sustainable sub-populations) have yet to be determined for the LTBMU. The 2009 LCT 5-year status review recommended the following range-wide actions: revise the 1995 recovery plan, develop state and tribal hatchery management plans, improve utility of monitoring/accomplishment databases and develop regulations to help conserve LCT. Discussion regarding the revision to the 1995 recovery plan has occurred, but not been formally initiated (USFS 2015a).

Lahontan cutthroat trout were introduced to the headwaters of the Upper Truckee River in Meiss Meadows in the late 1980's and early 1990's through a cooperative effort between the California Department of Fish and Wildlife (CDFW), USFS and FWS. The Meiss Meadow population is one of the only high-elevation meadow populations of LCT in the Sierra Nevada mountain range and also functions as a source population for LCT in lower river segments of the Upper Truckee River. This is the only self-sustaining population in the LTBMU. Expansion efforts were initiated to increase the range of this population in 2009 and will continue through 2016. Additional recovery actions for LCT are ongoing in Fallen Leaf Lake and Glen Alpine Creek.

All of these locations are on the south shore of Lake Tahoe, while the analysis area is on the east shore (USFS 2015a).

Lahontan cutthroat trout have been stocked by both Nevada Department of Wildlife (NDOW) and CDFW throughout the LTBMU for recreational fishing opportunities, including Lake Tahoe. Although these efforts are not for the recovery of LCT, where stocking occurs and where migration of LCT is possible, analysis of potential effects to this listed species is required. Burke Creek was surveyed in 2012 and 2013. No Lahontan cutthroat trout were found (USFS 2015a).

Northern Goshawk

The Northern goshawk (*Accipiter gentilis*) is a FSS and a TRPA Special Interest Species on the LTBMU. There is approximately 129,035 acres of medium and high quality habitat within the LTBMU. There is less than 0.5 acres of high quality habitat and only seven acres of medium quality habitat within the analysis area. There was one detection of a goshawk within the analysis area in 1993. Almost all of the habitat within the analysis area is low quality habitat. Additionally, the area experiences high recreational and canine use, rendering the low quality habitat unsuitable for goshawk. A small portion of the analysis area was surveyed for goshawk in 2005, 2007 and 2008, with no detections.There are four known nests approximately 300-700 meters northeast of the analysis area. The last time any of these nests were active was in 1992. There were three detections in this area in 2015, all of plucking posts. In addition to being surrounded by urban areas the habitat in the historic nest stand experiences moderate levels of recreation and canine disturbance. In 2013 the Burke Creek PAC was moved from this area to the north in order to protect higher quality habitat where goshawks might be more likely to nest. To date no detections have been made in the new PAC location (USFS 2015a).

Willow Flycatcher

The willow flycatcher (*Empidonax trailii*) is a FSS on the LTBMU. An estimated 4,138 acres of high and moderate capability habitat currently exist for willow flycatcher within the LTBMU and 17 acres within the project analysis area, including less than one acre of emphasis habitat. While the habitat within the analysis area technically meets habitat requirements for willow flycatcher, this area also experiences high levels of recreational and canine activity. This activity essentially renders this habitat unsuitable. There are 18 known historically or recently occupied willow flycatcher sites within the LTBMU. None of these are within the analysis area. The nearest detection to the analysis area is 900 meters southeast. The nearest known reproductive site is more than 10 kilometers south west (USFS 2015a).

Bald Eagle

The bald eagle, (*Haliaeetus leucocephalus*), was federally de-listed on August 8, 2007 (Federal Registrar Vol. 72, No. 130, pp. 37346-37372) and then placed on the USFS Region 5 Regional Forester's sensitive species list. The winter and nesting bald eagle population in the LTBMU is

also designated as a TRPA Special Interest Species.

There are 188,030 acres of high and moderate suitability bald eagle habitat in the LTBMU. This includes all lakes regardless of size or quality and therefore likely over estimates the total amount of habitat available. There are 91 acres of high and moderate suitability bald eagle habitat within the analysis area. There is one known perch site within the analysis area, documented in 1988. The nearest know nest is 13 kilometers west at Emerald Bay. This nest has been active 14 years since it was discovered in 1994. Annual nesting and winter occupancy surveys are conducted in the LTBMU. The nearest winter survey station is approximately one kilometer northwest at Nevada Beach. Bald eagles are frequently counted at this location during these surveys (USFS 2015a).

California Spotted Owl

The California spotted owl (*Strix occidentalis occidentalis*) is a Region 5 FSS and a Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat on the LTBMU.

There are approximately 130,387 acres of medium and high quality habitat in the LTBMU and approximately 10 acres of moderate quality habitat within the analysis area, but no high quality habitat. Almost all of the habitat within the analysis area is low quality habitat. Additionally, the area experiences high recreational and canine use, rendering the low quality habitat unsuitable for spotted owl. Portions of the analysis area were surveyed for spotted owl in 2005, 2007 and 2008, with no detections. There are no territories or PACs in the analysis area (Appendix C, Figure 7). The nearest PAC is eight kilometers southwest near Cold Creek. The nearest detection is approximately six kilometers northeast of the analysis area. This detection was of a single owl and occurred in 1998 (USFS 2015a).

Pallid Bat

The pallid bat (*Antrozous pallidus*) was added to the Region 5 FSS list for the LTBMU in 2013.

There are 23,953 acres of high and moderate capability pallid bat habitat in the LTBMU and 141 acres in the analysis area. Acoustic bat surveys were conducted in the LTBMU during 2004 and 2006-2008 by Michael Morrison and his graduate students through University of Nevada, Reno and Texas A&M University. These surveys took place at stream and meadow sites throughout the LTBMU. Mist netting surveys were also conducted by the USFS, Pacific Southwest Research Station Multi-Species Inventory and Monitoring program in 2001 and 2002 at 24 sites throughout the LTBMU. The LTBMU conducted roost exit surveys and acoustic monitoring at several sites 2009-2015. There are four detections of pallid bat in the LTBMU, none of which are in or near the analysis area (USFS 2015a).

Townsend's Big-eared Bat
Townsend's big-eared bat (*Corynorhinus townsendii*) is a FSS on the LTBMU.

There are 32,970 acres of high and moderately suitable Townsend's big-eared bat habitat, not including roosts, in the LTBMU. There are 14 acres within the analysis area. Acoustic bat surveys were conducted in the LTBMU during 2004 and 2006-2008 by Michael Morrison and his graduate students through University of Nevada, Reno and Texas A&M University. These surveys took place at stream and meadow sites throughout the LTBMU. Mist netting surveys were also conducted by the USFS, Pacific Southwest Research Station Multi-Species Inventory and Monitoring program in 2001 and 2002 at 24 sites throughout the LTBMU. The LTBMU conducted roost exit surveys and acoustic monitoring at several sites 2009-2015. Townsend's big-eared bat was first detected on the LTBMU in 2007, by Michael Morrison's restoration monitoring surveys. They were detected in Blackwood Creek and Big Meadow Creek watersheds. They have since been detected at five additional locations, none of which are in or near the analysis area (USFS 2015a).

Fringed Myotis
The fringed myotis (*Myotis thysanodes*) is a bat species that was added to the Region 5 FSS list for the LTBMU in 2013. There are 14,399 acres of high and moderate capability fringed myotis habitat in the LTBMU and four acres in the analysis area. Acoustic bat surveys were conducted in the LTBMU during 2004 and 2006-2008 by Michael Morrison and his graduate students through University of Nevada, Reno and Texas A&M University. These surveys took place at stream and meadow sites throughout the LTBMU. Mist netting surveys were also conducted by the USFS, Pacific Southwest Research Station Multi-Species Inventory and Monitoring program in 2001 and 2002 at 24 sites throughout the LTBMU. The LTBMU conducted roost exit surveys and acoustic monitoring at several sites 2009-2015. There are many detections of fringed myotis in the LTBMU, none of which are in or near the analysis area (USFS 2015a).

Pacific Marten
The Pacific marten (*Martes caurina*) is a USFS Sensitive and Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat component on the LTBMU.

An estimated 138,092 acres of high and moderate capability habitat currently exist for Pacific marten within the LTBMU. There are 101,841 acres of denning habitat in the LTBMU. Of this, there are 71 acres of habitat and seven acres of denning habitat within the analysis area. While there have been mesocarnivore surveys throughout the LTBMU none have occurred within the analysis area. There are no known detections or dens within or near the analysis area (USFS 2015a).

Western Bumble Bee

The western bumble bee (*Bombus occidentalis*) was added to the Region 5 FSS list in 2013. There are 94 collection records for the western bumble bee on 11 national forests in Region 5, including seven on the LTBMU. There is only one record of the western bumble bee on the LTBMU since 2000 (USFS 2015a).

The status of the western bumble bee in the wildlife analysis area is unknown. However, the wildlife analysis area includes multiple habitats that would contain flowering plants.

Great Basin Rams-horn

Great Basin rams-horn (*Helisoma newberryi*) is a Region 5 FSS. Historically the species occurred in Lake Tahoe and the slow flowing outflow into the Lower Truckee River. The population status of Great Basin rams-horn is currently unknown as no surveys have been conducted, however they have been detected in Lake Tahoe approximately 1,500 meters North of the Burke Creek mouth and there is a spring (Folsom Spring) with suitable habitat within the analysis area. Folsom Spring is eight meters outside of the project area and well within the aquatic analysis area (USFS 2015a).

Lahontan Lake tui chub

Lahontan Lake tui chub (*Gila bicolor pectinifer)* is a Region 5 FSS. Lahontan Lake tui chub are known to be present in Lake Tahoe and were found at the mouth of Burke Creek during fish assessment surveys in 2012 and 2013 (USFS 2015a).

USFS Management Indicator Species (MIS)

MIS are animal species identified in the Sierra Nevada Forest MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the LTBMU Forest Plan as amended by the 2007 SNF MIS Amendment ROD directs USFS resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the LTBMU Forest Plan as amended.

The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in Table 3-2 (Appendix D, USFS 2015b). In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column), and the associated MIS (3rd column), the Table discloses whether or not the habitat of the MIS is potentially affected by the Burke Creek Highway 50 Crossing and Realignment Project (4th column).

Table 3-2. MIS for Project-Level Habitat Analysis.

HABITAT OR ECOSYSTEM COMPONENT	CWHR TYPE(S) DEFINING THE HABITAT OR ECOSYSTEM COMPONENT1	SIERRA NEVADA FORESTS MANAGEMENT INDICATOR SPECIES SCIENTIFIC NAME	CATEGORY FOR PROJECT ANALYSIS 2
Riverine & Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	3
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler *Dendroica petechia*	3
Wet Meadow	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree (chorus) frog *Pseudacris regilla*	3
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail *Oreortyx pictus*	1
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail *Oreortyx pictus*	1
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse *Dendragapus obscurus*	1
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	California spotted owl *Strix occidentalis occidentalis*	1
		American marten *Martes americana*	
		Northern flying squirrel *Glaucomys sabrinus*	
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker *Picoides villosus*	2

[1] All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

[2] **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

The habitat types Early Seral Coniferous Forest, Mid Seral Coniferous Forest, Late Seral Open Canopy Coniferous Forest and Late Seral Closed Canopy Coniferous Forest, as they are defined in Table 3-2, do not occur within the analysis area for the Burke Creek Highway 50 Crossing and Realignment Project, therefore there will be no effects to these habitat types. The Snags in Green Forest habitat type does occur within the analysis area however, snag removal will only occur where it poses a safety risk, therefore neither of the habitat components will be affected a measureable amount. The above habitat types will not be carried forward in this analysis.

The MIS whose habitat would be either directly or indirectly affected by the Burke Creek Highway 50 Crossing and Realignment Project, identified as Category 3 in Table 3-2, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the Proposed Action and No Action alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for the Burke Creek Highway 50 Crossing and Realignment Project are: Riverine and Lacustrine, Riparian and Wet Meadow (USFS 2015b).

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)
Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition. They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are: flow, sedimentation, and water surface shade (USFS 2015b).

Riparian Habitat (Yellow warbler)
The yellow warbler was selected as the MIS for riparian habitat in the Sierra Nevada. This species is usually found in riparian deciduous habitats in summer (cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland) (USFS 2015). Yellow warbler is dependent on both meadow and non-meadow riparian habitat in the Sierra Nevada (USFS 2015b).

Wet Meadow Habitat (Pacific tree (chorus) frog)
The Pacific tree frog (now known as the Pacific chorus frog) was selected as an MIS for wet meadow habitat in the Sierra Nevada. This broadly distributed species requires standing water for breeding; tadpoles require standing water for periods long enough to complete aquatic development, which can be as long as 3 or more months at high elevations in the Sierra Nevada (USFS 2015). During the day during the breeding season, adults take cover under clumps of vegetation and surface objects near water; during the remainder of the year, they leave their breeding sites and seek cover in moist niches in buildings, wells, rotting logs or burrows (USFS 2015b).

USFS and Non-USFS System Lands Landbird Conservation (Migratory Birds)
Under the National Forest Management Act (NFMA), the USFS is directed to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 USDA USFS Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF North American Landbird Conservation Plan, references goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a Memorandum of Understanding between USFS and the FWS to Promote the Conservation of Migratory Birds was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the USFS and the Fish and Wildlife Service as well as other federal, state, tribal and local governments.

For USFS System Lands, potential impacts to habitats and select migratory bird populations were assessed in the project MIS report (Appendix D) and the Migratory Landbird Conservation

Report (Appendix F) and impacts to select TECPS birds and their habitats have been analyzed in the project BEBA (Appendix C).

For Non-USFS System Lands, migratory birds in addition to TRPA Special Interest Species included in Table 3-3 that have potential to occur within the project area are willow flycatcher (WRC 2015, Appendix E).

Table 3-3. TRPA Special Interest Species.

Species	Population Sites	Disturbance Zone (mi.)	Potential to Impact Threshold Standard? Y/N
Northern goshawk (*Accipiter gentiles*)	12	0.25 Most suitable 500 acres surrounding nest site including a 0.25 mile buffer centered on nest sites	Y
Osprey (*Pandion haliaetus*)	4	0.25	N
Bald eagle (winter) (*Haliaeetus leucocephalus*)	2	Mapped Areas	N
Bald eagle (nesting)	1	0.50	N
Golden eagle (*Aquila chrysaetos*)	4	0.25	N
Peregrine falcon (*Falco peregrinus anatum*)	2	0.25	N
Waterfowl	18	Mapped Areas	N
Mule deer (*Odocoileus hemionus*)	Potential fawning habitat	Meadows-potential fawning habitat has not been mapped	N

Willow flycatcher surveys were performed on non-USFS System Lands located east of US 50. The survey on non-USFS lands was conducted on June 19 during the required survey period 2 (June 15-25), and the second survey was performed July 12 during the required survey period 3 (June 26-July 15) (Bombay et al. 2000). The primary objective of the protocol is to determine the presence or absence of willow flycatchers at a given site during the year in which surveys are completed (WRC 2015, Appendix E).

No willow flycatchers were detected at or between any of the survey points. The meadow portion of the survey area was dry. Bird species detected during the surveys are listed in Appendix E), WRC 2015).

TRPA Special Interest Species

Effects to TRPA Special Interest Species and migratory birds (Table 3-3) are addressed as a group in this section. Occurrence data on TRPA Species of Special Interest, as well as USFS LTBMU sensitive species, was requested from Dan Segan, Principal Natural Resource Analyst (TRPA), on September 21, 2015. A GIS shapefile of the project area was provided to Mr. Segan via email. The TRPA provided an emailed figure depicting known occurrences of special status species on September 24, 2015 (Sean Tevlin, Assistant Environmental Specialist)(WRC 2015 Appendix E). TRPA Special Interest Species are summarized in Table 3-3. Given that Northern goshawk is the only TRPA Special Interest Species where the Threshold Standard may be impacted by the Proposed Action, it is the only species carried forward for analysis. Migratory birds are discussed under USFS Landbird Conservation above.

Although Northern goshawk are addressed above, the following describes the existing conditions for TRPA Special Interest Species for the non USFS System Lands. Surveys for Northern goshawk were conducted for this project in accordance with the Goshawk Inventory and Monitoring Technical Guide (USDI 2006). Two surveys are required during the nestling and fledgling stages, including early post-fledging dependency. For this project, the first survey was conducted June 14 and the second survey was performed August 8. The adult alarm call was broadcast during the first survey. For the second survey, the wail call and nestling and fledgling food begging calls were also broadcast. The survey was performed within a 0.5 mile radius of the project area on private lands east and west of US 50.

No Northern goshawks were detected at or between any of the call stations. No signs of Northern goshawk occupancy were found (e.g., stick nests, white-wash, plucking posts, prey remains, pellets, molted feathers). Email correspondence from the LTBMU suggested that goshawk plucking posts were found earlier in the year within 0.5 miles of the easternmost boundary of the project area. The three waypoints provided were checked during both survey sessions. However, no prey remains (i.e., plucked feathers) or other sign was found. (WRC 2015, Appendix E)

It should be noted that hikers, dog-walkers, and bicyclists were present at numerous locations with the call station survey area during both survey sessions. The biologist often had to wait until people were gone before broadcasting the calls.

3.2.1.2 Environmental Consequences

For USFS System Lands, the analysis areas are spatially defined as the 239 acre terrestrial wildlife analysis area comprising all proposed activities on USFS land plus a 400 meter buffer; the aquatic wildlife analysis area comprising all proposed activities on FS land plus land downstream to Lake Tahoe and upstream 400 meters. A separate larger analysis area is utilized for Sierra Nevada yellow-legged frog and Lahontan cutthroat trout. This analysis area encompasses the entire project area, all of the downstream area to the edge of the meadow

system and upstream areas 300 meters (1,000 feet) beyond the project area. This analysis area encompasses all of the SNYLF habitat within 1,000 feet of the project area and all of the SNYLF habitat downstream of Highway 50 that is connected to the project area. The analysis areas are temporally defined to extend 5 years before and after planned implementation.

The analysis contained in the USFS BEBA (Appendix C) pertains only to those actions occurring on USFS land and does not address the project as a whole except for analysis of Threatened and Endangered species which include all project activities for consistency with the BEBA (USFS 2015a).

Proposed Action activities would remove and also create habitat and could affect individuals and/or populations of TEPCS species. Proposed Action activities could disturb individuals and/or populations of terrestrial and aquatic wildlife species during implementation. Potential direct and indirect effects on TEPCS terrestrial and aquatic wildlife species and habitat were determined by evaluating the type and amount of existing habitat for each species, type and amount of habitat alteration/removal/creation for each species, and type and magnitude of disturbance for each species.

The type and amount of existing habitat for each species is described above under Existing Conditions. The type and amount of habitat altered, removed, or created is described below under the Alternatives section below.

For TRPA Special Interest Species and Migratory Birds, the analysis area is the 16 acre project area associated with the TRPA Project Permit (forthcoming).

No Action Alternative

FWS/USFS TEPCS

Sierra Nevada Yellow-legged frog and Proposed Critical Habitat

The No Action alternative would avoid effects to Sierra Nevada yellow-legged frog and its proposed critical habitat, but would also forgo the opportunity to improve public safety on US 50 related to flooding, treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Commercial Complex parking lot and Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Lahontan Cutthroat Trout

The No Action alternative would avoid effects to Lahontan cutthroat trout, but would also forgo the opportunity to improve public safety on US Highway 50 related to flooding, treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Commercial Complex parking lot and Kahle Drive trailhead facility and

improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Northern Goshawk, Bald Eagle, California Spotted Owl, and Pacific Marten

The No Action alternative would avoid effects to Northern goshawk, bald eagle, California spotted owl and Pacific marten, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Willow Flycatcher

The No Action alternative would avoid effects to willow flycatcher, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Pallid Bat, Townsend's Big-eared Bat and Fringed Myotis

The No Action alternative would avoid effects to pallid bat, Townsend's big-eared bat and fringed myotis, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Western Bumble Bee

The No Action alternative would avoid effects to Western bumble bee, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Great Basin Rams-horn

The No Action alternative would avoid effects to Great Basin rams-horn, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

Lahontan Lake tui chub

The No Action alternative would avoid effects to Lahontan Lake tui chub, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015a).

USFS Management Indicator Species (MIS)

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)

The No Action alternative would avoid effects to Lacustrine/Riverine habitat, but would also forgo the opportunity to treat stormwater runoff to Burke Creek and Folsom Spring, reduce sediment load from Burke Creek, reduce flooding of the Kahle Drive trailhead facility and improve plant community by reducing non-native and invasive plant species (USFS 2015b, Appendix D).

Riparian Habitat (Yellow warbler)

The No Action alternative would avoid effects to riparian habitat, but would also forego the opportunity to restore ecological function and processes within the Burke Creek channel and its adjacent floodplain, reduce pollutant loading to Lake Tahoe and improve public safety on US 50 related to flooding (USFS 2015b, Appendix D).

Wet Meadow Habitat (Pacific tree (chorus) frog)

The No Action alternative would avoid effects to Wet Meadow habitat, but would also forego the opportunity to restore ecological function and processes within the Burke Creek channel and its adjacent floodplain, reduce pollutant loading to Lake Tahoe and improve public safety on US 50 related to flooding (USFS 2015b, Appendix D).

USFS and Non-USFS System Lands Landbird Conservation (Migratory Birds)

Under the No Action alternative, effects are the same as discussed above under the FWS/USFS TEPCS section (WRC 2015, Appendix E; USFS 2015c, Appendix F).

TRPA Special Interest Species

Under this Alternative, the existing conditions and resulting issues (Section 1.3) would remain; therefore there would be no impact to TRPA Special Interest Species.

Proposed Action Alternative

The terrestrial wildlife analysis area includes a 400 meter buffer around the portions of the project that occur on USFS land (Appendix C, Figure 5), regardless of landowner (USFS 2015a).

The aquatic wildlife analysis area includes the portion of the project area that occurs on USFS land plus land upstream on Burke Creek and downstream to Lake Tahoe, regardless of landowner. This analysis area will be used for all of the aquatic wildlife species that are not ESA listed species (Appendix C, Figure 5).

The ESA FWS listed species will be analyzed using the Aquatic ESA Analysis Area (Appendix C, Figure 5). The ESA Aquatic Analysis Area is based on the functional distance that SNYLF can disperse rounded up to 1,000 feet (based on the recommendation found in the Programmatic

Biological Opinion (ref. FF08ESMF00-2014-F-0557; December 19, 2014)). Areas inside the 1,000 foot buffer that are not included in the analysis area were excluded because there is no habitat (e.g. urban areas, upland forest, etc.).

Direct and Indirect Effects

FWS/USFS TEPCS

Sierra Nevada Yellow-legged frog and Proposed Critical Habitat

No Proposed Critical Habitat occurs within the analysis area. The Burke Creek Highway 50 Crossing and Realignment project will have "No Effect" on Proposed Critical Habitat.

While no surveys for SNYLF have been conducted, Burke Creek provides habitat for non-native aquatic species known to predate and compete with SNYLF. The presence of these species reduces the likelihood that SNYLF could become established in the analysis area or survives long-term without additional management actions outside the scope of this project.

Implementation could introduce additional disturbance to SNYLF if they are present. However, this would be short-term disturbance that would be alleviated after implementation. Implementation could reduce habitat quality in the areas where the stream is relocated but would also add habitat in the new stream path. Long-term this project should improve SNYLF defined suitable habitat by reducing sedimentation and erosion from the impaired stream segments. Additionally, project Design Features and BMPs (Section 2.3) that protect water quality will reduce the potential effects to suitable habitat (USFS 2015a).

Lahontan Cutthroat Trout

The Proposed Action will not affect Lahontan cutthroat trout directly because fish assessment surveys in Burke Creek have not located LCT in or adjacent to the project area. Only Brook trout were found in Burke Creek during assessment surveys and brook trout generally outcompete LCT therefore as long as brook trout are present, it would be unlikely to find LCT in Burke Creek though LCT may occupy Lake Tahoe in which Burke Creek confluences with downstream of the project area. The Proposed Action will likely improve aquatic habitat by improving depth and siltation in stream habitat between Highway 50 and Jennings Pond and upstream of Highway 50, but will not affect habitat downstream of Jennings Pond (USFS 2015a).

Northern Goshawk, Bald Eagle, California Spotted Owl, and Pacific Marten

There are no PACs (Northern goshawk and California spotted owl) or den site buffers (Pacific marten) and very little habitat for any of these species within the analysis area. Since there is no known reproductive activity in or near the action areas; project implementation is not expected to affect reproductive effort of goshawk, bald eagle, spotted owl or marten. The Proposed

Action could disturb all four species foraging in the area during implementation however since there is considerably better and more abundant foraging habitat nearby this would be a minor, short-term disturbance at most. There would be no effect to habitat of any of these species since the Proposed Actions would not occur within forested habitat or affect a large body of water (USFS 2015a).

Willow Flycatcher

There are no detections or known reproductive sites within the analysis area. While it is unlikely that willow flycatcher would be found in an area with such a high level of recreational and canine disturbance, there is suitable habitat within the analysis area and the action area. If willow flycatcher are in the area during implementation there would be a short-term disturbance to their daily activity that may cause them to vacate the area. There would also be a detrimental effect to habitat as a result of losing riparian shrub coverage along a maximum of 76 meters of riparian corridor. However, willow and alder will be replanted along the new stream channels (192 meters) which may result in an equal or increased amount of riparian shrub cover in the long-term (USFS 2015a).

Pallid Bat, Townsend's Big-eared Bat and Fringed Myotis

There are no detections of USFS sensitive bat species within the analysis area however, there is suitable foraging habitat. Foraging habitat may also be impacted during implementation caused by changes in hydrology and removal of riparian shrubs. If bats are foraging within the analysis area there could be disturbance type effects during implementation due to changes in insect abundance and species composition as a result of habitat changes. However, this impact should be short-term and riparian habitat in the new stream channel should replenish or increase riparian habitat in the long-term. There may be roost habitat within the analysis area but there is not within the USFS action area. Therefore the Proposed Action should not affect roosting bats or roost habitat (USFS 2015a).

Western Bumble Bee

Western bumble bee, if they do occur in the project area, would experience disturbance type effects. Underground hives and foraging individuals could be lost or temporarily displaced by ground disturbing implementation. If bumble bees are hibernating in the analysis area, they would not be affected because implementation would be conducted outside the hibernation season (USFS 2015a).

While implementation would result in a loss of habitat, increased riparian habitat might increase flowering plants and therefore increase bumble bee foraging habitat in the long-term (USFS 2015a).

Great Basin Rams-horn

The only Proposed Action that will occur near Folsom Spring is the installation of trench drain and a culvert on the Highway 50 shoulder (which is not on USFS property) and decommissioning the culvert leading from Highway 50 to Folsom Spring. The trench drain and decommissioning the culvert will benefit the spring in the long-term by directing road runoff into the retention basin to the North of the spring, rather than allowing it to run off the road into the spring as it has in the past. The spring will be protected from implementation affects resulting from this action by design features requiring standard erosion control BMPs. Any Great Basin rams-horn that may be present in the spring would be protected by the same BMPs (USFS 2015a).

Lahontan Lake tui chub

While Lahontan Lake tui chub is known to occur in Lake Tahoe, downstream of the analysis area, Burke Creek is not tui chub habitat. The Proposed Action will not affect individuals but may improve habitat by reducing sediment running into Lake Tahoe (USFS 2015a).

USFS MIS

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)

The flow and stream surface shade through Jennings Pond will not be affected by this project. The amount of flow in Burke Creek and Jennings Pond within the analysis area would not be altered as a result of the Proposed Action; however the flow would be split between three channels leading into Jennings Pond. The northern and central channels would receive flow from Burke Creek and US 50 runoff, while the southern channel will continue to receive flow from the urban area runoff. Additionally, since the channel depth in the northern and central channels will be less incised, the water is likely to spread out during high flows.

Sedimentation should be reduced in the analysis area as a result of repairing incised channels and headcuts.

Water surface shade will be reduced in the southern channel due to a decrease in the amount of water in that channel. It is surmised that approximately 20% of the current riparian shrubs will be cut and utilized in the new northern and central channels. More riparian shrubs may die off over time due to a lack of water. Water surface shade in the northern and central channels will increase over time as plantings mature (USFS 2015b).

Riparian Habitat (Yellow warbler)

There will be 192 meters of new channel construction. It is highly likely that riparian habitat will expand along the new channel. Some of the riparian habitat may be lost along 76 meters of the old channel. That channel will not be removed but will have a greatly reduced flow, likely resulting in the loss of some of the existing riparian habitat. With the combination of expanded

riparian habitat around the new channels and some remaining habitat around the existing channel, there should be a net increase in riparian habitat, although it is not possible to estimate the amount with the available data (USFS 2015b).

Deciduous canopy cover and size class will not change in the riparian hardwood habitat. Canopy cover will likely be increased in the riparian shrub habitat due to a long-term increase in riparian shrubs in the new channels (192 meters) and retention of a portion of the riparian shrub canopy cover in the existing channels (76 meters). Since there is no canopy cover other than riparian habitat the change in overall canopy cover will be the same. Size class will decrease initially due to smaller shrubs in the new channel but may increase in the long-term due to growth in the new channel and growth of the remaining shrubs in the existing channel (USFS 2015b).

Wet Meadow Habitat (Pacific tree (chorus) frog)

The existing wet meadow habitat will not be affected by the Proposed Action. There may be an undetermined amount of wet meadow habitat added as a result of rerouting the stream. Most of the habitat around the new stream channel will likely become riparian habitat but some will likely be converted from perennial grassland to wet meadow. While this type conversion may not affect the height or amount of ground cover of herbaceous plants it should change the species present. Meadow hydrology will be affected in that the location of available water will change and siltation will be reduced because there should be less sediment transported by the 192 meters of new channel. However, impacts from the remaining incised channel below Jennings Pond and recreational impacts will not change (USFS 2015b).

USFS and Non-USFS System Lands Landbird Conservation (Migratory Birds)

Potential effects associated with the Proposed Action are the same as discussed above under the FWS/USFS TEPCS section. Project construction that will include removal of willows is scheduled to occur during the avian nesting season Therefore, a migratory bird nesting survey will be required in compliance with the Migratory Bird Treaty Act and the project design features (Section 2.3). The primary objective of the surveys is to prevent affects to nesting migratory birds. If nesting migratory birds are found in areas where project implementation would affect the nest, an LOP may be implemented and/or construction timelines or facility locations may be adapted.

TRPA Special Interest Species

TRPA Special Interest Species, willow flycatcher and Northern goshawk are discussed above under FWS/USFS TEPCS.

Although Northern goshawk were not detected during project surveys on non-USFS System lands, the closest known TRPA Northern goshawk threshold area is located 205 feet east of the

project area boundary. This Northern goshawk threshold area is called the Burke Creek Territory (TRPA 2015). Goshawks may occasionally forage or perch in the project area; however, due to the high levels of human disturbance, this species is not expected to nest within the project area. Therefore, it is unlikely that the Proposed Action would have a long term adverse cumulative effect on Northern goshawk (WRC 2015).

Cumulative Effects

FWS/USFS TEPCS

Cumulative effects represent (40 CFR 1508.7) the "impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions."

Past actions contributed to the existing condition of the analysis area. Therefore only past activities that occurred within the previous five years are considered. Below is a summary of past, present and foreseeable future activities (Section 3.1) within or adjacent to the analysis areas that are relevant to the proposed project:

- 2010 USFS improved the Lam Watah hiking/biking trail consisting of 1.1 miles of trail through Rabe Meadow, from parking area on the east side of Kahle Drive at the intersection of US 50 to Nevada Beach.
- The second segment of the Nevada Stateline to Stateline Bikeway South Demonstration Project was completed in 2013.
- The third segment f the Nevada Stateline to Stateline Bikeway South Demonstration Project was completed in 2015.
- The Oliver Park GID has completed the first part of an Evaluation of Existing Conditions Memorandum (ECAM).
- Kahle Basin Redesign Project, currently in the conceptual design process.
- Sierra Colina Village is filing permit applications for construction beginning in 2017.
- Burke Creek Highway 50 Crossing and Realignment Project (non-USFS portions (2016 and 2017)

All of the past, present and reasonably foreseeable future projects listed above would have similar environmental effects. The majority of effects would be disturbance type effects during implementation. The bike path projects likely introduced long-term disturbance effects for species with habitat along the trail route, primarily forest dwelling species. The water quality improvement projects likely improved habitat for aquatic species by improving water quality in streams and Lake Tahoe. Applicable BMPs would have/will prevent unintended environmental effects (USFS 2015a).

Sierra Nevada Yellow-legged frog and Proposed Critical Habitat

Since the No Action alternative would have no effect on Sierra Nevada yellow-legged frog, its defined suitable habitat or its proposed critical habitat, there are no cumulative effects expected.

When past, present and reasonably foreseeable future projects are considered, the Proposed Action would not have any effect on species composition. It would not increase or decrease the amount or access of non-native salmonids that are currently occupying perennial water sources within the analysis area, which is a well-documented threat to the established and survival of this species. The expected changes to the defined suitable habitat for SNYLF is very minor compared to the amount of habitat within the LTBMU as a whole. Therefore, no measureable cumulative effects are expected to result from implementation of this project (USFS 2015a).

Lahontan Cutthroat Trout

Since the No Action alternative would have no effect on Lahontan cutthroat trout or their habitat there are no cumulative effects expected.

When past, present and reasonably foreseeable future projects are considered, there would be no cumulative effect on Lahontan cutthroat trout because the Proposed Action won't directly affect LCT and could have a beneficial effect on LCT habitat (USFS 2015a).

Northern Goshawk, Bald Eagle, California Spotted Owl, and Pacific Marten

Since the No Action alternative would have no effect on Northern goshawk, bald eagle, California spotted owl, bald eagle or Pacific marten or their habitat there are no cumulative effects expected.

The anticipated effects to goshawk, bald eagle, spotted owl and marten are generally characterized as short-term disturbance. The cumulative effect of the Proposed Action, when combined with past, present and reasonably foreseeable future actions is to adversely affect individuals during implementation however this is not expected to constitute a cumulative effect (USFS 2015a).

Willow Flycatcher

Since the No Action alternative would have no effect on willow flycatcher or their habitat there are no cumulative effects expected.

The Proposed Action, when combined with past, present and reasonably foreseeable future actions is not expected to have a cumulative effect on willow flycatcher or their habitat because the project occurs in a location where willow flycatcher are not known or expected to occur and habitat that is removed during implementation will be added in the new riparian corridor (WRC 2015, USFS 2015a).

Pallid Bat, Townsend's Big-eared Bat and Fringed Myotis
Since the No Action alternative would have no effect on pallid bat, Townsend's big-eared bat or fringed myotis, or their habitat there are no cumulative effect expected.

The Proposed Action when combined with past, present and reasonably foreseeable future actions is not expected to have a cumulative effect on sensitive bat species or their habitat because the other past, present and reasonably foreseeable future projects should not have a noticeable effect on sensitive bats or their habitat (USFS 2015a).

Western Bumble Bee
Since the No Action alternative would have no effect on Western bumble bee or their habitat there are no cumulative effects expected.

When past, present and reasonably foreseeable future projects are considered, there could be a short-term loss of habitat and disturbance and/or loss of individuals, however, this loss of habitat and/or loss of individuals would be small compared to the habitat available in the LTBMU and would constitute an additive effect rather than a cumulative effect (USFS 2015a).

Great Basin Rams-horn
Since the No Action alternative would have no effect on Great Basin rams-horn or their habitat there are no cumulative effects expected.

When past, present and reasonably foreseeable future projects are considered, there would be no cumulative effect on Great Basin rams-horn as a result of the Proposed Action because the only direct or indirect affect would be an improvement to spring habitat (USFS 2015a).

Lahontan Lake tui chub
Since the No Action alternative would have no effect on Great Basin rams-horn or their habitat there are no cumulative effects expected.

When past, present and reasonably foreseeable future projects are considered, there would be no cumulative effect on Lahontan Lake tui chub as a result of the Proposed Action because the only direct or indirect affect would be an improvement to lake habitat (USFS 2015a).

USFS MIS
Cumulative effects at the bioregional scale are tracked via the SNF MIS Bioregional monitoring, and detailed in the 2010 SNF Bioregional MIS Report (USFS 2015b). Section 3.1 of this EA provides a complete description of past, present, and foreseeable future actions. This cumulative effects analysis is bounded by 400 meters on all sides of the USFS project area.

Lacustrine/Riverine Habitat (Aquatic Macroinvertebrates)
Since the No Action alternative would have no effect on Lacustrine/Riverine habitat in the analysis area, no cumulative effects are expected.

The Proposed Action, when combined with past, present, and reasonably foreseeable future actions is not expected to have a cumulative effect on Lacustrine and Riverine habitat because this project should result in a decrease in the amount of sedimentation, flow would essentially be unchanged and water surface shade would be increased in some areas but reduced in others. These effects should result in a net improvement in Lacustrine and Riverine habitat in the analysis area USFS 2015b).

Riparian Habitat (Yellow warbler)
Since the No Action alternative would have no effect on riparian habitat in the analysis area, no cumulative effects are expected.

The Proposed Action, when combined with past, present, and reasonably foreseeable future actions is not expected to have a cumulative effect on riparian habitat because this project should result in a net increase in riparian habitat USFS 2015b).

Wet Meadow Habitat (Pacific tree (chorus) frog)
The No Action alternative would avoid effects to Wet Meadow habitat, but would also forego the opportunity to restore ecological function and processes within the Burke Creek channel and its adjacent floodplain, reduce pollutant loading to Lake Tahoe and improve public safety on US 50 related to flooding.

The Proposed Action, when combined with past, present and reasonably foreseeable future actions is not expected to have a cumulative effect on wet meadow habitat because it is expected to result in a long-term increase in habitat and habitat quality USFS 2015b).

USFS and Non-USFS System Lands Landbird Conservation (Migratory Birds)
Potential cumulative effects associated with the Proposed Action are the same as discussed above under the FWS/USFS TEPCS section above (WRC 2015, Appendix E, USFS 2015c, Appendix F).

TRPA Special Interest Species
For willow flycatcher and Northern goshawk, the analysis area is spatially defined as the project area (~16 acres). The analysis area is temporally defined to extend 5 years before and after the present. Although actual implementation of the Proposed Action alternative may last only one to two years, the results of the implementation activities, may not be realized for 10-

15 years following implementation. Potential cumulative effects associated with the Proposed Action are the same as discussed above under the FWS/USFS TEPCS section above (WRC 2015, Appendix E, USFS 2015c, Appendix F).

3.2.2 Botanical Resources and Invasive Plant Species

This section analyzes the Proposed Action and No Action alternatives to determine whether they have the potential to affect any federally endangered, threatened, proposed or candidate botanical species, or USFS Region 5 Sensitive botanical species as well as other botanical resources, such as TRPA Sensitive Plants, and LTBMU Watch List botanical species. Effects to sensitive botanical species are also discussed in the Project Botanical Field Reconnaissance Report and Plant Risk Assessment (Appendix G), and USFS Botanical Review (Appendix H, USFS 2015d).

3.2.2.1 Existing Conditions

Vegetation Communities and Sensitive Species

The area analyzed in this document is the project area that encompasses approximately 16 acres (Figure 1-2). This area was selected because the proposed hydrologic restoration activities do not have the potential to influence hydrological processes beyond this area.

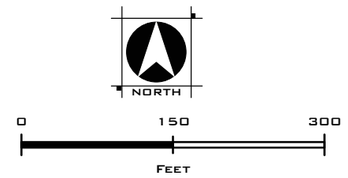
Vegetation types were mapped for the project area in the spring of 2012. This survey also identified an area near Lake Tahoe on the west side of the project area that has been fenced for Tahoe yellow cress habitat preservation (WR 2012). A Nevada Natural Heritage Program (NNHP) Database Query was completed for the project area. There was only one "at risk" plant was identified by the query and this was the Tahoe yellowcress. Tahoe yellow cress is also a Region 5 FSS. The results of the database query can be found in Appendix G.

A complete species inventory was previously completed for the Sierra Colina EIS in June and July of 2007. This survey included TRPA "special status" species that had potential to occur on that property based on potential habitat observed in the area. These species included Washoe tall rockcress, Galena rockcress, and Mariposa sedge. According to this report, none of these species were encountered on the property during the spring 2012 survey (EDAW 2009).

A follow-up survey of both non-USFS System Lands and USFS System Lands (project area) was conducted between May 13 and June 25, 2015 and the results are contained in Appendix G. Vegetation communities documented in 2015 include riparian, mesic meadow, ruderal and wetlands (as defined by the USACE) are illustrated in Figure 3-1A. During the 2015 floristic survey, no sensitive plant species were documented to occur within the project area (Appendix G).

Insert Figure 3-1A

FIGURE 3-1A
VEGETATION COMMUNITIES
BURKE CREEK HIGHWAY 50 CROSSING
AND REALIGNMENT
DOUGLAS COUNTY, NV
OCTOBER, 2015



- Spring
- ExVegMapping2014

Vegetation Communities

- AI: Anthropoenic Influence
- CF: Coniferous Forest
- CF/SL: Coniferous Forest/Shrubland
- DM: Dry Meadow
- OW: Open Water
- SL: Shrubland
- WM: Wet Meadow
- WM/WR: Wet Meadow/Woody Riparian
- WR: Woody Riparian
- Project Boundary

NOTES:
IMAGERY: DOUGLAS COUNTY
PARCELS: DOUGLAS COUNTY
VEGETATION TYPES: WOOD RODGERS

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The existing hydrophytic vegetation of Rabe Meadow is supported by groundwater sub-irrigated from the main channel of Burke Creek, whose base flow is derived from spring flow. Folsom Spring, located adjacent to US 50 approximately 0.13 mi. north of the Burke Creek Crossing, contributes flow to the Lower Burke Creek Meadow. Currently flow from US 50 right-of-way is allowed to comingle with Folsom Spring flow via an embankment protector with outlet pipe pointing directly at the spring location. Based on groundwater monitoring data collected via ten piezometers installed approximately 6 months ago in the upper portion of Rabe Meadow, it appears that groundwater levels are nearest to the ground surface and highest in elevation near the existing stream channel. Therefore, it is most likely that the stream is the primary source of shallow groundwater levels, and that other groundwater sources are limited (Balance 2015).

In 2012 and 2015, a Routine Onsite Wetlands Delineation was completed in accordance with the US Army Corps of Engineers Mountain West Supplement requirements. This delineation was submitted to the USACE in June 2013 and it was verified June 6, 2014. In June of 2015, potential for jurisdictional resources was assessed for the area west and adjacent to US 50, on the upper reach of Burke Creek (an extension to Wetland B), and an extension to Wetland A in Rabe Meadow. The additional areas surveyed in 2015 will be submitted to the USACE for verification with a permit application required for this project. Verified wetlands (2102) and proposed wetlands 2015 total an approximate 3.5 acres of waters of the United States including wetlands for the project area. Figure 3-1B shows potential jurisdictional resources surveyed and delineated for the project area.

Invasive Species

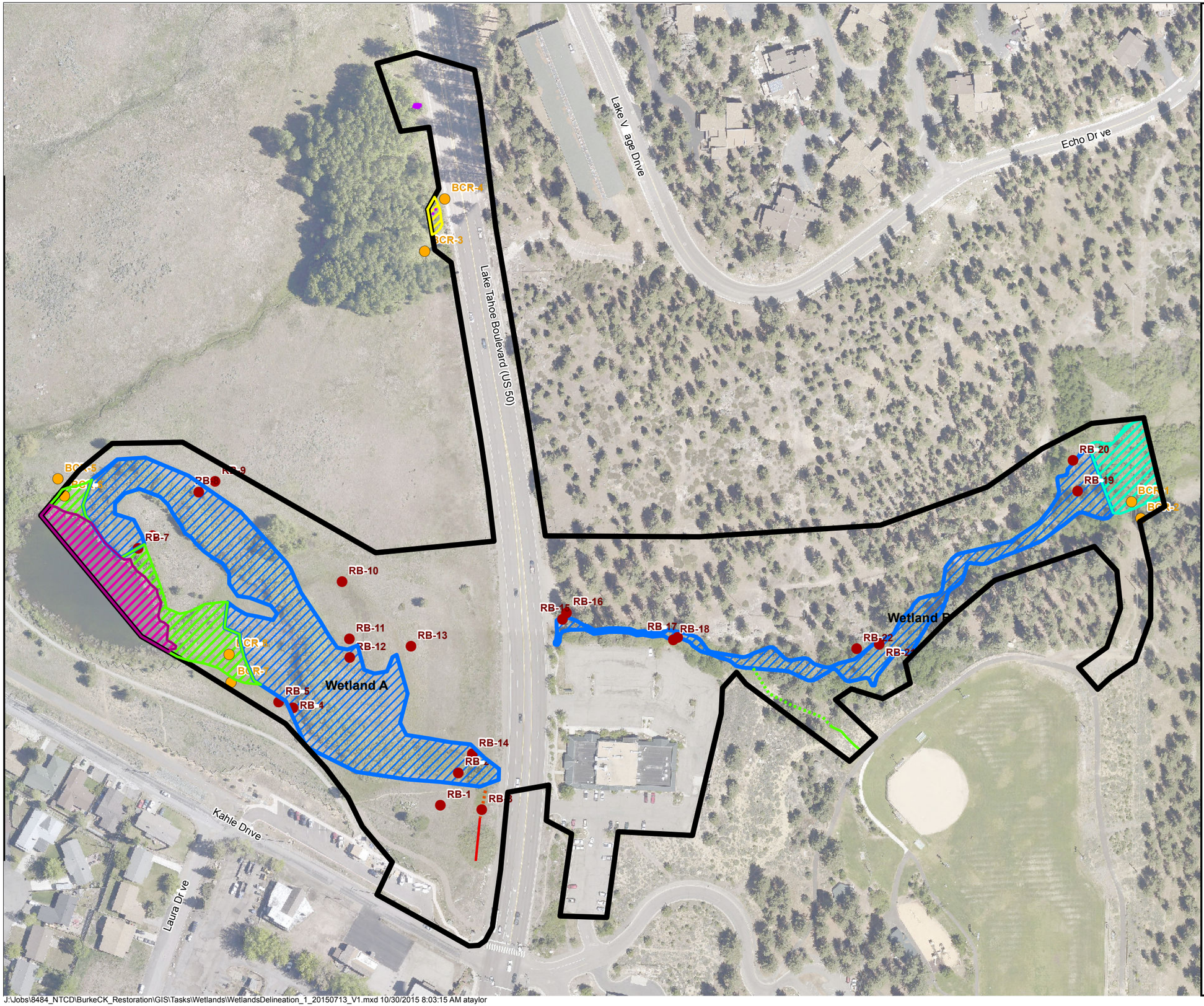
Several invasive and noxious weed risk assessments were conducted by NTCD, The County Weed Abatement, and USFS personnel between 2010 and 2013 for the portion of Burke Creek upstream of US 50 to just past the ball fields, and also downstream of US 50 to Jennings Pond in 2015 (WR 2012 ECAM). Invasive species documented in the project area prior to 2015 included *Potentilla recta* (sulfur cinquefoil), *Cirsium vulgare* (bull thistle), *Bromus tectorum* (cheatgrass), and *Leucanthemum vulgare* (oxeye daisy), *Hypericum perforatum* (St. Johnswort), and *Verbascum thapsus* (common mullein). In 2015, documented invasive species included cheatgrass, bull thistle, St. Johnswort, and common mullein. Figure 3-2, illustrates the current documented locations of these species.

FWS Threatened, Endangered, Proposed, USFS Sensitive (TEPCS) and LTBMU Watch List Botanical Species

The botanical species on the LTBMU that are targeted for management are listed in Table 3-4 TEPCS Botanical Species and Table 3-5 LTBMU Botanical Watch List. Invasive plants are addressed in the project's Invasive Plant Risk Assessment described above Appendix G).

Insert Figure 3-1B

FIGURE 3-1B:
WETLANS DELINEATION
BURKE CREEK HIGHWAY 50 CROSSING AND REALIGNMENT
DOUGLAS COUNTY, NV
OCTOBER, 2015



NOTES:
AERIAL: DOUGLAS COUNTY 2007
TOPOGRAPHY: SURVEY & LIDAR FROM OPEN TOPOGRAPHY

NORTH

0 50 100
FEET

- Sample Point 2015
- Sample Point 2012

Line Feature 2015
- Feature 1
- Feature 2
- WOUS 2

Line Feature 2012
- Feature 1
- Feature 2

Wetlands 2015
- Wetland A
- Wetland B
- Wetland C
- Feature 3
- Feature 4
- 2015 Project Boundary

Wetland 2012
- Wetland 2012

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Insert Figure 3-2

FIGURE 3-2
LOCATIONS OF INVASIVE SPECIES
BURKE CREEK HIGHWAY 50 CROSSING
AND REALIGNMENT
DOUGLAS COUNTY, NV
OCTOBER, 2015

NORTH

0 100 200
FEET

Project Boundary

Invasive Species 2015 Survey

- Bromus tectorum L.
- Cirsium vulgare
- Hypericum perforatum L.
- Verbascum thapsus L.

NOTES:

WOOD RODGERS

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Table 3-4. List of all TEPCS Botanical Species with Known Occurrences or Suitable Habitat on the LTBMU (USFS 2015d).

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in project	Suitable habitat in project
Boechera rigidissima (= Arabis rigidissima var. *demota)*	Galena Creek rock cress	FSS	Open, rocky areas along forest edges of conifer and/or aspen stands; usually found on north aspects; 7,500 ft. & above.	X	No	No
Boechera tiehmii	Tiehm's rock cress	FSS	Open rocky soils in the Mt. Rose Wilderness; 10,000 ft. & above.	Suitable habitat only	No	No
Boechera tularensis	Tulare rockcress	FSS	Shaded, mostly east-facing subalpine rocky areas, including rocky slopes, rock-lined streams and seeps, rocky outcrops, saddles, and canyons; 6,000-11,000 ft.	Known only from herbarium or text records	No	No
Botrychium spp.			*Botrychium* species are found in similar habitat; wet or moist soils such as marshes, meadows, and along the edges of lakes and streams; generally occur with mosses, sedges, rushes, and other riparian vegetation; 2,000-10,000 ft.			
Botrychium ascendens	upswept moonwort	FSS	See *Botrychium* spp	X	No	Potential habitat but surveys did not identify *Botrychium*
Botrychium crenulatum	scalloped moonwort	FSS		X	No	
Botrychium lineare	slender moonwort	FSS		Suitable habitat only	No	
Botrychium lunaria	common moonwort	FSS		Suitable habitat only	No	
Botrychium minganense	Mingan moonwort	FSS		X	No	
Botrychium montanum	western goblin	FSS		X	No	
Bruchia bolanderi	Bolander's candle moss	FSS	Mainly in montane meadows and stream banks, but also on bare, slightly eroding soil where competition is minimal.	X	No	Potential habitat but surveys did not identify *Bruchia*
Dendrocollybia racemosa[1]	branched collybia	FSS	On old decayed or blackened mushrooms or occasionally in coniferous duff, usually within old growth stands.	Known only from herbarium or text records	No	No
Draba asterophora var. *asterophora*	Tahoe draba	FSS; TRPA	Rock crevices and open granite talus slopes on north-east slopes; 8,000-10,200 ft.	X	No	No

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in project	Suitable habitat in project
Draba asterophora var. *macrocarpa*	Cup Lake draba	FSS; TRPA	Steep, gravelly or rocky slopes; 8,400-9,300 ft.	X	No	No
Draba cruciata	Mineral King draba	FSS	Subalpine gravelly or rocky slopes, ridges, crevices, cliff ledges, sink holes, boulder and small drainage edges; 7,800-13,000 ft.	Known only from herbarium or text records	No	No
Erigeron miser	starved daisy	FSS	Granitic rock outcrops; 6,000 ft & above	Suitable habitat only	No	No
Eriogonum luteolum var. *saltuarium*	goldencarpet buckwheat	FSS	Sandy granitic flats and slopes, sagebrush communities, montane conifer woodlands; 5,600-7,400 ft.	Suitable habitat only	No	No
Eriogonum umbellatum var. *torreyanum*	Donner Pass buckwheat	FSS	Dry gravelly or stony sites; often on harsh exposures (e.g. ridge tops, steep slopes)	Suitable habitat only	No	No
Helodium blandowii	Blandow's bog-moss	FSS	Bogs, fens, wet meadows, and along streams under willows.	X	No	Potential habitat but surveys did not identify *Helodium*
Hulsea brevifolia	short-leaved hulsea	FSS	Red fir forest, but also in mixed conifer forests; found on gravelly soils; 4,900-8,900 ft.	Suitable habitat only	No	No
Ivesia sericoleuca	Plumas ivesia	FSS	Vernally wet portions of meadows and alkali flats, vernal pools within sagebrush scrub or lower montane coniferous forest; often on volcanic soils; 4,300-7,200 ft.	Suitable habitat only	No	No
Lewisia kelloggii ssp. *hutchisonii*	Kellogg's lewisia	FSS	Ridge tops or flat open spaces with widely spaced trees and sandy granitic to erosive volcanic soil; 5,000-7,000 ft.	Suitable habitat only	No	No
Lewisia kelloggii ssp. *kelloggii*	Kellogg's lewisia	FSS	See *Lewisia kelloggii* ssp. *hutchisonii*	Suitable habitat only	No	No
Lewisia longipetala	long-petaled lewisia	FSS; TRPA	North-facing slopes and ridge tops where snow banks persist throughout the summer; often found near snow bank margins in wet soils; 8,000-12,500 ft.	X	No	No
Meesia uliginosa	broad-nerved hump-moss	FSS	Bogs and fens, but also very wet meadows.	X	No	No
Orthotrichum praemorsum	ortho-trichum moss	FSS	Shaded, moist microhabitats of rock outcrops; eastern Sierra to intermountain West; up to 8,200 ft.	Known only from herbarium or text records	No	No

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in project	Suitable habitat in project
Peltigera gowardii	Goward's water fan	FSS	Cold unpolluted streams in mixed conifer forests.	X	No	No
Pinus albicaulis	whitebark pine	C; FSS	Subalpine and at timberline on rocky, well-drained granitic or volcanic soils.	X	No	No
Rorippa subumbellata	Tahoe yellow cress	C; FSS; TRPA	Endemic to the shore zone of Lake Tahoe, typically in back beach areas between 6,223 and 6,230 ft.	X	No	No

Botanical species includes vascular and non-vascular plants, lichen, and fungi.
There are no federally threatened, endangered, or proposed botanical species known to occur or with known suitable habitat within LTBMU. This list includes all R5 Sensitive botanical species with known occurrences or known suitable habitat on LTBMU.
Legal status: C—Candidate for federal listing under the Endangered Species Act; FSS—USFS Sensitive (Regional Forester's Sensitive Species List, Region 5); TRPA—Tahoe Regional Planning Commission Sensitive Species (TRPA Code of Ordinances 2012)
[1]For branched collybia, surveys are only effective when fruiting bodies are visible. This species typically fruits in late fall -early winter. The extent to which aboveground fruiting bodies are correlated with the abundance of underground structures is unknown. When a survey does not find the fruiting body, the species could still be present at the site. Because of this detection difficulty, it is important to manage habitat in a state that is suitable for fungi.

Table 3-5. LTBMU Watch List Botanical Species (USFS 2015d).

Scientific Name	Common Name	Habitat characteristics	Known on LTBMU	Known in project area
Astragalus austiniae	Austin's milkvetch	Rocky ridges and slopes of high peaks above 8,000 ft. in the Tahoe area (Castle Peak to Carson Pass)	X	No
Boechera rectissima (= *Arabis rectissima* var. *simulans*)	bristlyleaf rock cress	Dry, sandy, granitic or andesitic soil on mostly gentile slopes of all aspects, in full or filtered sunlight of thinly-littered openings in mature, open Jeffrey pine and white fir; 6,000-7,400 ft.	X	No
Carex davyi	Davy's sedge	Subalpine coniferous forest, upper montane coniferous forest	X	No
Chaenactis douglasii var. alpina	alpine dusty maidens	Alpine boulder and rock field (granitic)	X	No
Claytonia megarhiza	fell fields claytonia	Alpine boulder and rock field (granitic)	X	No
Cryptantha crymophila	subalpine cryptantha	Subalpine coniferous forest (volcanic, rocky)	Suitable habitat only	No
Epilobium palustre	marsh willowherb	Bogs and fens, meadows and seeps(mesic)	Known only from herbarium or text records	No
Meesia longiseta	meesia moss	Coniferous forests, stream banks, wet meadows, and fens	X	No
Myurella julacea	myurella moss	Seep like granitic rock walls; on soil over rocks or in crevices in alpine boulder and rock fields; subalpine coniferous forest on damp soil over rocks; 8,800-9,900 ft.	Suitable habitat only	No

Scientific Name	Common Name	Habitat characteristics	Known on LTBMU	Known in project area
Orthotrichum holzingeri	Holzinger's orthotrichum moss	Seasonally wet rocks in small streams of dry montane forests; 3,000-6,500ft	Suitable habitat only	No
Orthotrichum spjutii	Spjut's orthotrichum moss	Volcanic rock walls; continually misted, shaded granitic rock faces at high elevations near Sonora Pass.	Suitable habitat only	No
Pohlia tundrae	tundra pohlia moss	Gravelly, damp soils of alpine boulder and rock fields; 8,800-9,900 ft.	Known only from herbarium or text records	No
Sphagnum spp.	sphagnum moss	Wet meadows, bogs, fens; sea-level to subalpine.	X	No
Tomentypnum nitens	tomentypnum moss	Forming lawns and hummocks in calcareous, mesotrophic fens in association with other calciphiles, usually found with hypnaceous moss, such as *Paludella squarrosa* and *Aulacomnium* spp.	Suitable habitat only	No

LTBMU maintains a watch list of botanical species that are of conservation concern, but have not been designated as Sensitive by the Regional Forester. This list includes species that are newly described; locally rare; range extensions or disjunct populations; species of specific public interest; or species with too little information to determine their appropriate status. This list was formerly known as 'special interest'. Survey for and document occurrences of Watch List spp.; do not include in Biological Evaluation.

There are no federally threatened, endangered, or proposed plant species known to occur or with known suitable habitat on LTBMU (USFS 2015d, Appendix G and H).

3.2.3.2 Environmental Consequences

For botanical resources, the goal of a stream restoration and erosion control project is to improve the quantity and quality of hydric habitat to promote better health of riparian and wetland vegetation, and reduce mesic conditions that promote increases in invasive species. To measure the environmental effects of the alternatives on desirable and undesirable botanical species, the following attributes were analyzed.

- Area of montane riparian (Stream Environment Zone)(acres)
- Area of stabilized and geomorphically functional stream channel (length), and
- Area addressed through integrated invasive plant management

Table 3-6 summarizes project erosion control and stream restoration botanical attributes by alternative. Acreage and linear feet were calculated from estimates provided in Existing Conditions Report (Wood Rodgers 2012) and the design plans (NTCD 2015).

Table 3-6. Summary of Botanical Resource Indicators by Alternative

Botanical Attributes	No Action Alternative	Proposed Action Alternative
Area of wet meadow/montane riparian (SEZ) (Acres)	4.6	5.3
Area of stabilized and geomorphically functional stream channel (Linear Feet),	0	600
Area addressed through integrated invasive plant management (Acres)	0	1.5

No Action Alternative

Under this alternative the existing quantity of montane riparian habitat (4.6 acres) may decrease over time due to unstable streambank conditions that could lead to increased disconnect with the floodplain of Burke Creek and lowering of the groundwater table. Existing area of unstable streambank could increase as accelerated erosion progresses resulting in decreased water quality through increased entrainment of sediment being discharged in the system. As the area of hydric habitat decreases and evolves into more mesic habitat, it is anticipated that the area and diversity of invasive species are likely to increase.

Proposed Action Alternative

Direct Effects

Vegetation Communities and Sensitive Species

Proposed Action activities would temporarily impact upland (1 acre), meadow (~1.4 acres) and riparian vegetation (~0.79 acre) that includes above and below US 50 (NTCD 2015). During the 2015 floristic survey, no sensitive plant species were documented to occur within the project area (Appendix G and H), therefore there would be no impact to sensitive species.

Temporary impacts to vegetation communities would be attributed to streambank stabilization, parking lot removal and floodplain recontouring, new channel construction and channel abandonment downstream of US 50. In addition, temporary dewatering of the upper portion of existing Burke Creek above Jennings Pond for a maximum of one year is anticipated to result in short term drying of the meadow that currently supports riparian habitat. Based on groundwater monitoring data (NTCD 2015) collected over the past 7 months, it is anticipated that 0.17 acre of riparian and meadow habitat would be subject to temporary drying due to dewatering to facilitate stream restoration between US 50 and Jennings Pond. In order to reduce impacts due to stream diversion, approximately one-half riparian and herbaceous meadow vegetation would be salvaged during construction to the extent that the resource can be reused during revegetation activities. In addition, an adaptive management strategy

including monitoring the health of the remaining willows and continued groundwater monitoring would occur during stream diversion. If there are indications that willow health and/or depth to groundwater is declining, additional trees could be salvaged for use during restoration revegetation below US 50.

Revegetation above US 50 would include seeding and installation of containerized plant stock Figure 3-3A) Upstream Revegetation Plan – use 50% design plans reveg sheet(s?). Below US 50, appropriate salvaged plant materials including willow stakes and root wads, and alder root wads would be used in revegetation of the new channel as well as seeding. (Figure 3-3B,).

Invasive Species

Strict adherence to construction BMPs (Appendix B) and the Weed Management Plan (USFS 2015e, Appendix I) would provide for abatement of known occurrence of invasive species within the project area and prevention of spread of weed species to unaffected areas within the project area and off site.

Cumulative Effects

The area analyzed for cumulative impacts is the project area (16 acres). The Proposed Action would affect only approximately 1 percent of the approximate 1600 acre Burke Creek watershed. Temporally, cumulative impacts for botanical resources are analyzed for 5 years prior and 10 years in the future. The Proposed Action when combined with the projects described in Section 3.1 have in the past, and would result in temporary impacts to desirable vegetation communities in the present and future. However, all past, present and reasonably foreseeable projects are bound by the TRPA Code of Ordinances environmental thresholds and the USFS LTBMU Forest Plan. These binding thresholds and guidance are in place to ensure that all projects in the Tahoe Basin work towards meeting or exceeding TRPA's thresholds and adhere to USFS management goals. Thus, as a stream restoration and erosion control project, working towards and attaining the desired conditions as detailed in Section 2.2 would result in a positive cumulative impact to vegetation communities by promoting establishment of desirable species.

Insert Figure 3-3A

PLANT LEGEND					PERENNIALS			
SYMBOL	BOTANICAL NAME	COMMON NAME	QTY.	SIZE	BOTANICAL NAME	COMMON NAME	QTY.	SIZE
AS	*Populus tremuloides*	Aspen	12	5-gal	*Gaillardia pulchella*	Indian Blanketflower	20	Supercell
SB	*Amelanchier alnifolia*	Serviceberry	8	T-pot	*Arnica nevadiensis*	Sierra Arnica	20	Supercell
SW	*Salix scouleriana*	Scouler's Willow	4	D-pot	*Delphinium glaucum*	Towering Larkspur	20	Supercell
SH	*Salix lucida ssp. Lasiandra*	Shining Willow	4	D-pot	*Potentilla gracilis*	Slender Cinquefoil	20	Supercell
LW	*Salix lemmonii*	Lemmon's Willow	4	D-pot	*Mimulus guttatus*	Common Monkeyflower	20	Supercell
DW	*Cornus sericea*	Red-Osier Dogwood	8	D-pot	*Castilleja miniata* ssp. *Miniata*	Giant Red Paintbrush	20	Supercell
EB	*Sambucus nigra (mexicana)*	Blue Elderberry	5	1-gal	*Castilleja parviflora*	Small-Flowered Paintbrush	20	Supercell
MS	*Spirea densiflora*	Mountain Spirea	10	1-gal	*Arnica longifolia*	Seep-Spring Arnica	20	Supercell
SC	*Ribes nevadense*	Sierra Currant	10	1-gal	*Arnica mollis*	Soft Arnica	20	Supercell
TW	*Lonicera involucrata*	Twinberry	6	1-gal	*Rubus parviflorus*	Thimbleberry	30	4"
WC	*Ribes cereum*	Wax Currant	5	1-gal	*Aquilegia formosa*	Columbine	20	4"
WR	*Rosa woodsii*	Woods' Rose	10	1-gal	*Lupinus polyphyllus*	Big Leafed Lupine	20	4"
WB	*Betula occidentalis*	Water Birch	6	Supercell	*Lilium parvum*	Alpine Lily	10	4"
MA	*Sorbus californica*	Mountain Ash	6	Supercell	*Potentilla glandulosa*	Sticky Cinquefoil	20	4"
RS	*Perovskia atriplicifolia*	Russian Sage	8	1-gal	*Mimulus lewisii*	Lewis' Monkeyflower	20	4"
PF	*Potentilla fruticosa*	Shrubby Cinquefoil	7	1-gal	*Helenium bigelovii*	Bigelow Sneezeweed	20	4"
BB	*Arctostaphylos uva-ursi*	Bearberry	11	1-gal	*Penstemon rydbergii* var. *oreocharis*	Meadow Penstemon	20	4"

REVEGETATION LEGEND

TYPE 1 SEED MIX (3635 SQ FT)

TYPE 2 SEED MIX (6177 SQ FT)

TYPE 3 SEED MIX (2993 SQ FT)

ROCK MULCH

LOG STEP POOL STRUCTURE

ROCK STEP POOL STRUCTURE

(AS) TREE/SHRUB WITH SPECIES SYMBOL

N

0 10 20
SCALE IN FEET

50% DESIGN PLANS
NOT FOR CONSTRUCTION

NOTES:
1. FINAL PLANT AND PERENNIAL LOCATIONS TO BE DETERMINED IN FIELD BY REVEGETATION SPECIALIST.
2. PLANTS AND PERENNIALS TO BE SUPPLIED BY NTCD.
3. SEE CIVIL ENGINEERING PLANS AND DETAILS FOR CHANNEL STABILIZATION AND GRADING DETAILS.
4. NO TREES OR SHRUBS TO BE PLACE WITHIN LIMITS OF BERM OR AS DIRECTED BY ENGINEER

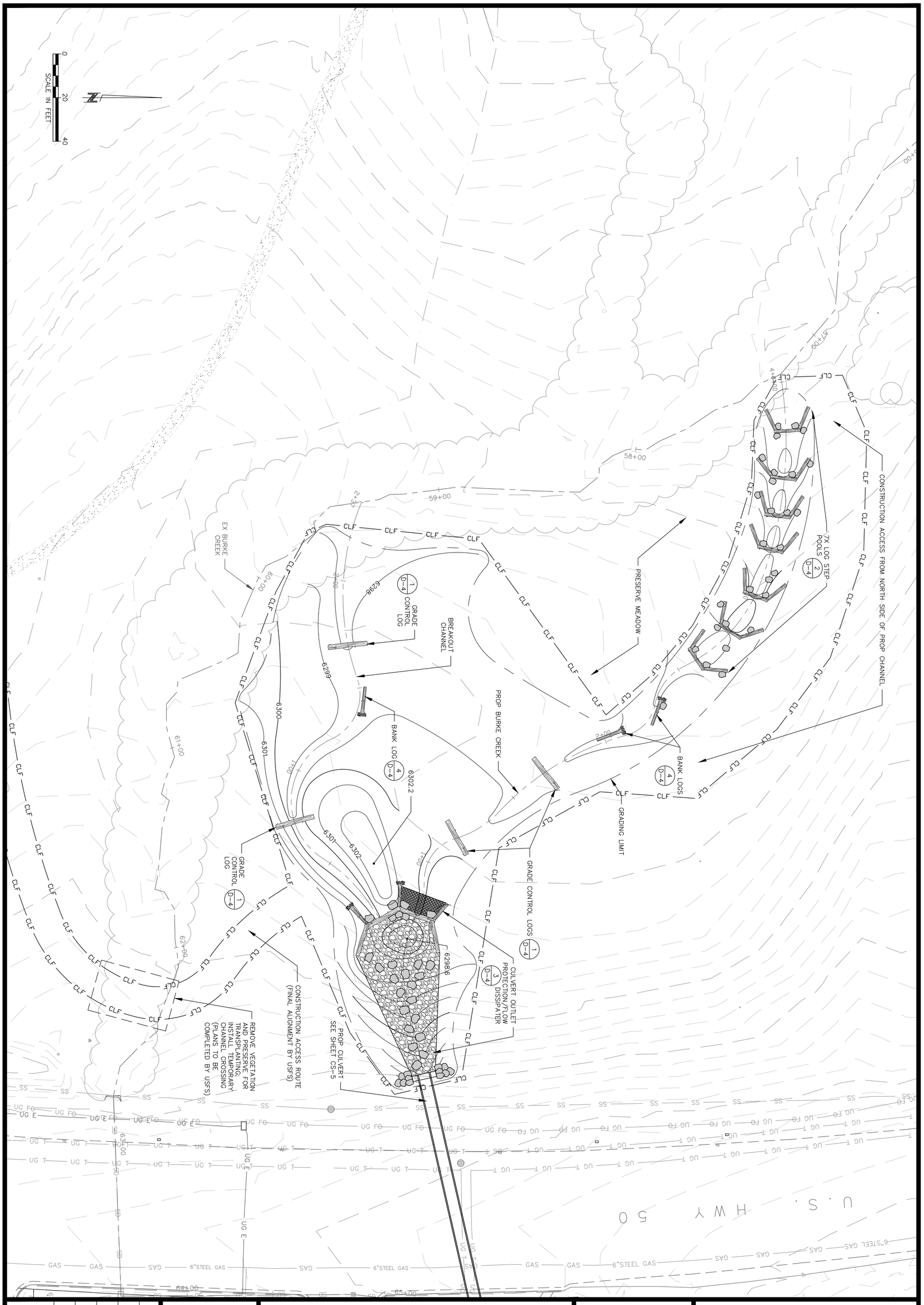
Nevada Tahoe Conservation District

REVEGETATION PLAN
BURKE CREEK HWY 50 CROSSING AND REALIGNMENT PROJECT
PHASE 1

Figure 3-3A

DESIGNED/DRAWN	MCP/MCP
CHECKED	XXX
DATE	09/18/2015
SCALE	AS SHOWN
PROJECT	BCC
SHEET	RVEG

Insert Figure 3-3B



DESIGNED/DRAWN DS/PK
CHECKED MK/MG
DATE 6/24/2015
SCALE 1" = 20'
PROJECT BCC
SHEET CS-6
11 OF 19

Figure 3-3B

DOWNSTREAM OF HIGHWAY PLAN
BURKE CREEK HWY 50 CROSSING AND
REALIGNMENT PROJECT
PHASE 2

Nevada Tahoe Conservation District

3.3 Cultural Resources

This section describes the cultural resources that have been identified in the Project Area APE (Area of Potential Effect) which is the project area Figure 1-2, and the historical significance of those resources as required by Section 106 of the National Historic Preservation Act (NHPA). The project area was subject to a Class I and Class III inventory in 2015 (Appendix J).

3.3.1 Existing Conditions

Two previously recorded sites were re-located during the Burke Creek Highway 50 Crossing and Realignment Project Phase I and II Class III cultural resources inventory. 26DO1104 is a milling station consisting of a single bedrock mortar. It was originally recorded by Taggert (2006). No other artifacts occur within the vicinity. The new mapped location of 26DO1104 is approximately 29 meters southeast of the NVCRIS and Taggert (2006) site location. Site FS 05-19-1103 was previously recorded as two segments of barbed wire fence (Godin 2005). Segment 2 was re-located during the inventory with running wire present only in very short segments. No other artifacts were associated with the fence line. No other archaeological sites or architectural properties were identified within Phase I or Phase II of the Burke Creek Highway 50 Crossing and Realignment Project. Surface expressions of 26DO481/05-19-143 are not evident within the project area (GBCG 2015).

The two previously recorded sites are not associated with events (Criterion A) or persons (Criterion B) that have made a significant contribution to our past. They do not embody a distinctive method of construction or work of a master (Criterion C). Much of the historic fence (05-19-1103) has been dismantled and many fence posts are missing. That site lacks integrity. Neither property holds the potential to provide archaeological information due to their simplicity and lack of associated diagnostic artifacts (Criterion D). 26DO1104 has no chronological indicators (charcoal, projectile points, or obsidian), subsistence remains, or patterning that could address questions important to local and regional prehistory. 26DO1104 and USFS 05-191103 are considered not eligible for nomination to the National Register of Historic Places (NRHP) under any of the four criteria for eligibility (GBCG 2015).

3.3.2 Environmental Consequences

No Action and Proposed Action Alternatives

No cultural resources within the proposed project area are eligible to the NRHP. No historic properties lie within the direct or indirect APE. Direct effects from the Proposed Action consist of modifications confined to the existing creek channel, adjacent paved parking lot,

and US 50 right-of-way. Indirect visual effects would be screened by existing vegetation and proposed revegetation over time. Stream channel and meadow restoration will include re-vegetation of disturbed areas. Acoustic and atmospheric effects will be negligible and temporary. A finding of No Historic Properties Affected as defined in 36 CFR 800.4 for the proposed Phase I and Phase II Burke Creek Highway 50 Crossing and Realignment Project has been presented to the USFS (GBCG 2015).

There is potential for archaeological sites to lie partially or completely buried beneath the surface. A surface archaeological inventory may not fully identify the nature of those sites. If any prehistoric or historic artifacts or subsurface archaeological deposits are encountered during completion of the proposed project, work within the vicinity of the resource should be halted and the LTMBU archaeologist contacted for purposes of evaluation and any required mitigation (GBCG 2015).

The Class III Cultural Resources Inventory Report is currently under review by the USFS who will seek concurrence from the Nevada SHPO of the determination that Sites 26DO1104 and USFS 05-191103 are considered not eligible for nomination to the NRHP under any of the four criteria for eligibility. Therefore, in anticipation of SHPO concurrence, the No Action as well as the Proposed Action will have no impact to cultural resources (GBCG 2015).

Cumulative Effects

In anticipation of SHPO concurrence of the determination that Sites 26DO1104 and USFS 05-191103 are considered not eligible for nomination to the NRHP under any of the four criteria for eligibility, there would be no cumulative effects to archaeological resources (GBCG 2015).

3.4 Soils and Water Resources

This section describes existing soil and water quality, water flow characteristics, and stream channel and floodplain geomorphic function, and analyzes the potential effect of the No Action and Proposed Action alternatives on these soil and water resource ecosystem attributes. Much of the information on existing conditions was obtained from a previous report (Woods Rodgers 2014). Design features (Section 2.2) and BMPs (Appendix B) are identified to minimize or eliminate potential impacts on soil and water resources.

3.4.1 Soil Quality

3.4.4.1 Existing Conditions

There are five primary soil map units within the project area that represent a full range of hydrologic soil groups, from well drained to poorly drained. Soil map unit descriptions are

provided in Appendix K (NRCS 2006), along with a map showing their location within the project area.

The dominate soil unit present in the project area, is poorly drained and considered susceptible to compaction and erosion. Currently, most soils in the project area are stable; however, there are some areas currently exhibiting signs of chronic erosion, which is described below in relationship to impacts to water quality.

The Tahoe Basin has a unique designation for soils adjacent to water bodies or high levels of groundwater. Stream environment zones (SEZs) are land areas that owe their physical and biological characteristics to the presence of surface water and/or shallow groundwater for a significant duration during the growing season in most years. SEZs typically encompass streams, adjacent wetlands, and many of the transitional areas that exist between the boundaries of these waters and adjacent upland landforms and plant communities. The location and extent of SEZs in the Tahoe Basin has been mapped by TRPA as a part of their Land Capability Classification System. A majority of the project area (80.1 percent, 7.9 acres) has been verified by TRPA as being SEZ (Land Capability District 1a, TRPA 2014). A map of Land Capability classifications within the project area can be found in Appendix L. One of TRPA's Environmental Threshold Standards is to restore 25 percent of the SEZ lands that have been identified as disturbed, developed or subdivided to attain a 5 percent increase in the area of naturally functioning SEZ lands. Much of the SEZ within the project area can be considered in a currently disturbed condition.

Two water quality studies have been conducted within the project area. The first was completed by the USFS to evaluate the effectiveness of a stream channel restoration project and urban stormwater treatment basin (Kahle Drive basin) constructed below US 50 in 1992, (USFS 1999). This study collected data at three sites between 1990 and 1998, including two instream sites above and below the restored channel reach, and one site below the Kahle Drive stormwater treatment basin. Another water quality study was completed by NTCD and Northwest Hydraulic Consultants for Sierra Colina in April 2008, in order to establish baseline water quality data for Burke Creek upstream of US 50 (NTCD 2008). This study monitored six sites collecting grab samples and flow monitoring data from February 2006 through December 2007. Three sites were upstream of the Sierra Colina property and three sites along the Sierra Colina property.

Results from these reports indicate that applicable tributary standards for nutrients and sediments were not exceeded under existing conditions within the project area above US 50; however the Nevada standards for total suspended solids and turbidity were exceeded below US 50. Results of restoration work conducted in 1992 below US 50, resulted in minimal improvements to water quality.

Source of pollutants within the project area currently occur primarily from urban source areas,

including soil erosion from bare road shoulders along US 50, and dirt roads and trails within private property (Sierra Colina) lands. The dirt roads and trails on the Sierra Colina property have been identified for decommissioning as required mitigation to improve water quality by the Tahoe Regional Planning Agency (NCE 2015).

Historically a slope adjacent to Burke Creek below the Kahle Community Center ball fields contributed sediment to the stream in a mass wasting event. This slope failed in the large rain-on-snow event of January 1997, but since then the soil surface has stabilized. However the current slope topography does confine the Burke Creek channel at that location, not allowing flows to overbank at that location. Applied traction abrasives in the commercial complex parking lot and US 50, are also a source of coarse and fine sediments in project area urban stormwater. Urban stormwater is transported into the existing storm water conveyance and treatment systems along US 50, draining to Burke Creek and Folsom Springs and ultimately Lake Tahoe (Wood Rodgers 2014).

Under existing conditions, when Burke Creek reaches a flow greater than 25 cfs, flows flood onto US 50 and the commercial complex parking lot, because the current capacity of the existing US 50 Burke Creek culvert is undersized and does not meet current design standards. Flood flows overwhelm the current urban stormwater conveyance and treatment system along US 50, resulting in the transport of untreated urban stormwater to Burke Creek. This stream flow volume is statistically predicted to occur at least once every 5 years. The existing impaired capacity to convey stormwater flows is also described in the next section describing water flow characteristics.

The existing infrastructure conveying urban stormwater from portions of the Lake Village neighborhood and the east side of US 50 to SW Outfall 3 does not currently function to NDOT design standards and frequently floods the highway. At SW Outfall 2, there is inadequate treatment of US 50 runoff discharging to Folsom Spring. SW outfall 4 conveys untreated stormwater input to the existing alignment of Burke Creek. The Project proposes to disconnect urban stormwater flow from tributary flow at this outfall.

Channel erosion is also a source of fine sediment within the project, as there are sections of channel above and below US 50 that show signs of accelerated erosion with active head cutting and channel avulsions (Wood Rodgers 2014). This is described in further detail in the stream channel/floodplain geomorphic section below.

Additional pollutant sources may include runoff from excess fertilizer and pesticide application to the ball fields. A Burke Creek monitoring location in a drainage channel below the ball fields found that phosphorus concentrations were at least an order of magnitude greater than concentrations measured in Burke creek (NTCD 2008).

As part of the Lake Tahoe Total Maximum Daily Load (TMDL) targets established in 2011

(EPA 2011), all local jurisdictions are required to develop stormwater load reduction plans, and report progress in achieving load reduction targets for fine sediments and nutrients from urban source areas through the Lake Tahoe Clarity Crediting Program (NDEP 2011). In order to characterize the loading of fine sediment particulates (FSP) and other pollutants of concern from the urban source areas, tools were developed to estimate current loading under existing conditions, as well as estimate reductions in loading from water quality improvement projects. These tools are known as pollutant load reduction models (PLRM). NTCD used the PLRM to characterize existing conditions using parameters and field data collected by NTCD, and following the guidelines of the Lake Clarity Crediting Program.

As part of calculating the stormwater runoff, NTCD adjusted the drainage areas to better represent the Project. The following drainage areas make-up the PLRM inputs: private Commercial Complex (Apartments 801 LLC. property, 'E'), part of Douglas County's Kahle Community Center recreation fields (KCCtr) and NDOT drainage areas 5006a, 5008a, 5008b, 5009a, 5009b, 5009c and 5009f (see Figure 3-4A). All PLRM modeling followed the assumptions found in the Baseline Report (Technical Memorandum #1, NTCD, 2013), and the Existing Conditions Report (Wood Rodgers 2014), Draft Technical Memorandum #2 (NTCD 2013), Draft Nov. 22, 2013). The preliminary results of the PLRM for each drainage area in the project area estimated that a total of approximately 2,825 lbs of FSP is contributed from the project area annually to Lake Tahoe. Douglas County's contribution is 40 percent of the total, NDOT's is 60 percent. The current target for reduction for these drainage areas established in the Lake Clarity Crediting Program is 1,029 lbs of FSP per year or 5 credits; 2 Douglas County credits and 3 NDOT credits.

3.4.1.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative no new temporary soil disturbance will occur. However existing areas of channel instability, and inadequate transport and treatment of urban stormwater and Burke Creek flows during flood events will not be addressed. Opportunities for long term water quality improvement and SEZ restoration will not be realized.

Proposed Action Alternative

Direct Effects

Under the Proposed Action alternative, temporary soil disturbance would occur as a result of project construction. However to minimize soil disturbance and potential water quality impacts, the Proposed Action includes BMPs and design features (Section 2.2) that will be strictly adhered to during project construction. Soil disturbance will be limited to that necessary to facilitate construction of the Proposed Action. The biggest threat to water quality from project construction will be during the initiation of flows to newly constructed channels. Project design

Insert Figure 3-4A

FIGURE 3-4A
BURKE CREEK WATERSHED AND SUBWATERSHED BOUNDARIES

BURKE CREEK HIGHWAY 50 CROSSING AND REALIGNMENT

DOUGLAS COUNTY, NV

FEBRUARY, 2016

0 750 1,500

FEET

- NTCD PLRM Catchments
- Project Area Boundary
- Burke Creek Project Watershed Boundary

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Nevada Tahoe Conservation District

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J:\Jobs\8484_NTCD\BurkeCK_Restoration\GIS\Tasks\EA\hydrologic_conditions_20150915_V1.mxd 2/12/2016 1:14:58 PM eford

specifications will include detailed procedures for minimizing this risk through a variety of methods, including channel flushing and substrate jetting which helps to "seat" fine sediment particles within the newly constructed channel prior to new flow initiation.

The stabilization of the bare road shoulder along US 50, as well as decommissioning of dirt roads and trails within the Sierra Colina property would eliminate these areas as potential sources of fine sediment to Burke Creek.

The proposed channel re-alignment and stabilization would result in a more stable channel form, which would decrease sediment loading from channel erosion. Replacement of the US 50 Burke Creek culvert to increase flow transport capacity, as well as installation of improved stormwater conveyance and treatment infrastructure along US 50 would provide increased treatment of urban stormwater flows prior to entering Burke Creek and Folsom Spring. The PLRM model will be run to calculate an estimate of project benefits in terms of reductions in fine sediment loading, and included in the 90% and 100% Design Reports.

Indirect Effects

Reconstruction of a geomorphically stable channel above and below US 50 would provide a channel with a larger connected floodplain that would increase the frequency and duration of overbank flooding. Decommissioning of a portion of the parking lot upstream of US 50 and reestablishment of a connected floodplain would provide an area for fine sediment deposition, rather than flowing across asphalt potentially picking up pollutants and discharging them into the stream and the stormwater conveyance infrastructure. Flows reaching the floodplain adjacent to the stream channel may result in reductions in fine sediment as suspended sediment in overbank flows settle and adheres to floodplain vegetation. However it is our professional opinion that the scale of increased floodplain is not large enough to expect significant measurable water quality benefits in this regard. Stream channel and floodplain restoration is expected to result in 0.7 acres of restored SEZ, through construction of new floodplain above US 50, and improving floodplain connectivity below US 50. This is described further in the sections below.

3.4.2 Water Flow Characteristics

3.4.2.1 Existing Conditions

The project area is located within the Burke Creek Watershed. Of the approximate 1600 acres in this watershed, the project area represents approximately 1 percent of that watershed (16 acres contained within sub watersheds WS16, WS16b and WS24) (Figure 3-4A). The sub watersheds were delineated by using two-foot contour topography based on the 2010 LiDAR data obtained from the USGS (2010). The existing drainage facilities and outlet points were incorporated into the LiDAR data (Wood Rodgers 2012 ECAM). Annual precipitation is

approximately 22.5 inches, much of which falls as snow (NOAA 2013). Most stormwater runoff is generated from spring snowmelt and rain-on-snow precipitation events; summer precipitation events are infrequent and localized in nature. A portion of the runoff is urbanized storm runoff which is conveyed through road shoulders, earthen roadside ditches and storm drain systems which drain to Burke Creek at various locations throughout the project area.

In June 2009, Winzler & Kelly completed the Burke Creek Restoration Project, Alternatives Analysis Report, which includes peak surface flow calculations. Burke Creek is not gauged, so peak flow calculations were estimated, based on USGS gauge data for nearby Edgewood and Glenbrook Creeks. Peak flow calculations were used to estimate flow capacities for the design stormwater conveyance and treatment infrastructure described in the Proposed Action. The Winzler & Kelly Report estimated peak flows for Burke Creek at the US 50 culvert crossing are summarized below in Table 3-7.

Table 3-7. Design Flows for Burke Creek at the US 50 culvert crossing

Event	Peak Flow (cfs)
Q_5	32
Q_{10}	47
Q_{25}	71
Q_{50}	94
Q_{100}	121

*Q is the statistical probability for a particular peak flow event – ie. Q100=121 cfs, means that a flow of 121 cfs is expected to occur only once every 100 years.

The current capacity of the US 50 Burke Creek stream crossing was compared to the above peak flow calculations. The current capacity of this crossing is only capable of passing 25 cfs, which is less than the Q5 event. Not only is this culvert undersized, but the alignment of the culvert in relationship to the stream channel creates a situation in which flow velocities are reduced to the point that stream sediment bedload deposits in the culvert. This has further contributed to the diminished flow conveyance capacity of this culvert. This impaired conveyance capacity creates a situation in which flows in excess of 25 cfs flood onto US 50 and into the commercial complex parking lot. Not only does this create a significant safety issue for vehicle travel, these flood flows also overwhelm the existing urban stormwater treatment and conveyance infrastructure (drop inlets, underground culverts, and sediment basins) along US 50, as described in the previous section on water quality. Based on current design standards (NDOT Drainage Manual (NDOT 2006), and TRPA Code, Section 60.4.6.D), the US 50 Burke

Creek crossing should be designed to convey a minimum of a 50 year storm (94 cfs).

Other stormwater conveyance infrastructure was also analyzed in the Winzler Report. As described in the soil and water quality section, not all of the other existing stormwater conveyance infrastructure meets current design standards (Q25 flow) for the catchment area they are designed to receive flows from.

Groundwater levels in the vicinity of the existing and proposed channels downstream of US 50, have been evaluated (Balance 2015) to determine how willows along the existing Burke Creek alignment will be affected by channel realignment. Based on the data collected over the past 6 to 7 months (March through October), it appears that the existing stream channel has the dominant influence on shallow groundwater levels (and therefore plant available water) in the adjacent floodplain. Meaning that shallow groundwater levels are highest adjacent to the stream channel, and decrease with increased distance from the stream channel.

3.4.2.2 Environmental Consequences

No Action Alternative

Under the No Action Alternative urban stormwater conveyance would continue as it currently does. The flooding on US 50 and the commercial complex parking lot due to the undersized Burke Creek culvert would continue, as well as resulting impacts to traffic safety and transport of untreated urban stormwater to Burke Creek.

Proposed Action Alternative

Direct Effects

As a result of replacing the Burke Creek culvert, stream flows up to 103 cfs and associated bedload would be effectively transported under US 50, surpassing design standards requiring conveyance of the Q50 flow (94 cfs). This will alleviate the flooding that currently occurs at Burke Creek with flows exceeding 25 cfs and associated adverse impacts to traffic safety and water quality. However, modeling suggests that some flooding may still occur into to the parking lot from Burke Creek just upstream of the flow split and the redirected Phase 1 reach. Because of private property constraints, the entire section of Burke Creek with potential for flooding could not be addressed and will likely continue to flood in large events (>20 cfs) post project.

The location of Burke Creek channel flows will be redistributed. Above US 50, a flow split will be constructed at the upstream boundary of the parking lot reach so that both a newly constructed channel and a portion of the existing channel can be utilized. The primary flows and low flows of Burke Creek up to 3 cfs (the 1.5 year event) will be conveyed in the newly constructed channel adjacent to the commercial complex parking lot. At flows above 3 cfs the flow split will be activated, directing higher flows into both the new channel and a portion of

the existing channel. The portion of existing channel will function to increase total floodplain capacity, maintain existing healthy channel vegetation, and include redundancy in design. At 5 cfs (the 2 year event) the new channel will just begin to inundate the approximately 0.25 acres of newly graded floodplain while the existing channel, located higher in elevation, will remain in its banks. Given its higher elevation, the existing channel will not overbank and connect to the floodplain until approximately 71 cfs of total flow, the 25 year event.

Although the proposed culvert will only pass 103 cfs, the total 121 cfs of the 100 year event will be contained by project grading to preventing flooding to the adjacent property from the Phase 1 reach. The floodplain will be inset approximately 5 feet lower than the adjacent parking lot closest to the proposed culvert inlet. A berm will be constructed at the upstream end of the Phase 1 reach to contain the 100 year event as the newly constructed channel transitions from the new floodplain to the existing perched channel. Modeling suggests that the 100 year event will backwater at the proposed culvert to a depth of 0.3 feet and will not cause flooding to the adjacent property. Downstream of US 50, Burke Creek flows will be conveyed in two newly constructed channels with increased connectivity to the adjacent floodplain. Flows will overbank in these two channels at 1.7 cfs, the 1 year event.

Urban stormwater flows will still be conveyed to the existing alignment of Burke Creek downstream of US 50, however the majority of these stormwater flows are expected to infiltrate prior to reaching Jennings Pond. Proposed sediment removal and grading in this area will be designed to promote infiltration. Preliminary flow estimates indicate that the 25 year storm, the project design storm for stormwater facilities, will route approximately 1.4 cfs to the existing alignment downstream of US 50. A thorough analysis of flow rates and design of drainage facilities will be included in the project Design Report.

Urban stormwater flows currently conveyed to Folsom Spring will be redirected to SW outfall 1, and SW outfall 2 to Folsom Spring will be eliminated.

Indirect Effects

Realignment of Burke Creek within the project area is expected to redistribute groundwater levels adjacent to stream channels both above and below US 50. All stream channels exert a cone of influence on adjacent subsurface flows and groundwater levels. Basically, the surface level of the water in the stream channel increases subsurface flows/ground water levels adjacent to the stream when channel flow elevation is higher than groundwater aquifer levels, which frequently occurs in healthy systems during mid to late summer. This cone of influence is greatest in lower gradient reaches. Stream channels can also increase groundwater level and subsurface flow during overbank flooding events, as flood flows are spread across the floodplain. Generally we are expecting that the extent and duration of plant available groundwater will be increased adjacent to the newly constructed Burke Creek channels and adjacent connected floodplains as a result of the proposed project. There will be less plant

available water in the existing alignment of Burke Creek below US 50, as this area would receive only flows from urban stormwater conveyance. Urban stormwater runoff flows will not occur during the mid to late summer except during storm events that generate surface runoff.

Please see the Botanical Resources section (Section 3.2.2) for a description of how changes in plant available groundwater may affect riparian vegetation with the project area.

3.4.3 Stream Channel and Floodplain Geomorphic Function

3.4.3.1 Existing Conditions

The upper reaches of Burke Creek and its tributaries in the upper watershed above the project boundary are characterized by high gradient, confined channels. Between the eastern project boundary and US 50, the channel gradient decreases and the creek is still confined, bordered by a steep forested side slope to the north, and fill material associated with the construction of the Kahle Community Center ball fields, and other urban development to the south. The confined stream channel has a very narrow hydrologically connected floodplain. Below US 50, Burke Creek flows through low gradient channels through an area known as Rabe Meadow, which provides a wide expanse of connected floodplain. The reach just below US 50 was the site of restoration project in the early 80's, to restore the impacts from initial construction of a new casino site, known as Jennings Casino. The USFS purchased this property before construction was completed, and the casino foundation construction was removed or buried. A restored stream channel, including an in-channel pond was constructed a part of the restoration effort. This man-made pond is referred to as Jennings Pond.

At the downstream (western) edge of the project boundary, the restored reach between Jennings Pond and US 50 has visually indicators of both historic and current channel avulsions, where sediments have deposited so heavily they have forced high flows to cut new flow paths laterally in the adjacent floodplain. A headcut located approximately 75 feet downstream of the upstream (eastern) project boundary has caused approximately 340 feet of entrenched channel immediately below it. Beginning just upstream of US 50 and heading east, approximately 265' of low berm was constructed in the 1950s to the south of Burke Creek to keep flows from flooding adjacent commercial development, effectively channelizing Burke Creek into a stable but straight man-made ditch through this area.

The existing conditions of Burke Creek in the project area represent a system with compromised functionality. Straightening the channel and routing the stream through an undersized 24 inch corrugated metal pipe (CMP) under US 50 has resulted in compromised conveyance capacity. As described previously, the culvert is currently half full of sediment at the outlet, and overbank flows over 25 cfs results in flooding in the commercial complex parking lot and US 50. In addition, urban development has caused constrictions in the channel/floodplain, and likely

increased peak flows to this reach resulting in the current evidence of channel headcutting. Downstream of US 50, stream channel function has been improved over conditions that were created during urban development that occurred through the 60's and 70's, including the initiation of construction of the Jennings Casino. However the restoration efforts conducted during the 80's resulted in a channel morphology with too low of a gradient relative to channel sediment bed load. This bed load has deposited so heavily within the channel, the channel capacity has been substantially reduced. In addition, willows that were planted as part of restoration have grown so robustly that they actually are now contributing to reduced channel capacity. This entire channel was constructed on a knoll, perching the channel at a slightly higher elevation than the surrounding floodplain. All these factors have forced flows to overbank during high flow at velocities with enough force to cut new flow paths in the floodplains, eroding areas of floodplain containing a high concentration of fine sediment particles.

3.4.3.2 Environmental Consequences

Environmental consequences are assessed based on the potential for changes in geomorphic function within the Burke Creek stream channel and floodplain.

No Action Alternative

Under the No Action alternative, channel form and function will continue to degrade as unstable areas of channel continue to erode and excessive bedload sediment continues to accumulate upstream of the undersized US 50 Burke Creek crossing. Opportunities for increasing the extent of hydrologically connected floodplain will not be realized. Upstream of US 50, the entrenched channel near the eastern project boundary will likely continue to degrade, increasing sediment loading from channel erosion downstream to Lake Tahoe. The berm containing the parking lot reach will continue to degrade, potentially causing more frequent flooding to the adjacent property and further degrading water quality. Downstream of US 50 the channel will continue to avulse from its perched location.

Proposed Action Alternative

Direct Effects

Under the Proposed Action alternative, there will be changes to the existing location and extent of channels and associated floodplain, as well as changes in channel and floodplain function upstream and downstream of US 50. Channel re-alignment and stabilization would improve transport of natural sediment bedload, which will not only reduce flooding impacts described in the previous section but will reduce potential for continued channel destabilization. Existing areas of channel instability will be stabilized, resulting in channels that are more resilient to erosion from natural disturbances (ie. floods), including climate change impacts, which is expected to result in a higher frequency of flood events. As described previously in Section

3.2.3.2 and summarized in Table 3-6, it is anticipated that the Proposed Action alternative would result in an estimated increase of 600 linear feet of geomorphically functional stream channel and 0.7 acres of hydrologically connected floodplain (montane riparian SEZ).

Indirect Effects

Indirect effects in terms of water flow characteristics and water quality have been described already in the sections above.

3.4.4 Cumulative Watershed Effects

A Cumulative Watershed Effects (CWE) analysis describes the expected impacts of the proposed action in the context of the effects on the watershed in which it lies, including the cumulative effects of other past, present, and reasonably foreseeable future actions.

As described previously and illustrated on Figure 3-4A (section 3.4.2.1), the project area is located within the Burke Creek Watershed. Of the approximate 1600 acres in this watershed, the project area represents approximately 1 percent of that watershed (16 acres contained within sub watersheds WS16, WS16b and WS24), located in the downstream end of the watershed.

Cumulative watershed response is assessed based on whether the cumulative effects of past, present and future projects are expected to cause an overall change in watershed hydrology, including increases in peak flows which can cause destabilization of stream channels that are not adapted to those flows. This type of cumulative watershed response can be caused by an excessive amount of soil disturbance and compaction which exceeds the ability of the watershed to infiltrate surface runoff generated from storm events, generating flow volumes and sediment loads that exceed the transport capacity of the stream channel network. For projects that involve a large amount of ground disturbing activity, there are procedures for quantitatively assessing the risk of cumulate watershed response. However because the disturbance footprint of the proposed project is so small in comparison to the watershed size, and the scale of existing soil disturbance from urban development around the project, it was determined that a qualitative assessment was more reasonable.

Based on the limited scale of project activities in proportion to the watershed size, temporary soil disturbance from project activities, are not expected to result in changes in flow volumes or sediment loads to stream channels, particularly with the application of identified Design Features and BMPS.

However because the Proposed Action includes improving geomorphic function in the channels and floodplains in close proximity to the outlet to Lake Tahoe, the Proposed Action is expected to result in a positive change in how channel flows generated from the entire watershed are transported through this reach. The proposed stream channel/and floodplain restoration actions,

should provide greater resiliency to peak flow events, and provide increased opportunity for overbank flooding which can lower the magnitude of peak flow volumes, and provide stable areas for in stream flow sediment deposition. This has been described previously in the Stream Channel and Floodplain Geomorphic Condition Section above.

In addition the proposed action includes improving the capacity of existing stormwater treatment facilities along US 50, including providing increased capacity for the infiltration of urban stormwater runoff generated within the project area. The proposed action also includes eliminating areas of existing compacted soils, including decommissioning part of the existing commercial parking lot, and legacy road and trails within the Sierra Colina property. These actions will also reduce the risk of adverse cumulative watershed effects.

Climate change predictions for the Lake Tahoe Basin (Coats, 2010) include a higher probability of increased frequency of peak flow events, as future winter precipitation events are predicted to occur more as rain rather than snow. The magnitude of peak flow events are not necessarily expected to increase, but the frequency of occurrence is. The proposed actions elements that will provide for increased capacity to infiltrate urban stormwater, as well as the improvements in stream channel/floodplain geomorphic function, will provide greater resiliency for stream channel network within the project area, in response to peak flow events generated from the entire watershed.

Most of the projects described as past, present and reasonably foreseeable in the future (Section 3.1) would have little to no effect on water quantity and quality in the watershed by nature of the project. However, a few of those projects discussed in Section 3.4.4 (the USFS's acquisition of the Jennings Casino site and subsequent restoration efforts of the Burke Channel between US 50 and Lake Tahoe, and the proposed South Area Plan water quality improvement elements in the Lake Village Community, Kahle Basin Redesign, and the Beach Club at Lake Tahoe proposed Rabe Meadow restoration) all are expected to have a net positive impact on water quantity and quality in the watershed.

As stated earlier, the scale of this expected positive outcome is not realistically quantifiable either through measurement or modeling. But an overall positive cumulative influence, based on the assumption that the past present, and reasonably foreseeable future projects have been designed to improve watershed process function, is a qualitatively reasonable conclusion.

3.5 Noise

This section addresses potential noise impacts on humans within the Project Area and surrounding area from the No Action and the Proposed Action alternatives. Impacts on wildlife are addressed in Section 3.2, Biological Resources. The noise impacts would be considered significant if construction activities would expose people to noise or vibration levels in excess of established standards, or substantially increase ambient noise levels.

3.5.1 Existing Conditions

Noise impacts may be defined as unwanted sound. Noise impacts are usually objectionable because it is disturbing or annoying. Several noise measurement scales are used to describe noise in a particular location. The standard unit of sound amplitude measurement is the decibel (dB). A dB is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. The A-weighted decibel scale (dBA) de-emphasizes the low and high end frequencies and emphasizes those frequencies the human ear is able to hear. It is widely accepted that most human sound perception can barely detect a change in sound level of 3 dBA. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. The Community Noise Equivalent Level (CNEL) is a 24-hour average Equivalent energy level (Leq), with the addition of five dBA to sound levels from 7:00 am. – 10:00 pm. and the addition of 10 dBA to sound levels from 10:00 pm. – 7:00 am.

The proposed stream restoration activities would occur primarily in urban meadow and forested areas, near the South Lake Tahoe casino corridor, urban residences and upslope wooded residential areas. Noise sources in urban areas are predominantly from human sources including vehicles, construction noise, and children playing outdoors. Accordingly, existing ambient noise levels near the project area are fairly high during the day as well as nighttime hours due to proximity to the US 50 corridor. Land uses adjacent to the project area include urban residential areas to the west, US 50 to the south as well as commercial development to the south and west, The County facilities to the west and casinos, and wooded residential areas upslope to the south.

Some land uses are regarded as more sensitive to noise than others due to the types of population groups or activities involved. Single- or multiple-family residences, schools, hospitals, churches, and public libraries are typically considered to be noise-sensitive receptors. The noise-sensitive receptors within the project area include areas where people reside and participate in recreational activities that can be disrupted by unwanted noise. The project area is located immediately adjacent to residences to the west.

3.5.2 Environmental Consequences

No Action Alternative

Under the No Action alternative, no restoration construction would take place and therefore, no construction noise impacts would occur. The No Action alternative would not result in any direct, indirect, or cumulative noise impacts.

Proposed Action Alternative

Direct Effects

Under the Proposed Action alternative, the construction period is anticipated to occur over 4.5 months (June – October 15) over two years. This scenario would result in normal (day-time) working hours during the construction in each construction season for the project. It is possible, that NDOT may request nighttime work hours to be approved by TRPA for culvert replacement and utility relocation. If this request is granted, benefits would be realized for traffic flow as it would require a shortened period of lane closures (Please see Section 3.9 regarding Traffic).

Construction activities would result in a temporary increase in noise. Construction-related noise between 7:00 am – 6:30 pm is exempt from TRPA noise standards (Chapter 23.8 of code of ordinances). The Project Area is located near sensitive receptors (residential dwellings) that could be subject to noise, particularly from equipment traffic and activities at staging areas. Construction would require the use of heavy equipment such as excavators, loaders and trucks. Construction worker, delivery, and visitor traffic would be an additional, but smaller, source of noise. Noise levels produced by construction equipment would vary throughout the day.

During the busiest construction periods, maximum noise levels of 72-92 dBA at 100 feet (without controls) could be generated, although peak noise levels would be intermittent (USEPA 1971). Adjacent residential properties would experience maximum sound levels (with control measures such as mufflers) of 69-74 dBA at 100 feet, 57-62 dBA at 500 feet, and 51-56 dBA at 1,000 feet (USEPA 1971).

The TRPA Code of Ordinances regulates construction-related noise in The County within the Lake Tahoe region. Chapter 23.8 of the Code exempts construction-related noise provided such activities are limited to the hours between 7:00 am and 6:30 pm. Outside of those hours construction noise would be subject to TRPA community noise level standards. TRPA's noise level standards for the land uses in and around the project area are 50 dBA for low density residential and rural outdoor recreation areas and 65 dBA for within 300 feet of US 50 (TRPA 2015).

The following construction control would be implemented to reduce impacts. Before initiating construction activities during exempted hours, the NTCD or LTBMU shall prepare a plan

demonstrating appropriate noise-reducing measures. The plan shall be submitted to TRPA for review and approval, and shall be implemented during all construction activities occurring during and outside (if approved) of TRPA's exempted hours. Any nearby sensitive receptors (less than 500 feet from activities) must be given at least 48 hours' notice of such activities.

Analysis of transportation-related noise impacts of the Proposed Action were evaluated based on the estimated total number of worker vehicle trips. It is predicted that the volume of traffic generated by the estimated 20 trips per day would be very low in relation to existing traffic volumes. In addition, the estimated total number of haul truck trips associated with importing construction materials for the Proposed Action is approximately 10 round trips spread over the 2 year construction window. However, the noise generated by the Proposed Action would be short-term and the low volume of construction-related traffic would likely increase noise levels no more than 1 dBA. In general, increasing the level of steady, continuous noise by 3 dBA may be noticeable to most people with good hearing, assuming that the noise maintains the same character. A noise increase of 5 dBA is normally noticeable to most people, and an increase of 8 to 10 dBA is often perceived as a doubling of the noise (Minnesota Pollution Control Agency 2008).

Indirect Effects

Vibration caused by construction is transmitted via waves in the ground and dissipates with distance from the vibration source (e.g., heavy equipment operation). Peak Particle Velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal and is used to assess the potential for damage to buildings and structures and is expressed in inches per second (in/sec); vibration for evaluating human response can also be expressed using the PPV metric. People are less aware of short-duration vibration events than those of a longer duration. Vibration lasting thirty seconds or less is barely perceptible at 0.03 in/sec PPV, whereas vibrations of 0.13 in/sec PPV are distinctly perceptible (Dowding 1996).

The American National Standards Institute (ANSI) Standard S2.71-1983 [R2006] (formerly ANSI S3.29) (ANSI 1983) defines the limit for human disturbance from continuous vibration in buildings at 0.022-0.064 in/sec PPV during daytime and evening hours (7 am to 10 pm), and 0.016-0.022 in/sec PPV during the nighttime (10 pm to 7 am). To protect houses with plastered walls and ceilings, the American Association of State Highway and Transportation Officials (AASHTO) California Department of Transportation, guidelines for continuous ground-borne vibration from construction suggest a limit of 0.2 in/sec PPV (AASHTO Jones & Stokes 2004).

The following analysis evaluates temporary impacts during construction from ground-borne vibration by evaluating the types of construction equipment and the distances between the construction area and potential receptors. To provide a conservative analysis, the nighttime criterion of 0.016 in/sec PPV was used. This criterion would address early morning construction and residents that sleep during the day (TRPA 2006).

Restoration of the channel, culvert replacement and utility relocation would require ground clearing and excavation by excavators, backhoes and loaders. The primary sources of vibration would include excavators and haul trucks. As discussed above, levels of 0.2 in/sec PPV for continuous vibration sources were applied as significance thresholds for daytime construction vibration analysis. Vibration levels reduce at a rate proportional to (1/D) 1.5, where D is the distance from the vibration source (FTA 2006).

Excavators and vibratory equipment used in backfilling would generate vibrations of 0.21 in/sec PPV at 25 feet. Therefore to reach the threshold of damage for structures (0.2 in/sec PPB for cracking of paint or plaster), vibratory rollers would have to be used within 26 feet of a home. In comparison, excavators would not result in significant impacts on structures at a distance of 25 feet. Vibration from excavation would not exceed the most conservative criterion (nighttime construction – 0.016 PPV) for human disturbance at a distance of 135 feet.

Trucking of construction materials to the staging areas or imported materials on haul trucks would be infrequent and short term. Deliveries and hauling would occur only during the day. The Federal Transit Administration (FTA) (2006) lists vibration from loaded (construction) trucks as 0.076 in/sec PPV at a distance of 25 feet. This vibration is well below the criterion for cosmetic structural damage (0.2 in/sec PPV). Vibration from trucking would not exceed the most conservative criterion (nighttime construction – 0.016 PPV) for human disturbance at a distance of 68 feet. However, the homes closest to the excavation areas are a minimum of 500 feet away. This analysis is conservative because construction would occur during the day.

Cumulative Effects

Although the Proposed Action would be implemented over a two year period, potential impacts from construction related noise and vibration are considered to be short term and would cease at the close of each construction season. There is potential for other projects to also be under construction during the same two year construction period. If funding and permitting is secured, the Beach Club at Lake Tahoe downstream from the Proposed Action project area may likely be under construction in 2016. Permit applications are under review for construction starting in 2017 for the Sierra Colina Village immediately east of the Burke Creek upstream project area. It is possible that this project would be under construction during the Proposed Action stream restoration activities planned for below US 50.

These construction projects, including the Proposed Action would be subject to the same work hour restrictions, unless a waiver is issued by TRPA. To minimize the potential for cumulative impacts related to construction noise and vibration, construction for the Proposed Action activities would be limited to 7:00 am – 6:30 pm (exempt from TRPA noise standards (Chapter 23.8 of code of ordinances). If, NDOT requests nighttime work hours (to be approved by TRPA) for culvert replacement and utility relocation to alleviate potential impacts to traffic flow as it would require a shortened period of lane closures (Please see Section 3.9 regarding Traffic),

adjacent property owner notification would be initiated in accordance with plan prepared by NTCD or LTBMU that would outline that process and would demonstrate appropriate noise-reducing measures. The plan shall be submitted to TRPA for review and approval, and shall be implemented during all construction activities occurring during and outside of TRPA's exempted hours. Any nearby sensitive receptors (less than 500 feet from activities) must be given at least 48 hours' notice of such activities.

3.6 Recreation and Scenic Resources

3.6.1 Existing Conditions

The project area includes a portion of the parking access to the Lam Watah Trail and the Rabe Meadow Multi-Use Trail. The entire parking area provides a total of 20 parking spaces. The parking area provides access to the Lam Watah Trail, the Rabe Meadow Multi-Use Trail and Lake Tahoe. The Rabe Meadow Multi-Use Trail was built in 2014 and extended along Laura Drive in 2015. The trailhead facilities at the corner of Kahle Drive and US 50 provide popular recreation access and opportunity to diverse recreational pursuits. The trailhead parking lot and facilities were renovated during the bike path construction in 2014 to include more parking spaces, a restroom, a picnic area, and multiple interpretive signs/kiosks. The trailhead parking lot and Rabe Meadow Multi-Use Trail are managed by the County under Special Use Permit with the USFS.

Shoreline Adventure Center offers bicycle, ski and snowshoe rentals from their location across the street from the trailhead. Pedestrians and bike riders travel through the meadow and enjoy meadow, forest, and stream environments as they travel to Nevada Beach or along the bike path to Round Hill Pines Resort. The Lam Watah Trail also starts at this trailhead and leads users past Jennings Pond, which supports waterfowl, lush vegetation and the occasional fisherman before terminating at the Nevada Beach campground. The Lam Watah Trail is managed by the USFS. The area's proximity to the concentrated Stateline hotels contributes to its popular recreation use.

In general, the trailhead appearance is quite inviting to those that wish to enjoy both passive recreation – a leisurely stroll, as well as active recreation – bicycling to the Nevada Beach Campground. From the trailhead and the project area below US 50, in the foreground one has a view of a mountain meadow inclusive of riparian habitat. In the middle ground lies a forested area to the east and north, and Lake Tahoe to the west. The background includes the US 50 corridor, adjacent residences and commercial uses with the forested areas of Kingsbury Grade in the background.

The USFS Recreation Opportunity Spectrum (ROS) offers a framework for understanding the relationships and interactions for recreation opportunity and experience (USFS 1986). The Spectrum has been divided into six major classes for USFS use: Urban (U), Rural (R), Roaded Natural (RN), Semi-Primitive Non-Motorized (SPNM), Semi-primitive Motorized (SPM), and Primitive (P).

The Burke Creek-Rabe Meadow area falls within the designation of Rural. Rural is an area characterized by substantially modified natural environment and may include features such as:

- Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil.
- Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.
- A considerable number of facilities are designed for use by a large number of people.
- Facilities are often provided for special activities.
- Moderate densities are provided far away from developed sites.
- Facilities for intensified motorized use and parking are available.

3.6.2 Environmental Consequences

No Action Alternative

Under the No Action alternative recreation opportunity and experience would not be impacted.

Proposed Action Alternative

Direct Effects

Potential impacts to trailhead users associated with the Proposed Action above US 50 would include noise from construction activities associated with streambed restoration and parking lot decommissioning and floodplain recontouring. At US 50, culvert replacement may also impact trailhead visitor experience due to increased noise levels during work hours. Below US 50 and immediately adjacent to the trailhead and pathway, noise and temporary daily closure of a portion of the parking area could impact trailhead user access as well as experience. These forgoing, potential impacts would be short term and temporary. Thinning of the willows and alders along the portion of the stream channel to be abandoned, and construction of the new channel would result in a temporary impact to the scenery of the area. If the project is phased over multiple seasons, the new channel may appear barren until it is revegetated. Post revegetation activities it is anticipated that the construction area would be stabilized with immature herbaceous vegetation and transplanted willows and alders. The abandoned stream channel will still receive water from stormwater flow and it is anticipated that the remaining vegetation in the channel area will continue to thrive. The overall impact will be a slight change in the location of the larger willows (moved north from the abandoned channels to the two new channel locations), however the area will continue to appear as a meadow ecosystem.

Stream restoration activities are planned to occur within 125 feet of the trailhead parking and 70 feet of the Lam Watah Trail during the 2017 construction season. Although the construction is in close proximity to the Lam Watah trail, it is anticipated that the Lam Watah Trail will

remain open throughout construction. Access to the construction site will result in temporary intermittent closures of the parking lot entrance as construction traffic enters or exits the construction site. Entrance closures are anticipated to be less than 20 minutes in duration and not interrupt public use of the trailhead facilities. Three parking spaces will be unavailable to the public for a maximum period 2 hours on a daily basis for initial daily access by workers and for delivery/off haul of construction materials and then again at the end of the work day.

To minimize potential impacts to access and recreation experience, public notice of temporary daily closure of a portion of the parking area and pathway in vicinity of the work area would be published in the local newspaper. In addition, public notice will be posted and updated daily at the trailhead to notify users of unavoidable inconvenience.

Post construction of the Proposed Action, the trailhead and Lam Watah Trail would not be directly affected. Project activities are not anticipated to significantly adversely impact the access to existing recreation facilities, alter the spectrum of allowable recreation activities (the ROS class of rural will remain), or degrade the visual character of the site.

Indirect Effects

In the long term, construction of a stable stream channel below the US 50 culvert crossing with a connected floodplain is anticipated to alleviate flooding issues at the parking area and around the existing restroom building. In addition, the Proposed Action stream restoration activities are anticipated to enhance the overall appearance of the Burke Creek-Rabe Meadow system down to Jennings Pond. Stream restoration including a channel with a connected floodplain is anticipated to result in a larger extent of the project area positively affected by higher groundwater levels supporting a larger extent of meadow and riparian vegetation species. Treatment of invasive weed species in the project area would improve the aesthetics of the site, as well. Indirect effects from project activities are not anticipated to adversely impact the access to existing recreation facilities, or to alter the spectrum of allowable recreation activities at the site (the ROS class of rural will remain). Indirect effects to the visual character of the site are anticipated to be positive.

Cumulative Effects

The Proposed Action when considered cumulatively with the only other project planned to take place during the same time period in the vicinity of the Proposed Action (Beach Club at Lake Tahoe) would not result in cumulative negative impacts to recreation opportunity and experience in the short term or the long term. Conversely, over the long term (~5 to 10 years) it is anticipated that these project would have a cumulative net benefit to recreation opportunity and experience as the restored stream system and meadow revegetation matures to a state of full restoration. It is anticipated that flooding at the trailhead parking and restroom building would no longer occur.

3.7 Hazardous Materials

This section evaluates the potential impacts related to hazardous materials in relation to the Proposed Project.

3.7.1 Existing Conditions

Within the Burke Creek-Rabe Meadow project area, the only known potential hazardous materials site is what is assumed to be left of the casino structure footings in Rabe Meadow.

In 1979, the USFS implemented a project to remove, demolish and cover existing casino pier footings and a retaining wall within the upper portion of Rabe Meadow. This work was reported by the USFS in the *Final Construction Report Casino Site Restoration ((50-91U9-0-80059) 1980).* As a consequence of this work, there is potential for concrete and rebar to remain in the upper portion of Rabe Meadow.

3.7.2 Environmental Consequences

No Action Alternative

Under the No Action alternative, the current location and quantity of casino pier footing and retaining wall concrete and rebar would remain buried in Rabe Meadow.

Proposed Action Alternative

Direct Effects

Under the Proposed Action alternative, ground disturbing activities within the upper portion of Rabe Meadow to facilitate culvert replacement and stream channel restoration would affect removal of a portion of the concrete and rebar buried in this part of the project area.

Removed buried materials would be hauled outside the Basin and disposed of at an approved disposal site.

Construction of the Proposed Project would involve the short term use of hazardous materials, principally diesel fuel, hydraulic fluid and other materials necessary for operation and maintenance of construction equipment. Design features, construction controls and BMPs have been incorporated into the project to reduce the risk from hazardous materials during construction. These include implementation of spill prevention and clean-up measures in accordance with the LTBMU Spill Notification and Response Plan for LTBMU lands, and implementation of the Spill Response section of the SWPPP and Health and Safety Plan for any spill or contamination encountered on CTC lands.

Construction vehicles would be serviced in specific upland areas or stabilized areas to prevent accidental spills from reaching unprotected soils or surface water. Once construction is

completed, the Proposed Project's operations will not involve the use, transport, disposal or accidental release of hazardous materials.

In the event that undocumented hazardous materials are encountered on site soils or water during construction, standard construction BMPs contained in the SWPPP would reduce impacts to less than significant. Such construction controls include stopping work if suspected contamination is encountered to allow evaluation by the Project Engineer for appropriate action. Any encountered contamination would be addressed, handled and removed in accordance with the SWPPP. Excavated soils deemed hazardous would not be used as backfill material.

Indirect Effects

Indirect effects are anticipated to be both positive and potentially negative. The positive indirect effects are anticipated to be water and soil quality improvement where these materials are removed.

Potential negative effects focus on potential loosening of buried concrete and rebar and possibly having particles of concrete and rust from rebar entrained in moving surface and groundwater and potentially reaching Lake Tahoe.

Cumulative Effects

The cumulative effects analysis area is the portion of the project area below US 50 down to the outlet of Burke Creek at Lake Tahoe. This area was selected as it will be that portion that could be directly affected by the Proposed Action. All of the projects described in Section 3.1 focus on or include elements of environmental improvement in one form or another. When the Proposed Action is combined with these project elements it is not anticipated that there would be a direct cumulative adverse effect with respect to hazardous materials.

3.8 Climate Change and Greenhouse Gas Emissions

The environmental setting for GHG emissions and climate change is larger than the immediate Project Area. The sections below describe the context for climate change and the properties of GHGs to affect climate change.

3.8.1 Climate Change Effects

3.8.1.1 Existing Conditions

Current science indicates that the climate is changing in the Tahoe Basin. Climate change predictions (Coats et al, 2010) indicate there will be similar seasonal precipitation amounts, but more of the precipitation will fall as rain and there will be less snow. This research also predicts

- upward trends in minimum and maximum day time temperatures,
- earlier snowmelt and runoff during the water year, and decreases in the hydrologic flow-duration,
- some increases in drought severity, especially toward the end of the century,
- dramatic increases in flood magnitude in the middle third of the century,

In its most recent report (Fourth Assessment Report), IPCC stated that warming of the Earth's climate is unequivocal and that warming is very likely attributable to increases in atmospheric GHGs caused by human activities. IPCC further stated that changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts are linked to changes in the climate system, and that some changes might be irreversible.

In 2008, the USFS stated that climate change could result in changes in the timing, location, and quantity of precipitation; and increased frequency of extreme weather events such as heat waves, droughts, and floods. The USFS stated further that these changes will vary regionally and affect renewable resources, aquatic, and terrestrial ecosystems, and agriculture, and that while uncertainties exist, trends indicate that continued increases in GHG emissions will lead to increased climate change (USFS 2008c).

3.8.1.2 Environmental Consequences

No Action Alternative

The No Action alternative would not be effective in helping the area become more ecologically resilient to the predicted trends in climate change in the Tahoe Basin. Instead the restored stream channel and adjacent floodplain within the project area would be extremely vulnerable with continued degradation in response to climate change effects.

Proposed Action Alternative

Direct Effects

However, the Proposed Action alternative was designed to repair human caused disturbances, restore and improve hydrologic function throughout the project area. Within 5 to 10 years the quality of the meadow habitat should show observed improvement. Even with projected

increased temperatures and reduced snowpack predicted from climate change, water will be much more efficiently conveyed, stored and utilized in the restored montane riparian SEZ complex (Bisson, 2008).

Indirect Effects

Restoration and water quality improvement actions would be much more resilient in being able to absorb and dissipate the energy of flows from high magnitude flow events, preventing accelerated erosion of channel or floodplain surfaces (Furniss et.al, 2008).

Cumulative Effects

Because the project area is primarily meadow, and the Proposed Action would decommission a portion of asphalt parking lot, reducing the carbon footprint for the project area, when considered in combination with the projects described in Section 3.1, the Proposed Action would not result in cumulative adverse effects that could contribute to climate change.

3.8.2 Green House Gas Emissions

3.8.2.1 Existing Conditions

The most common GHGs are carbon dioxide, methane, and nitrous oxide. Because CO_2 is the reference gas for climate change, measures of non-CO_2 GHGs are converted into CO_2-equivalent values based on their potential to absorb heat in the atmosphere, referred to as GWP (USEPA 2010). This section evaluates the Proposed Action's emissions to determine individual and cumulative effects in relation to established thresholds of significance.

In nature, carbon is cycled between various atmospheric, oceanic, land biotic, marine biotic, and mineral reservoirs. Atmospheric CO_2 is part of this global carbon cycle. CO_2 concentrations in the atmosphere increased from 278 ppm by volume in pre-industrial times to 365 ppm by volume in 1998, a 31 percent increase. The Intergovernmental Panel on Climate Change (IPCC) notes that "this concentration has not been exceeded during the past 420,000 years, and likely not during the past 20 million years. The rate of increase over the past century is unprecedented, at least during the past 20,000 years." The IPCC definitively states that "the present atmospheric CO_2 increase is caused by anthropogenic emissions of CO_2" (USEPA 2010).

Methane (CH_4) is primarily produced through anaerobic decomposition of organic matter in biological systems. Agricultural processes such as wetland rice cultivation, enteric fermentation in animals, and the decomposition of animal wastes emit CH_4, as does the decomposition of municipal solid wastes. Atmospheric CH_4 concentrations have increased by about 150 percent since preindustrial times, although the rate of increase has been declining. The IPCC has estimated that slightly more than half of the current CH_4 flux to the atmosphere is anthropogenic from human activities such as agriculture, fossil fuel use, and waste disposal.

Anthropogenic sources of N_2O (nitrous oxide) emissions include agricultural soils, especially the use of synthetic and manure fertilizers; fossil fuel combustion, especially from mobile combustion; adipic (nylon) and nitric acid production; wastewater treatment and waste combustion; and biomass burning. The atmospheric concentration of N_2O has increased by 16 percent since 1750, from a preindustrial value of about 270 parts per billion to 314 parts per billion in 1998, a concentration that has not been exceeded during the last thousand years.

Currently, there is no local, state, or federal regulatory standards relating to GHG emissions from temporary sources such as construction projects that would have no quantifiable long-term operational emissions.

3.8.2.2 Environmental Consequences

No Action Alternative

The USFS (2009) policy on climate change states that the No Action alternative can be used to compare emissions; however, because it is not possible to predict the effects of a single project on global climate change, a baseline comparison cannot be made. The No Action alternative would not involve construction and would not emit any GHGs, and therefore would have no direct, indirect, or cumulative impacts on GHG emissions.

Proposed Action Alternative

Direct, and Indirect and Cumulative Effects

Under the Proposed Action GHGs would result from engine exhaust emissions caused by operation of off-road construction equipment and on-road vehicles. Given the immediate proximity of the project area to US 50 that is used consistently for various sizes of personal and construction related vehicles during the Tahoe Basin construction season, it was determined that it would not be possible to separate out short-term construction emissions associated with the Proposed Action alternative and that of other sources from south shore construction projects. Other construction projects that would utilize US 50 range from individual residence construction to local agency projects such as those listed in Section 3.1.

Although the Project would emit GHGs during construction, these emissions would be temporary, with no long-term operational component. Furthermore, in the long term, the Proposed Action alternative would add riparian vegetation along the length of the restored channel and would result in a wetter meadow with denser hydrophytic vegetation. The ecosystem plays an important role in the carbon cycle: carbon stored in live biomass, dead plant material and soil represents the balance between CO_2 absorbed from the atmosphere and its release through respiration, decomposition, and burning. Over longer time periods, vegetation will absorb carbon (USFS 2011). During each year's vegetation production, the meadow and stream corridor vegetation would sequester carbon. Given that the restored channel would be designed to remain indefinitely, over time the carbon sequestered by this improved plant growth

is predicted to offset the Project's overall CO_2 emissions. There are currently no local, state or federal statutes, regulatory standards, or policy direction on the significance of such effects from construction-only projects. Until meaningful, accepted thresholds are adopted, it is not possible to determine whether a specific project would have a significant effect.

Cumulative Effects

The Proposed Action would emit CO2e during construction over a period of two consecutive years. These emissions would be temporary, with no long-term operational component. Since the Proposed Action would not use electric power during operation, there would be no net increase of indirect GHG emissions from utility electric power generation as a result of the Proposed Project. The USFS (2009) has determined it is not currently feasible to quantify the indirect effects of individual (or multiple) projects on global climate change and therefore determinations of significance of effects is infeasible. The USFS evaluates GHG emissions and carbon cycling in proportion to the nature and scope of the action and its potential to affect emissions or be affected by climate change impacts (USFS 201109). For the Proposed Action, the USFS has used a qualitative sequestration analysis for several reasons. The action is a very small scale temporary action in terms of emissions. The purpose of the Proposed Action is environmental restoration of both the project area and downstream water quality. Furthermore, the Proposed Action would contribute to carbon sequestration by revegetation and improved riparian plant growth. Based on the size, scope, and purpose of the Proposed Action, it would not have significant cumulative effects on GHG emissions or climate change and may be beneficial over the long term.

3.9 Traffic and Circulation

3.9.1 Existing Conditions

US 50 is a gateway to South Lake Tahoe for visitors coming to Lake Tahoe from Carson City, Reno, or the eastern side of the Lake. The scenic roadway also is utilized by commuter and local traffic.

3.9.2 Environmental Consequences

No Action Alternative

Under the No Action alternative there will be no effect to proposed traffic volumes or circulation patterns.

Proposed Action Alternative

Direct and Indirect Effects

The Proposed Action alternative would result in a minor temporary increase in traffic during project construction as a result of movement of heavy equipment accessing the site, daily

construction worker traffic, and traffic control efforts that will be needed to protect roadway users. In addition, vehicle access to the trailhead parking would be partially and temporarily limited during daily startup, delivery and haul of construction materials and daily shut down of work.

However, the impacts would be short-term and would be reduced by providing traffic control as required per NDOT. The Proposed Action would not change road geometry and project-related road improvements are limited to drainage improvements at the existing edges of the roadway. Therefore, the Proposed Action would not increase roadway hazards. The Proposed Action would not result in any road closures but may cause delays due to lane closure. Therefore, the Proposed Action would not affect emergency access. In addition, the Proposed Action would not result in additional vehicle trips outside of the temporary construction period, so no significant long-term traffic impacts would result once construction is completed.

Cumulative Effects

Given that there would be no changes to road geometry affecting traffic volumes and circulation, as a result of the Proposed Action when combined with past, present and reasonably foreseeable future projects (Section 3.1), there would be no incremental cumulative effect to traffic volume and circulation.

3.10 Utilities and Service Systems

This section analyzes the effects of the No Action/No Project Alternative and the Proposed Project on utilities and service systems within the Project Area and surrounding uses.

3.10.1 Existing Conditions

The local utility providers are: KGID for water, DCSID for sewer, Southwest Gas Company for natural gas, NV Energy for electricity, South Tahoe Refuse and Recycling (STRR) for solid waste, and Frontier for communication lines such as telephone and fiber optic. The Project site sits atop existing underground utilities consisting of sanitary sewer, potable water, and multiple communication lines. There are no other known utility systems within the Project Area.

3.10.2 Environmental Consequences

No Action Alternative

Under the No Action alternative existing utilities, water supply and wastewater treatment would not be affected.

Proposed Action Alternative

Direct Effects

The proposed alignment of Burke Creek would require relocations of the water line, gas line, and multiple communication lines. The water and gas lines are located within NDOT right-of-way and the communication lines are located on The County property and within NDOT right-of-way.

These utility relocations could temporarily inconvenience some customers but the project will not create a need for new or expanded facilities. Prior to excavation, known utility lines would be vertically located to ensure existing utilities are not damaged and coordination with utility purveyors would occur to minimize direct impact to customers. Any accidental pipeline damage would be repaired immediately.

During construction, the Proposed Project would only produce small quantities of wastewater from on-site sanitation and pipeline dewatering and would not require new wastewater treatment services. Sanitary facilities would be limited to temporary portable toilets used onsite by construction crews. The construction contractor or USFS would provide all water supplies required for construction (i.e., dust control via water truck).

The Proposed Project would not generate substantial quantities of solid waste. Most solid waste generated during construction (e.g. trash, scraps of plastic, fabric, concrete and asphalt) would be taken to STRR or the Waste Management Lockwood Landfill. Both landfill facilities have sufficient permitted capacity to accept the expected volumes of solid waste from this project. Therefore, the Proposed Project would have no impact on landfill capacity. Any solid waste would be taken to STRR or the Waste Management Lockwood Landfill. Therefore, waste generated by the Proposed Project would not adversely affect NFS lands.

Indirect Effects

There would be no indirect effects of the Proposed Action on utilities, water supply and wastewater treatment.

Cumulative Effects

When the effects of the Proposed Action are considered in combination with the past, present and reasonably foreseeable future projects described in Section 3.1, the only potential effect may be inconvenience to customers during utility relocation. However, this is not a cumulative effect as it will be temporary and short term. No new or expanded utilities would be needed; therefore, the Proposed Project would have no term or cumulative impact to the utility lines within the project area.

Chapter 4
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4.1 Interdisciplinary Team Members

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Chapter 5
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APPENDIX A

Prescribed Best Management Practices

Best Management Practices

The following management requirements are designed to address the watershed management concerns. BMPs are derived from the Forest Service publications *National Best Management Practices for Water Quality Management on Nation Forest System Lands* (USDA Forest Service 2012. All applicable water quality BMPs will be implemented. Final application of these BMPs is based on integration with project design features.

National Core BMO	Best Management Practice Objective Description
AqEco-1. Aquatic Ecosystem Improvement and Restoration Planning	Reestablish and retain ecological resilience of aquatic ecosystems and associated resources to achieve sustainability and provide a broad range of ecosystem services.
AqEco-2. Operations in Aquatic Ecosystems	Avoid, minimize or mitigate adverse impacts to water quality when working in aquatic ecosystems.
AqEco-3. Ponds and Wetlands	Design and implement pond and wetlands projects I a manner that increases the potential for success in meeting project objectives and avoids, minimizes or mitigates adverse effects to soil, water quality and riparian resources.
AqEco-4. Stream Channels and Shorelines	Design and implement stream channel and lake shoreline projects in a manner that increase the potential for success in meeting project objectives and avoids, minimizes or mitigates adverse effects to soil, water quality and riparian resources.
Rec-3. Dispersed Use Recreation	Avoid, minimize, or mitigate adverse effects to soil, water quality and riparian resources by managing dispersed activities and undeveloped sites to maintain ground cover, maintain soil quality, control runoff and provide needed sanitary facilities to minimize the discharge of nonpoint source pollutants and maintain streambank and riparian area integrity.
Road-5. Temporary Roads	Avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources from the construction and use of temporary roads
Road-7. Stream Crossings	Avoid, minimize, or mitigate adverse effects to soil, watera uality and riparian resources when constructing, reconstructing or maintaining temporary and permanent waterbody crossings.
Road-9. Parking and Staging Areas	Avoid, minimize, or mitigate adverse effects to soil, water quality and riparian resources when constructing and maintaining parking and staging areas.

	Construct, install and maintain an appropriate level of drainage and runoff treatment for parking and staging areas to protect water, aquatic and riparian resources.
Road-10. Equipment Refueling and Servicing	Avoid or minimize adverse effects to soil, water quality and riparian resources from fuels, lubricants, cleaners and other harmful materials discharging into nearby surface water or infiltrating through soils to contaminate groundwater resources fueling equipment refueling and servicing activities.
WatUses-4. Water Diversions and Conveyances	Avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources from construction, operation, and maintenance of water diversion and conveyance structures.

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