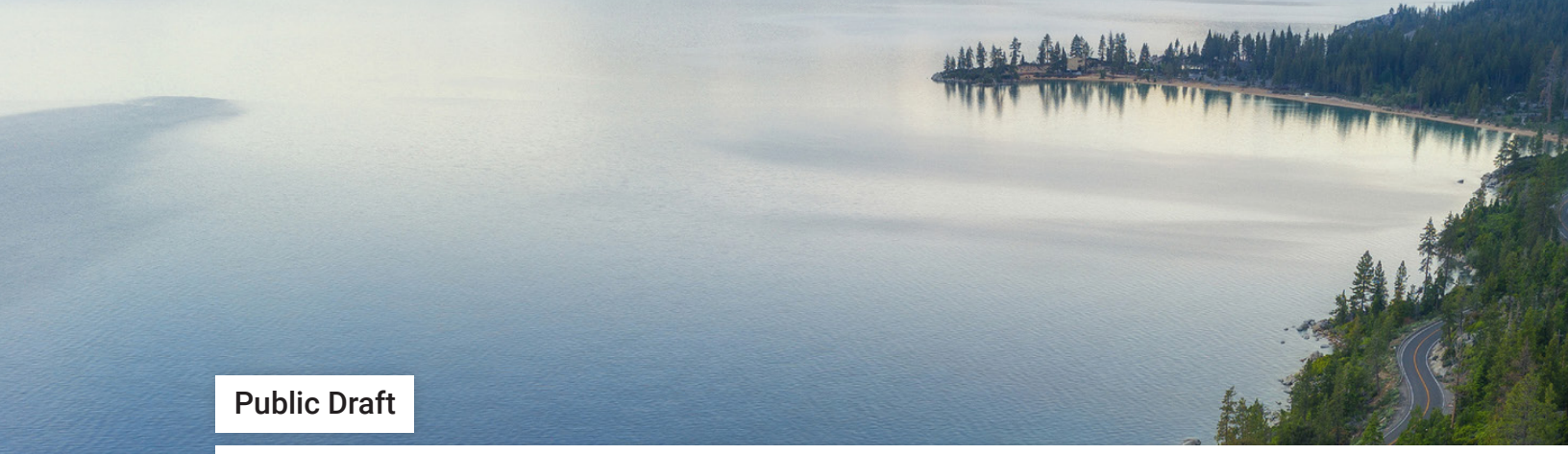

Public Draft

Tahoe Transportation District
Tahoe Resource Conservation District
2023 Hazard Mitigation Plan

Tahoe Transportation DISTRICT

TAHOE RESOURCE CONSERVATION DISTRICT

October 2023

Version Control Document

#	Date	Author	Summary of Changes Made

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
2023 HMP	Tahoe Transportation District–Tahoe Resource Conservation District 2023 HMP
AECOM	AECOM Technical Services, Inc.
AIS	Aquatic Invasive Species
BEPS	Bus Exportable Power Systems
BRIC	Building Resilient Infrastructure and Communities
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Office of Emergency Services
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CGS	California Geological Survey
CHSTP	Coordinated Human Services Transportation Plan
CO_2	carbon dioxide
CTC	California Tahoe Conservancy
CWPP	Community Wildfire Protection Plan
DFIRM	Digital Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000
DR	Major Disaster Declaration
DSOD	Division of Safety of Dams
EC	Elks Club
EDYC	El Dorado County Yard
EOC	Emergency Operations Center
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FRAP	Fire Resource and Assessment Program
FTA	Federal Transit Administration
FTI	Fire Threat Index
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IVA	Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin (CTC and Catalyst Environmental Solutions, 2020)
LCTOP	Low Carbon Transit Operations Program
LTBMU	Lake Tahoe Basin Management Unit
LTUSD	Lake Tahoe Unified School District
LRA	local responsibility area
LTF	Local Transportation Fund
M	magnitude

mph	miles per hour
NEP	National Exercise Program
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
PROTECT	Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program
RCC	Regional Coordinating Council
RFFC	Regional Forest and Fire Capacity Program
SRA	state responsibility area
SRTP	Short Range Transportation Plan
STA	State Transportation Assistance
State	State of California
STBG	Surface Transportation Block Grant
SWGP	Stormwater Grant Program
SWRP	Storm Water Resource Plan
Tahoe RCD	Tahoe Resource Conservation District
TCP	Tahoe Conservation Partnership
TDA	Transportation Development Act
TMC	transportation management center
TMWA	Truckee Meadows Water Authority
TTCF	Tahoe Truckee Community Foundation
TTD	Tahoe Transportation District
UC	University of California
USDOT	U.S. Department of Transportation
USFS	U.S. Forest Service
VAIS	Climate Change Vulnerability Assessment of Infrastructure Systems in the Lake Tahoe Basin (Energetics, 2019)

1.0 INTRODUCTION

1.1 HAZARD MITIGATION PLANNING

As defined in Title 44 Code of Federal Regulations (CFR) Subpart M, Section 206.401, hazard mitigation is "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." As such, hazard mitigation is any work to minimize the impacts of any type of hazard event before it occurs. Hazard mitigation aims to reduce losses from future disasters. It is a process that identifies and profiles hazards, analyzes the people and facilities at risk, and develops mitigation actions to reduce or eliminate hazard risk. The implementation of the mitigation actions—which include short- and long-term strategies that may involve planning, policy changes, programs, projects, and other activities—is the end result of this process.

Over the past two decades, local hazard mitigation planning has been driven by a federal law, known as the Disaster Mitigation Act of 2000 (DMA 2000). On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Title 42 United States Code Section 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. This new section also provided the legal basis for the Federal Emergency Management Agency's (FEMA's) mitigation plan requirements for the Hazard Mitigation Assistance grant programs.

1.2 2023 HAZARD MITIGATION PLAN SYNOPSIS

To meet the requirements of the DMA 2000, the Tahoe Transportation District (TTD) and the Tahoe Resource Conservation District (Tahoe RCD) have created a Hazard Mitigation Plan (HMP) known as the Tahoe Transportation District–Tahoe Resource Conservation District 2023 HMP (hereon referred to as the 2023 HMP). The goal of the planning process is to profile the natural and human-caused hazards in the Lake Tahoe Basin, determine the impacts of those hazards on the multi-modal transportation system and land conservation efforts in the basin, and develop strategies to mitigate future disasters.

Because this plan is funded through the California Office of Emergency Services (Cal OES), certain requirements in the plan only address the California side of the Lake Tahoe Basin. Both TTD and Tahoe RCD hope that future updates of the plan will include the Nevada side of the Lake Tahoe Basin too.

The 2023 HMP is organized to follow FEMA's 2022 Local Mitigation Plan Review Tool (**Appendix A**), which demonstrates how hazard mitigation plans meet the DMA 2000 regulations. As such, the specific planning elements of this review tool are discussed in their appropriate plan sections.

After this introduction, the 2023 HMP consists of the following sections:

- **Section 2, Planning Process,** provides an overview of the planning process, starting with a timeline. It identifies advisory committee members and describes their involvement with the planning process. This section also details stakeholder outreach, public involvement, and continued public involvement. In addition, this section provides an overview of the existing plans and reports, describes how those documents were incorporated into the 2023 HMP, and provides a method and schedule for updating the plan. Documentation that supports the planning process is provided in **Appendix B.**
- **Section 3, Prologue,** describes the planning area, the Lake Tahoe Basin (and more specifically, the California side of the Lake Tahoe Basin), for the 2023 HMP. This section identifies current owned, leased, and managed critical assets and proposes a list of assets for TTD and Tahoe RCD.

Figures showing the locations of the planning area and critical assets are provided in **Appendix C**.

- **Section 4, Hazard Identification and Risk Assessment,** describes each of the eight hazards addressed in this plan. Hazard figures are provided in **Appendix C**. In addition, this section includes impact (i.e., risk assessment) tables for both TTD and Tahoe RCD. This section also provides an overall summary description for each hazard.
- **Section 5, Mitigation Strategy,** provides a hazard-mitigation-specific capability assessment for both TTD and Tahoe RCD. It also describes the mitigation goals, the recommended mitigation actions and plans that prioritize the mitigation actions, and the process to integrate the 2023 HMP into other planning mechanisms.
- **Section 6, Plan Maintenance,** describes how public participation will proceed regarding the 2023 HMP and also outlines how the plan will be implemented, integrated into other documents, and updated in 5 years.
- **Section 7, Plan Update,** is not included, as the 2023 HMP is not an update.
- **Section 8, Plan Adoption,** contains scanned copies of the adoption resolutions.
- **Appendices** provides the appendices.

2.0 PLANNING PROCESS

This section addresses Element A: Planning Process of the Local Mitigation Plan Regulation Checklist.

Element A: Planning Process	
A1.	Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
A1-a.	Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved?
A1-b.	Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?
A2.	A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))
A2-a.	Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?
A3.	Does the plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))
A3-a.	Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?
A4.	A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))
A4-a.	A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?

2.1 OVERVIEW OF THE 2023 HMP PLANNING PROCESS (A1)

The development of the 2023 HMP was a collaborative effort between TTD and Tahoe RCD (plan participants that seek plan approval) and their consultant, AECOM Technical Services, Inc. (AECOM). TTD served as the project manager for the 2023 HMP. The planning process officially kicked off in July 2022 with the approval of TTD's Board (May 4, 2022). The planning process took a little more than a year, with a pause in the spring of 2023 due to a project manager change. A timeline of the major planning tasks and milestones by month, including the three times the advisory committee met virtually, is provided in **Table 2-1**. A list of the advisory committee members and how they contributed to the development of the plan is provided in **Table 2-2**.

Table 2-1: HMP Timeline

Date	Tasks	People Involved
July 2022	Received approval from TTD Board to begin planning process. Conducted project management "HMP huddle" kickoff conference call (July 26, 2022).	HMP project manager and AECOM
August 2022	Held first virtual advisory committee conference call to provide an overview of the HMP and FEMA mitigation grants and determine hazards to profile (August 8, 2022). Collected existing local and regional plans and reports. Determined the Geographic Information System (GIS) strategy for hazard profiles and collected hazard data sets.	HMP project manager, AECOM, and advisory committee
September 2022	Crafted and posted public outreach messages on TTD's website and Facebook page. Created draft hazard figures. Created draft district-specific appendices. Began to develop draft mitigation actions based on actions identified in the existing plans and reports.	HMP project manager and AECOM
October 2022	Identified initial list of stakeholders and emailed the stakeholders. Identified current and proposed critical assets.	HMP project manager, AECOM, and advisory committee
November 2022	Engaged Subject Matter Experts to review mitigation projects in existing TTD and Tahoe RCD plans and reports and also develop new mitigation project ideas.	HMP project manager and AECOM
December 2022	Reached out to stakeholders to notify them of the planning process.	HMP project manager
January 2023	Conducted an overlay analysis of critical assets in hazard areas and determined which assets are at risk.	HMP project manager, AECOM, and advisory committee
February 2023	Held second virtual advisory committee meeting to review draft vulnerability analysis and discuss potential mitigation strategies (February 13, 2023).	HMP project manager, AECOM, and advisory committee
June - August 2023	Created the Internal Draft HMP.	HMP project manager and AECOM
September 2023	Review of the Internal Draft HMP. Created the Public Draft HMP.	HMP project manager, AECOM, and Cal OES
October 2023	Review of the Public Draft HMP by the public and stakeholders. Created the Final Draft HMP and submitted it to Cal OES and FEMA for review.	HMP project manager, AECOM, and Cal OES
TBD	Plan approved by FEMA.	HMP project manager, AECOM, Cal OES, and FEMA Region IX

Table 2-1: HMP Timeline

Date	Tasks	People Involved
TBD	Plan adopted by TTD Board of Directors and Tahoe RCD Board of Directors.	TTD Board of Directors and Tahoe RCD Board of Directors
TDB	Held third virtual advisory committee to go over plan maintenance procedures and FEMA grants. Closed out project.	HMP project manager, AECOM, and advisory committee

Table 2-2: Advisory Committee

Name	Title and Agency	Contribution
Danielle Hughes	Capital Program Manager, TTD	Served as the 2023 HMP project manager. Led advisory committee conference calls and reviewed and commented on hazard figures, risk assessment, and potential TTD mitigation strategies.
Judi Allen	Executive Assistant, TTD	Served as the interim 2023 HMP project manager. Coordinated public outreach efforts; provided TTD asset information; and oversaw TTD's review of the Internal Draft HMP.
Mike Vollmer	Executive Director, Tahoe RCD	Participated on advisory committee conference calls; provided Tahoe RCD asset datasets; and reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft HMP.
Mollie Hurt	Director of Programs, Tahoe RCD	Participated on advisory committee conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft HMP.

2.2 OPPORTUNITIES FOR STAKEHOLDERS (A2)

On December 6, 2022, the HMP project manager reached out to stakeholders via email (**Appendix B**) about the 2023 HMP and invited them to participate in the planning process. Stakeholders included:

- Neighboring communities: El Dorado County, Placer County, City of South Lake Tahoe, Douglas County, Washoe County, and Carson City
- State of California partners: Cal OES, California Department of Forestry and Fire Protection (CAL FIRE), California Department of Transportation (Caltrans), California Highway Patrol, California State Parks, and California Tahoe Conservancy
- State of Nevada partners: Nevada Department of Emergency Management, Nevada Department of Transportation, and Nevada State Parks
- Federal partners: U.S. Forest Service - Lake Tahoe Basin Management Unit, U.S. EPA Lake Tahoe Basin Coordinator, and the Federal Highway Administration
- Agencies that have the authority to regulate development: Tahoe Regional Planning Agency
- Local and regional agencies involved in hazard mitigation: Environmental Improvement Program Working Groups, Lake Tahoe Aquatic Invasive Species Coordinating Committee, Tahoe Fire and Fuels Team, Stormwater Quality Improvement Committee, Upper Truckee River Watershed Advisory Committee, Nearshore Working Group, Tahoe Basin Recovery Implementation Team, Placer Fire Safe Alliance, North Lake Tahoe Fire Protection District, Fallen Leaf Lake Fire, Lake

Valley Fire Protection District, Tahoe Douglas Fire Protection District, Nevada Tahoe Conservation District, and Nevada Fire Safe Council

- Representatives of businesses, academia, and other private sectors: Liberty Utilities, Southwest Gas, and South Tahoe Refuse
- Other agencies, organizations, and special districts: Truckee / North Tahoe Transportation Management Association, South Shore Transportation Management Association, Sierra-Delta Chapter of the American Red Cross, Tahoe Truckee Unified School District, Lake Tahoe Unified School District (LTUSD), Tahoe Coalition for Homeless, South Tahoe Public Utility District, Tahoe City Public Utility District, North Tahoe Public Utility District, Douglas County School District, Washoe County School District, and Carson City School District

On December 7, 2022, one stakeholder requested to be added to any future mailing lists regarding the 2023 HMP.

The HMP project manager reached out to the stakeholders again via email on October 2, 2023, inviting them to review and provide comments on the Public Draft HMP (**Appendix B**).

2.3 PUBLIC INVOLVEMENT (A3)

The public was made aware of the 2023 HMP through the web, social media and email communication as follows:

- September 30, 2022: TTD announced the 2023 HMP kickoff on its website and Facebook page.
- October 2, 2023: Tahoe RCD and TTD announced the Public Draft and public comment period on the web and social media. A copy of the Public Draft HMP and contact information was posted to TTD's website. In addition, TTD also emailed 17 organizations that make up the Tahoe Area Coordinating Council for the Disabled about the Public Draft 2023 HMP public comment period.

Links to TTD's website and Facebook page as well as Tahoe RCD's Instagram are provided below (screenshots are provided in **Appendix B**):

- Website: https://www.tahoetransportation.org/tahoe-basin-hazard-mitigation-plan-notification/
- Facebook: https://www.facebook.com/TahoeTransportationDistrict/
- Instagram: https://www.instagram.com/tahoercd/

One public comment was received on October 8, 2022, requesting to be notified of the release of the public draft. This member of the public was sent a copy of the Public Draft HMP during the public comment period.

2.4 REVIEW AND INCORPORATION OF EXISTING PLANS AND REPORTS (A4)

A list of the relevant existing major plans and reports reviewed and incorporated into the 2023 HMP is provided in **Table 2-3**. In addition, these sources of information are referenced throughout the plan.

Table 2-3: Existing Plans and Reports

Plans and Reports	Information to Be Incorporated into the 2023 HMP
Tahoe Climate Resilience Action Strategy (California Tahoe Conservancy, 2022)	The five "focus areas" provided the basis for the goals for the 2023 HMP.
Tahoe State of the Lake Report, 2022 (University of California [UC], Davis Tahoe	This scientific assessment of the climate threats to the Lake Tahoe Basin was incorporated into the hazard profiles and risk

Table 2-3: Existing Plans and Reports

Plans and Reports	Information to Be Incorporated into the 2023 HMP
Environmental Center, 2022)	assessment.
Tahoe Climate Adaptation Action Portfolio (California Tahoe Conservancy [CTC] and TTD, 2021)	This scientific assessment of the climate threats to the Lake Tahoe Basin was incorporated into the hazard profiles and risk assessment, and the adaptation actions were incorporated into both TTD's and Tahoe RCD's mitigation strategies.
One Tahoe: A Transportation Funding Initiative (TTD, 2021)	Transportation funding sources were incorporated into TTD's capability assessment.
2020 Regional Transportation Plan (Tahoe Regional Planning Agency, 2021)	The recommended strategies were incorporated into TTD's mitigation strategy.
2020 Annual Report (Tahoe RCD, 2021)	Relevant programs were incorporated into Tahoe RCD's mitigation strategy.
Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin (California Tahoe Conservancy and Catalyst Environmental Solutions, 2020)	This scientific assessment of the climate threats to the Lake Tahoe Basin was incorporated into the hazard profiles and risk assessment.
Strategic Plan, 2021–2023 (Tahoe RCD, 2020)	The recommended strategies were incorporated into Tahoe RCD's mitigation strategy.
Vulnerability of California Roadways to Post-Wildfire Debris Flows (University of California, Los Angeles [UCLA] Institute of Transportation Studies, 2020)	The recommended resilient strategies were incorporated into TTD's mitigation strategy.
Climate Change Vulnerability Assessment of Infrastructure Systems in the Lake Tahoe Basin (California Tahoe Conservancy and TTD, 2019)	This scientific assessment of the climate threats to the infrastructure systems in the Lake Tahoe Basin was incorporated into the hazard profiles and risk assessment.
Caltrans Climate Change Vulnerability Assessment: District 3 Technical Report (Caltrans and WSP, 2019)	This scientific assessment of the climate threats to the Lake Tahoe Basin was incorporated into the hazard profiles and risk assessment.
California's Fourth Climate Change Assessment, Sierra Nevada Region Report (California Energy Commission, 2018)	This scientific assessment of the climate threats to the Lake Tahoe Basin was incorporated into the hazard profiles and risk assessment.
Tahoe Transportation District Short Range Transit Plan (TTD, 2017)	The recommended strategies were incorporated into TTD's mitigation strategy.
Linking Tahoe: Corridor Connection Plan (Stantec, 2017)	Mapped TTD critical facilities were used in TTD's vulnerability analysis.
Linking Tahoe: Lake Tahoe Basin Transit Master Plan (Stantec, 2017)	Mapped TTD critical facilities were used in TTD's vulnerability analysis.
Lake Tahoe Basin Community Wildfire Protection Plan (Tahoe Fuels and Fire Team, 2015)	This scientific assessment of the climate and wildfire threats to the Lake Tahoe Basin was incorporated into the hazard profiles and risk assessment. The recommended strategies were incorporated into Tahoe RCD's mitigation strategy.

3.0 PROLOGUE

This section provides an overview of the planning area and the two special districts participating in this 2023 HMP.

3.1 LAKE TAHOE BASIN

As noted in **Section 1.2**, because this 2023 HMP is funded through Cal OES, the planning area boundaries for the plan only cover the California side of the Lake Tahoe Basin. As shown on **Figure C-1**, the Lake Tahoe Basin is the area in the Sierra Nevada that naturally drains into Lake Tahoe. According to the U.S. Forest Service (USFS), it is estimated that the Lake Tahoe Basin was created about 5 million years ago during the formation of the Sierra Nevada, and Lake Tahoe itself formed about 2 million years ago when several large volcanic eruptions occurred. Today's Lake Tahoe has been roughly the same size for the past million years. The forest landscape surrounding the lake is quite young comparatively speaking and has only developed over the last 7,000 years as the region's climate became "warmer and wetter."

Today, the Lake Tahoe Basin consists of 191.6 square miles of lake, 376.56 square miles of land mass on the California side of the Lake Tahoe Basin, and 136.37 square miles of land mass on the Nevada side of the Lake Tahoe Basin. On the California side of the Lake Tahoe Basin, 218.84 square miles are in El Dorado County, 151.90 square miles are in Placer County, and 6.59 square miles are in Alpine County. The Lake Tahoe Basin is an "inter-mix of forest and urban communities," and the USFS–Lake Tahoe Basin Management Unit is responsible for 75 percent of basin lands.

3.2 TAHOE TRANSPORTATION DISTRICT

TTD is responsible for "facilitating and implementing safe, environmentally positive, multi-modal transportation plans, programs and projects for the Lake Tahoe Basin, including transit operations." The district was established in 1980, when the State of California, the State of Nevada, and the U.S. Congress amended the 1969 Bi-State Compact to implement and deliver transportation projects throughout the Tahoe Region.

Current and upcoming projects at TTD include the cross-lake passenger ferry service, Nevada Stateline to Stateline Bikeway Project, the State Route 28 National Scenic Byway, the State Route 89 Fanny Bridge Community Revitalization Project, and the US50 South Shore Community Revitalization Project. The sphere of influence for TTD is the Tahoe Basin boundaries. However, TTD, in partnership, works outside of these boundaries too.

TTD owns, leases, manages, and operates several critical assets to carry out its mission. In addition, TTD has identified several proposed critical assets, which FEMA also identifies as community lifelines. According to FEMA, "lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society. When disrupted, decisive intervention (e.g., rapid service re-establishment or employment of contingency response solutions) is required."

Existing and proposed assets for TTD are listed in **Table 3-1** and are shown on **Figures C-2** and **C-2A** through **C-2F**. Estimated values from 2018 for existing TTD critical assets have been provided when known. Due to grant funding restrictions for this plan, only existing and proposed critical assets that are located on the California side of the Lake Tahoe Basin are included in a semi-quantitative or qualitative vulnerability analysis in **Section 4**.

Table 3-1: Critical Assets That TTD Owns, Leases, Manages, and Operates

Category	Name of Asset
Administration	Administration building* (owned by Tahoe Regional Planning Agency)
Maintenance	Existing Maintenance building and yard and proposed Maintenance building and yard* (The estimated value of existing Maintenance building and yard not available. However, the yard houses 28 buses, two vans, three automobiles, two service trucks, and one piece of equipment with a total estimated replacement cost value of $6,359,037)
Bus Stops	1002 Hwy 28 at Tunnel Creek* ($30,000) 1952 US 50/Al Tahoe Blvd (US Bank) ($30,000) 1959 US 50/Bigler Ave ($30,000) 1983 US 50/Lyons Ave (Middle School) ($30,000) 1985 US 50/Takela Dr (Bank of America) ($30,000) 2011 US 50/Rufus Allen Blvd (County Library) ($250,000) 2012 US 50/Johnson Blvd (Safeway) ($30,000) 2055 US 50/Wildwood Ave ($30,000) 2085 South Y Transit Center 2111 Stateline Transit Center 4042 South Ave/3rd St (Barton Hospital) ($100,000) 4052 3rd St (Tahoe Senior Plaza) ($100,000) 4105 SR 207/Foothill Rd (Foothill Park and Ride)* ($50,000) 4107 SR 207/Foothill Rd (Foothill Park and Ride-EB)* ($50,000) 4148 Spruce Ave/Herbert Ave ($30,000) 4159 US 50/Tallac Ave (Visitor/Senior Center) ($250,000) 4168 Ski Run Blvd/Spruce Ave (Terry) ($30,000) 4173 US 50/San Jose Ave (Lakeview Commons) ($100,000) 4214 Pioneer Trail/Shepherds Rd ($30,000) 4215 US 50/Ski Run Blvd ($100,000) 4217 Pioneer Trail/Aspenwald Rd ($30,000) 4231 Pioneer Trail/Moss Rd ($30,000) 4233 US 50/Pioneer Trail (Holiday Inn Express) ($30,000) 4287 SR 207/Market St* ($50,000) 4295 Kingsbury Transit Center* 4356 Pioneer Trail/Moss Rd (7-11) ($30,000) 4720 Douglas County Community/Senior Center (Herbig Park)* 5004 US 50/Wildwood Ave ($30,000) 5006 US 50/Fairway Ave (Hotel Elevation) ($30,000) 5016 Pioneer Trail/Glen Dr ($30,000) 5017 Ski Run Blvd/Willow Ave ($30,000) 5023 Al Tahoe/US 50 (LTUSD Offices) ($30,000)
Cross-Lake Ferry Terminals	Proposed cross-lake ferry terminals have been identified for Tahoe City, Kings Beach, and South Lake Tahoe

Table 3-1: Critical Assets That TTD Owns, Leases, Manages, and Operates

Category	Name of Asset
Mobility Hubs	Lake Tahoe Community College ($1,450,562), Tahoe City, proposed Spooner Summit*, proposed Homewood, proposed Incline Village*, proposed Mt. Rose*, and proposed Sierra at Tahoe*
Mobility Hubs / Transit Centers (MH/TC)	Proposed Harrison Ave., proposed Heavenly Resort – California, proposed Palisades*, proposed Sugar Pine, and proposed Meyers
Transit Centers	Proposed Northstar*, proposed Tahoma, proposed Diamond Peak Resort*, and proposed Heavenly Lodge – Boulder*

Notes: * Critical asset is in Nevada and/or outside of the planning area.

3.3 TAHOE RESOURCE CONSERVATION DISTRICT

Tahoe RCD, founded in 1974 by the California State Legislature, is a non-regulatory, grant-funded, local agency that works in the Lake Tahoe Basin. It is one of nearly 3,000 conservation districts across the United States that protect land, water, forests, wildlife, and related natural resources. The mission of Tahoe RCD is to "promote the conservation, stewardship and knowledge of the Lake Tahoe Region's natural resources by providing leadership and innovative environmental services to all stakeholders."

Tahoe RCD, along with many partner agencies and organizations, achieves its mission using grant funding and private donations to support conservation—including water quality, wildlife habitat, fire defensible space, sustainable recreation, water conservation, and community enhancement—throughout the Lake Tahoe Basin. Current programs at Tahoe RCD focus on stormwater management, control and prevention of aquatic invasive species, and initiatives concerning land management, forestry, and conservation landscaping. These programs are described in more detail in **Appendix E**. The sphere of influence of the Tahoe RCD is within the same boundaries of the California side of the Lake Tahoe Basin as the sphere of influence of TTD. The Tahoe RCD also works in partnership outside of these boundaries too.

The Tahoe RCD owns, leases, manages, and operates several critical assets (community lifelines) to carry out its mission. These assets are listed in **Table 3-2** and are shown on **Figures C-3** and **C3-A** through **C3-E**. Estimated values for Tahoe RCD critical assets have been provided by Tahoe RCD when known. As of August 2023, Tahoe RCD is not looking to acquire more land in the future. In addition, there are no plans for additional stormwater sites either. As for inspection stations, there is a desire to create permanent inspection stations, but those will be located at the current seasonal inspection station sites.

Current Tahoe RCD critical assets that are located on the California side of the Lake Tahoe Basin are included in a semi-quantitative or qualitative vulnerability analysis in **Section 4**.

Table 3-2: Critical Assets That Tahoe RCD Owns, Leases, Manages, and Operates

Category	Name of Asset
Administration	Administration building ($996,000), Tahoe Regional Planning Agency storage* ($500,000)
Inspection Station	Alpine Meadows Inspection Station, Meyers Inspection Station, and Spooner Summit Inspection Station* ($608,500 each), and Cave Rock Launch Ramp* and Lake Forest Launch Ramp ($47,500 each)
Johnson Meadow	Johnson Meadow ($8,324,450) and Johnson Meadow signage and tools ($2,800)

Table 3-2: Critical Assets That Tahoe RCD Owns, Leases, Manages, and Operates

Category	Name of Asset
Meteorological Stations	El Dorado County Yard (EDCY), Hatchery, Nugget, Shop, Nevada Department of Transportation SR 431*, Tahoe Environmental Research Center*, and Shakori meteorological stations ($4,000 each)
Stormwater Monitoring Sites	Contech Inflow*, Contech Outflow*, Elks Club (EC), Jellyfish Inflow*, Jellyfish Outflow*, Lakeshore*, Pasadena Outflow, Speedboat, Tahoma, Tahoe City, Tahoe Valley (TV), and Upper Truckee (UT) stormwater monitoring sites ($16,000 each)

Notes: * Critical asset is in Nevada and/or outside of the planning area.

4.0 RISK ASSESSMENT

This section addresses Element B: Risk Assessment of the Local Mitigation Plan Regulation Checklist.

Element B: Risk Assessment	
B1.	Does the plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement § 201.6(c)(2)(ii))
B1-a.	Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?
B1-b.	Does the plan include information on the location of each identified hazard?
B1-c.	Does the plan describe the extent for each identified hazard?
B1-d.	Does the plan include the history of previous hazard events for each identified hazard?
B1-e.	Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change (e.g., long-term weather patterns, average temperature, and sea levels), on the type, location and range of anticipated intensities of identified hazards?
B1-f.	For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?
B2.	Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address National Flood Insurance Program (NFIP)-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))
B2-a.	Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?
B2-b.	For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?
B2-c.	Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?

4.1 HAZARD IDENTIFICATION, IMPACT, AND SUMMARY (B1-B3)

During the advisory committee kickoff conference call, the HMP project manager, consultant, and advisory committee discussed potential hazards to include in the 2023 HMP based on disaster declarations; known probabilities and vulnerabilities; and regional, State, and federal plans and reports. After some initial GIS work, the advisory committee determined that the 2023 HMP should address eight hazards: climate change, dam failure, drought, earthquake, flood, landslide, wildfire, and winter storm.

For each hazard, hazard identification consists of describing the nature of the hazard, the disaster history of the hazard, the locations of historical hazard events, their extent/severity, and the probability of future hazard events. Hazard identification profiles have been developed for each of the eight hazards, and these profiles are discussed in **Section 4.2** through **Section 4.9**. Hazard identification is discussed for the planning area that includes the California side of the Lake Tahoe Basin. Both TTD and Tahoe RCD work throughout the Lake Tahoe Basin, and therefore there are no hazards that are unique to either one of them or that vary from those affecting the overall planning area.

For each of the eight hazards, the 2023 HMP has created a summary profile of the hazard; a table that identifies the vulnerability of TTD and Tahoe RCD owned, leased, and managed critical assets to the

hazard; and a table that discusses the potential impacts of the hazard on critical assets that TTD and Tahoe RCD own, lease, and manage. The analyses are semi-quantitative or qualitative and are simplified assessments of the potential effects of each hazard on critical assets at risk without consideration of the probability of an event or the level of damage that might result from such an event. In addition, elevation data were not available; therefore, additional analysis will need to be conducted to develop a more accurate understanding of hazard vulnerabilities.

The hazards profiled for the 2023 HMP are discussed in alphabetical order, not in the order suggested in *Comprehensive Preparedness Guide 201: Threat and Hazard Identification and Risk Classification*. The order of discussion of the hazards in this 2023 HMP does not signify level of risk.

As noted in **Table 2-3**, several existing regional plans, studies, and reports were used to develop this section, including:

- California's Fourth Climate Change Assessment, Sierra Nevada Region Report (California Energy Commission, 2018)
- Climate Change Vulnerability Assessment of Infrastructure Systems in the Lake Tahoe Basin (Energetics, 2019) (hereafter referred to as the VAIS)
- Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin (California Tahoe Conservancy [CTC] and Catalyst Environmental Solutions, 2020) (hereafter referred to as the IVA)
- Tahoe Climate Adaptation Action Portfolio (CTC and TTD, 2021)
- Tahoe State of the Lake Report, 2022 (UC Davis Tahoe Environmental Center, 2022)

4.2 CLIMATE CHANGE

Table 4-1: Climate Change Profile

Profile	Description
Nature	Climate change is defined as the average statistics of weather, which includes temperature, precipitation, and seasonal patterns in a particular region. Climate change refers to the long-term and irrevocable shift in these weather-related patterns, either regionally or globally. The Earth and its natural ecosystem are very closely tied to the climate, and any permanent climate change will lead to an imbalance in the existing ecosystem, which impacts the way people live, the food they grow, their health, the wildlife, the availability of water, and much more. Research indicates that much of this warming is due to human activities—primarily the burning of fossil fuels and the clearing of forests—that release carbon dioxide (CO_2) and other gases into the atmosphere, which trap heat that would otherwise escape into space. Once in the atmosphere, these heat-trapping emissions remain there for many years (for example, CO_2 lasts about 100 years). If left unchecked, by the end of the century CO_2 concentrations could reach levels three times higher than in pre-industrial times. According to most climatologists, the planet is starting to experience shifts in climate patterns and an increased frequency of extreme weather events at both the global level and the local level. Over the next century, increasing atmospheric greenhouse gas concentrations are expected to cause a variety of changes to local climate conditions, including sea level rise and storm surge in coastal areas, increased riverine flooding, and stormwater inundation; and more frequent and prolonged higher temperatures (leading to extreme heat events and wildfires)—particularly inland—that decrease air quality and cause extended periods of drought. The social and economic impacts expected as a result of climate change include energy shortages, heat-related mortality and illnesses, failing infrastructure, and food and water insecurity, to name a few. Key climate impacts on the Lake Tahoe Basin include temperature, precipitation, snowpack, climate water deficit, runoff, wind, kinetic energy raindrops, wildfire, and lake level. This section will mainly address increased air temperatures as it relates to climate change in the Lake Tahoe Basin. Other climate change impacts are discussed as follows: water deficits and droughts are addressed in **Section 4.4, Drought**; floods and increased precipitation are addressed in **Section 4.6, Flood**; wildfires are addressed in **Section 4.8, Wildfire**, and winter storms are addressed in **Section 4.9, Winter Storm**.
Location	Climate change is now affecting all of the Lake Tahoe Basin at every elevation.
History	According to the Tahoe Environmental Research Center: • Since 1911, daily air temperatures for the Lake Tahoe Basin have increased. Measured at Tahoe City, the long-term trend in average daily minimum temperature has increased by 4.50 degrees Fahrenheit (°F), and the long-term trend in average daily maximum temperature has risen by 2.25°F. • The number of days when air temperature is below freezing has declined by 29 days per year since 1911. • On average, the snowpack has been decreasing since it started being recorded in the mid-1950s. From 1960 to 2020, the average snowpack has decreased at mid-mountain (at Palisades Tahoe) from 115 inches a year to 80 inches a year.

Table 4-1: Climate Change Profile

Profile	Description
Extent / Severity	According to the IVA, average ambient air temperature in the Lake Tahoe Basin has been rising over the past decade, and this trend is expected to intensify in the future. IVA's modeling predicts that from 2010 to 2100, average annual minimum and maximum air temperatures will increase by 3.6°F to 9.0°F. The average maximum air temperature in South Lake Tahoe for the month of August is projected to rise from 75°F (1981 to 2010) to 77°F in 2050 and 79°F in 2099. Increased annual air temperatures in the northern Sierra Nevada, including the Lake Tahoe Basin, will cause the winter season to shorten, with snowmelt occurring earlier in the spring and summer. The IVA also notes that the elevation at which snow accumulates (called the snow level) will eventually rise above the rim of the Lake Tahoe Basin, from approximately 6,200 feet to approximately 7,500 feet (by 2050) and to approximately 9,500 feet (by 2100) as less precipitation falls as snow and more falls as rain.
Future Events	Climate projections for warming air temperature for the Lake Tahoe Basin show an increase of 3.6°F to 9.0°F by the end of the century. In addition to warming air temperature, Tahoe Climate Research Center notes climate change effects in Lake Tahoe Basin by the 21st century will include: • Snow declining as a fraction of total precipitation • Extended droughts • Increased algal growth • Increased threat from aquatic invasive species • More extreme streamflow events • Increased tree mortality • Future impacts on clarity • Reduced deep lake mixing

Table 4-2: Climate Change Vulnerability

Vulnerability	
TTD	All of the Lake Tahoe Basin is vulnerable to climate change. TTD critical assets that are vulnerable to droughts, floods and increased precipitation, wildfires, and winter storms are discussed in detail in **Sections 4.4, 4.6, 4.8, and 4.9**. TTD critical assets that are vulnerable to increased temperature could include: • Future cross-lake passenger ferry terminals due to low lake levels.
Tahoe RCD	All of the Lake Tahoe Basin is vulnerable to climate change. Tahoe RCD critical assets that are vulnerable to droughts, floods and increased precipitation, wildfires, and winter storms are discussed in detail in **Sections 4.4, 4.6, 4.8, and 4.9**. Tahoe RCD critical assets that are vulnerable to increased temperature could include: • Johnson Meadow due to associated meadow, forest and wetland disturbances. • Launch ramps due to the low lake levels. • Inspection stations due to increased aquatic invasive species.

Table 4-3: Climate Change Impacts

Impacts	
TTD	Impacts from droughts, floods and increased precipitation, wildfires, and winter storms are discussed in detail in **Sections 4.4, 4.6, 4.8, and 4.9**. Impacts from increased temperatures include: • Deteriorating health conditions for transit operators and rides, including heat stress due to rising street-level temperatures and loss of shade, and poor air quality, due to warmer temperatures. • Deteriorating pavement performance due to increased temperature that thereby result in transit route delays, reroutes and/or cancellations. • Increased congestion and congested safety related issues as tourists visit the region to find cooler temperatures (VAIS).
Tahoe RCD	Impacts from Impacts from droughts, floods and increased precipitation, wildfires, and winter storms are discussed in detail in **Sections 4.4, 4.6, 4.8, and 4.9**. Impacts from increased temperatures include: • Severe ecological changes to riparian ecosystems such as Johnson Meadow caused by early peak streamflow / early snowpack melt (Tahoe Climate Adaptation Primer). • Habitat loss and fragmentation to species that inhabit small ranges of alpine ecosystems caused by higher temperatures (IVA). • Conifers to encroach upon and reduce meadow habitat as upland groundwater tables lower (Tahoe Climate Adaptation Primer). • Native species to be outcompeted by aquatic invasive species that adapt well to altered environments caused by warm surface water temperatures associated with higher temperatures (IVA).

4.3 DAM FAILURE

Table 4-4: Dam Failure Profile

Profile	Description
Nature	Dam failure, also known as a dam breach, is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity used in construction, or structural damage caused by an earthquake or flood. When a dam fails, a large quantity of water is suddenly released with a great potential to cause human casualties, economic loss, and environmental damage. This type of disaster is especially dangerous because it can occur suddenly, providing little warning or evacuation time for the people living downstream. The flows resulting from dam failure are generally much larger than the capacity of the downstream channels and therefore lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water flooding over the channel banks and the impact of the debris carried by the flow.
Location	In California, any dam with a height of more than 6 feet and impounding 50 acre-feet or more of water or any dam that is 25 feet or higher and impounds more than 15 acre-feet of water is under the State's jurisdictional oversight, unless exempted. As shown on **Figure C-4**, according to the California Department of Water Resources, Division of Safety of Dams (DSOD), as of August 2022, there are only three dams under the jurisdiction of DSOD within the California side of the Lake Tahoe Basin. These dams are all located in El Dorado County. In addition to the three jurisdictional dams, the Bureau of Reclamation operates the Lake Tahoe Dam in Placer County. The dam controls the top 6 feet of Lake Tahoe, creating a reservoir of 744,600 acre-feet capacity, and regulates the lake's outflow into the Truckee River.
History	There are no recorded dam failures in the Lake Tahoe Basin.
Extent / Severity	The Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (FEMA P-946, July 2013) defines the downstream hazards for dam incidents, not the probability of failure. The downstream hazards are based "solely on the potential downstream impacts to life and property should the dam fail when operating with a full reservoir." FEMA has developed three categories of increasing severity for downstream hazards: Low, Significant, and High. DSOD adds a fourth category of Extremely High. High hazard potential dams are expected to cause the loss of at least one human life if they fail. Dams that are classified as Extremely High hazard potential dams are expected to cause loss of human life or have an inundation area with a population of 1,000 or more. According to DSOD, two dams on the California side of the Lake Tahoe Basin are classified as High or Extremely High hazard potential dams: Echo Lake Dam is classified as Extremely High hazard potential, and the Emergency Effluent Holding Dam is classified as High hazard potential. A dam breach inundation map shows the downstream flooding that could result from a hypothetical failure of the dam or its critical appurtenant structure. In 2017, the California legislature passed a law requiring all owners of State jurisdictional dams—except for owners of Low hazard potential dams—to develop inundation maps approved by DSOD and emergency action plans approved by Cal OES. The approved Extremely High and High hazard potential dam breach inundation maps for the Greater Lake Tahoe Area are shown on **Figure C-5**, which shows that a total 1.87 square miles (0.49 percent) of mapped dam breach inundation area is located within the California side of the Lake Tahoe Basin.

Table 4-4: Dam Failure Profile

Profile	Description
Future Events	Dams fail for a variety of reasons, including substandard construction materials/techniques, spillway design error, geological instability, poor maintenance, intense rainfall, flow regulation, or earthquakes. Therefore, recurrence probabilities are unknown. State-jurisdictional dams are regulated by the DSOD, and each dam undergoes an annual inspection to ensure that it is safe, performing as intended, and not developing safety issues. According to the DSOD, dams have been designed to withstand storms so massive that they happen only once every 1,000 years (i.e., a 0.1 percent chance). In recent years, there has been growing concern about extreme precipitation events pushing aging dams beyond what they were designed to handle. Water flowing over the top of a dam is considered among the worst possible failures, as it puts pressure on the structure and increases the odds of a complete collapse. One way to measure extreme precipitation events that may cause dam failure in the Lake Tahoe Basin is to calculate the frequency return intervals for extreme storms. According to California's Fourth Climate Change Assessment (California Energy Commission, 2018), extreme storms (200-year storm sequences) will likely increase to every 40 to 50 years.

Table 4-5: Dam Failure Vulnerability

Vulnerability	
TTD	TTD does not have any critical assets located in a dam breach inundation area.
Tahoe RCD	Johnson Meadow ($8,324,450) is in Echo Lake's dam breach inundation area.

Table 4-6: Dam Failure Impacts

Impacts	
TTD	Inundation caused by a dam failure could inundate and/or damage highways and local roads, including Highway 50 in the City of South Lake Tahoe, leading to transit reroutes, delays and cancellations.
Tahoe RCD	Inundation caused by Echo Lake could flood and erode Johnson Meadow.

4.4 DROUGHT

Table 4-7: Drought Profile

Profile	Description
Nature	Drought is a normal, recurrent feature of virtually all climatic zones, including areas of both high and low rainfall, though the characteristics of droughts will vary significantly from one region to another. Drought differs from normal aridity, which is a permanent feature of the climate in areas of low rainfall. Drought is the result of a natural decline in the expected precipitation over an extended period, typically one or more seasons. Other climatic characteristics impact the severity of drought conditions, including high temperatures, high winds, and low relative humidities. Four common definitions for drought are as follows: • **Meteorological drought** is defined solely on the degree of dryness, expressed as a departure from actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales. • **Hydrological drought** is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels. • **Agricultural drought** is defined principally in terms of soil moisture deficiencies relative to the water demands of plant life, usually crops. • **Socioeconomic drought** associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. It may also be referred to as a water management drought. A drought's severity depends on numerous factors, including duration, intensity, geographic extent, and regional water supply demands by humans and vegetation. Due to its multi-dimensional nature, drought is difficult to define in exact terms and poses difficulties in terms of comprehensive risk assessments.
Location	The occurrence of drought is regional in nature and scope, which holds true for the northern Sierra Nevada. Therefore, the occurrence of a drought in the northern Sierra Nevada typically affects all of the Lake Tahoe Basin. According to the IVA, modeled climatic water deficits show that drought stress on soils and plants by 2070 to 2090 will be greatest in the northeast and southeast sides of the Lake Tahoe Basin.
History	Drought is a cyclic part of the climate of California, occurring in both summer and winter, with an average recurrence interval of 3 to 10 years. The driest year to date (since record keeping began in 1895) occurred in 2022. The droughts that have occurred in the Lake Tahoe Basin and California over the past 100 years are listed below: • 1917–1921, statewide, except for central Sierra Nevada and north coast • 1922–1926, statewide, except for central Sierra Nevada • 1928–1937, statewide • 1943–1951, statewide • 1959–1962, statewide • 1976–1977, statewide, except for southwestern deserts • 1987–1992, statewide • 2007–2009, statewide, particularly the central coast • 2012–2016, statewide • 2021–2023, statewide
Extent / Severity	The National Drought Mitigation Center produces drought monitor maps for the United States. It classifies droughts into five categories: D0 is the least severe, with abnormally dry conditions; D4 is the most severe, with exceptional drought conditions. At the beginning of drafting of this HMP, in September 2022, all of the northern Sierra Nevada, including the Lake Tahoe Basin, was classified as being in a D2 (severe drought) category. However, by the time a draft HMP was completed in

Table 4-7: Drought Profile

Profile	Description
	August 2023, the California side of the Lake Tahoe Basin was classified as D0, no drought conditions (according to the U.S. Drought Monitor), and the California Governor had rolled back some of the drought restrictions due to one of the wettest winters on record in the State. Projections show that by mid-century the Lake Tahoe Basin will experience a 2.0 – 23.6% increase (from historical climate water averages from 1950-2005) in climate water deficit. Areas with the biggest increases include the southeastern, northwestern, and northern parts of the basin. The very southern and southeastern portion of the basin is projected to have a -2.0 to -7.2% decrease in climate water deficiency. However, by end of the century, all areas of the Lake Tahoe Basin are expected to have an increase of climate water deficit of 5 – 120 percent with the greatest increases in the northeastern and southeastern portions of the basin (IVA).
Future Events	According to UCLA's Center for Climate Science, climate probabilities in Northern California (including the Lake Tahoe Basin) by the year 2100 show more weather extremes, including: • Extreme dry years will occur 1.8 times more frequently than the 1895 to 2017 frequency rate of one time every 100 years. • Dry-to-wet whiplash will occur 1.25 times more frequently than the 1895 to 2017 frequency rate of four times every 100 years. Additionally, according to the VAIS, climate projections for drought events include the entire Lake Tahoe Basin with the southern and northern parts of the basin projected to experience the biggest climate water deficit/drought stress.

Table 4-8: Drought Vulnerability

Vulnerability	
TTD	• Highways and local roads around the Lake Tahoe Basin could be vulnerable to subsidence and other performance issues associated with drought. • Future cross-lake passenger ferry terminals could be vulnerable to low lake levels associated with extended drought. • Transit riders could be vulnerable to worsening drought-induced conditions, such as rising street-level temperatures and loss of shade.
Tahoe RCD	• Johnson Meadow could be vulnerable to drought-associated forest and wetland disturbances. • Launch ramps could be vulnerable to the low lake levels associated with extended drought.

Table 4-9: Drought Impacts

	Impacts
TTD	• The declining groundwater levels and subsidence associated with drought could damage highways and local roads, causing transit route delays, reroutes and/or cancellations. • The higher temperatures associated with drought could affect pavement performance. • The low lake levels caused by extended drought could affect the functionality of ferry terminals. • Drought could create ideal conditions for wildfires, causing damage to and/or blocking major highways and access to local roads, transit stops, and parking lots. This could also result in transit reroute delays, reroutes and/or cancelations. • (**Table 4-21**).
Tahoe RCD	• Lack of consistent high groundwater from drought could make trees more susceptible to bark beetle attacks (IVA). • Lack of consistent high groundwater from drought could cause aspen trees to die and be replaced by conifer trees (IVA). • Droughts could lead to acidification, cracking, and compaction of wetland soils. • The low lake levels and higher water temperatures associated with drought could increase algae and other aquatic invasive species in the lake (IVA), thereby impacting Tahoe RCD's Aquatic Invasive Species Program, as there will be a greater need for controlling and monitoring existing and new aquatic invasive species. • Drought could create ideal conditions for wildfires, which might destroy or disturb forests and wetlands (**Table 4-21**).

4.5 EARTHQUAKE

Table 4-10: Earthquake Profile

Profile	Description
Nature	An earthquake is a sudden motion or trembling caused by the release of strain accumulated in or along the edge of Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and can cause massive damage and extensive casualties in a few seconds. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. Seismic waves radiate when a fault ruptures, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can amplify ground motions. In addition to ground motion, several secondary natural hazards can occur from earthquakes, including: • **Surface faulting**: Surface faulting is the differential movement of two sides of a fault at the Earth's surface. Displacement along faults varies in terms of both length and width but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to infrastructure, including railways, highways, pipelines, tunnels, and dams. • **Liquefaction**: Liquefaction occurs when seismic waves pass through saturated granular soil, distorting its granular structure and causing some of the empty spaces between granules to collapse. Liquefaction causes lateral spreads (i.e., horizontal movements of 10 to 15 feet most commonly but up to 100 feet), flow failures (i.e., massive flows of soil, typically hundreds of feet but up to 12 miles), and loss of bearing strength (i.e., soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property. • **Landslides / debris flows**: Landslides and debris flows occur as a result of horizontal seismic inertia forces induced in slopes by ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rockfalls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes completely saturated with water. Once the soil liquefies, it loses its ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase during a wet winter after an earthquake. • **Tsunamis**: A tsunami is a series of traveling ocean waves of extremely long length, generated by disturbances associated primarily with earthquakes occurring below or near the bottom of a large body of water or on the ocean floor. Subduction zone earthquakes at plate boundaries often cause tsunamis. The two most common measures of earthquake intensity used in the United States are (1) the Modified Mercalli Intensity Scale, which measures felt intensity, peak ground acceleration, and instrumental intensity by quantifying how hard the earth shakes in a given location, and (2) Magnitude (M), which is measured by the amplitude of the earthquake waves recorded on a seismograph using a logarithmic scale.
Location	According to the California Geological Survey (CGS) and as shown on **Figures C-6 and C-7**, the California side of the Greater Lake Tahoe Area is transected by a series of significant faults, including the Tahoe-Sierra Frontal Fault, Dog Valley Fault, Polaris Fault, West Tahoe–Dollar Point Fault, Agate Bay Fault, North Tahoe Fault (also referred to as the Stateline Fault), Tahoe Valley Fault, and Genoa Fault.

Table 4-10: Earthquake Profile

Profile	Description
History	As shown on **Figure C-6,** 12 M 5.0 or greater earthquakes have been recorded in and around the Greater Lake Tahoe Area between 1769 and 2015 (CGS). In addition, according to the Tahoe Environmental Research Center, a M 7.0 earthquake that occurred sometimes between 12,000 – 21,0000 years ago caused a massive land area along McKinney Bay to collapse, thereby causing an underwater landslide and a tsunami generated by the landslide displacement. Geologists estimate that the tsunami had waves as high as 100 – 300 ft. with seiche waves lasting 24 hours after the initial tsunami event.
Extent / Severity	The CGS has developed probabilistic seismic hazard maps for earthquake shaking potential for California. The maps refer to an estimate of the probability of exceeding a certain amount of ground shaking or ground motion in 50 years. The hazard depends on the magnitudes and locations of likely earthquakes, how often they occur, and the properties of the rocks and sediments that the earthquake waves travel through. Regions near major, active faults are shown in orange, red, and pink and experience stronger earthquake shaking more frequently. Regions that are distant from known, active faults are shown in green and yellow; these areas experience lower levels of shaking and do so less frequently. A probabilistic seismic hazard map depicting a 2 percent probability of exceedance in 50 years is shown on **Figure C-7**. Areas shaded in orange (very dark orange/red) will experience stronger earthquake shaking more frequently. Such areas include 23.92 square miles (6.35 percent) of the California side of the Lake Tahoe Basin. Areas within the same geographical boundaries that are shaded in light orange, yellow, or yellow-green will experience low levels of earthquake shaking less frequently. These areas include 157.73 square miles (41.89 percent) of the California side, and areas in green (60.02 square miles, or 15.94 percent of the California side) will experience the least amount of shaking the least often.
Future Events	Lake Tahoe Basin lies within one of the most active parts of the Sierra Nevada-Great Basin Zone. Active seismically significant faults in the Lake Tahoe Basin (for both the California and Nevada sides of the Lake Tahoe Basin) include the northeast-southwest-trending North Tahoe Fault, the north-south-trending West Tahoe–Dollar Point Fault, and the northwest-trending Tahoe-Sierra Frontal Fault. Two studies conducted by the Scripps Institution of Oceanography suggest that an "M 7.0+ earthquake occurs every 2,000 to 3,000 years in the Lake Tahoe Basin, and that the largest fault in the basin, the West Tahoe–Dollar Point Fault, appears to have last ruptured between 4,100 and 4,500 years ago." As noted above, probabilistic shake hazard maps show the greatest shaking potential to the north, south, and east sides of Lake Tahoe as well as under Lake Tahoe itself. According to the University of Nevada at Reno, a rupture along a fault beneath Lake Tahoe could generate a tsunami that in turn could trigger 30 feet or heigher seiche waves.

Table 4-11: Earthquake Vulnerability

Vulnerability	
TTD	• The following bus stops with an estimated value of unknown to $30,000 each are located in areas that may experience stronger earthquakes more frequently: 1952 US 50/Al Tahoe Blvd (US Bank),1959 US 50/Bigler Ave,1983 US 50/Lyons Ave (Middle School), 2012 US 50/Johnson Blvd (Safeway), 2055 US 50/Wildwood Ave, 2085 South Y Transit Center, 2111 Stateline Transit Center, 4148 Spruce Ave/Herbert Ave, 4168 Ski Run Blvd/Spruce Ave (Terry), 4214 Pioneer Trail/Shepherds Rd, 4217 Pioneer Trail/Aspenwald Rd, 4231 Pioneer Trail/Moss Rd, 4233 US 50/Pioneer Trail (Holiday Inn Express), 4356 Pioneer Trail/Moss Rd (7-11), 5004 US 50/Wildwood Ave, 5016 Pioneer Trail/Glen Dr, 5017 Ski Run Blvd/Willow Ave, and Al Tahoe/US 50 (LTUSD Offices). • The 4042 South Ave/3rd St (Barton Hospital) ($100,000) and the 4052 3rd St (Tahoe Senior Plaza) bus stops, which are both valued at $100,000 each, and the 4159 US 50/Tallac Ave (Visitor/Senior Center) bus stop, valued at $250,000, are also located in areas that may experience stronger earthquakes more frequently. • In addition, the existing Maintenance yard and building and the existing Lake Tahoe Community College mobility hub ($1,450,562) along with the proposed South Lake Tahoe cross-lake ferry terminal and the proposed Harrison Ave. MH/TC are all located in areas that may experience stronger earthquake shaking more frequently too.
Tahoe RCD	• The Administration building, Johnson Meadow ($8,324,450), Johnson Meadow signage and tools ($2,800), Shop meteorological monitoring station ($4,000), and EC, TV, and UT stormwater monitoring sites ($16,000 each) are in areas that may experience stronger earthquakes more frequently.

Table 4-12: Earthquake Impacts

Impacts	
TTD	• Earthquakes could cause road cracks and uneven road surfaces. • Earthquakes could trigger landslides, debris flows, rockfalls, and other associated hazards that could damage and/or block highways and local roads, transit stops, and parking lots. This could result in transit route delays, reroutes and/or cancellations. • In addition to ground shaking and surface ruptures from an earthquake, an earthquake in Lake Tahoe could create a tsunami. A moderate earthquake in Lake Tahoe has the potential to generate a tsunami wave that could impact the entire shoreline with inundation and permanent subsidence. Tsunami run-up could cause flooding and damage to the transportation infrastructure around the shoreline.
Tahoe RCD	• Earthquakes could trigger landslides, debris flows, rockfalls, and other associated hazards that can damage meteorological stations and stormwater monitoring sites. • Earthquakes could create ecological disturbances such as forest destruction, grassland degradation, and loss of surface water (Ecological Indicators, 2022). • As noted above, earthquake created tsunami run-up in Lake Tahoe could cause flooding and damage to inspection stations around the shoreline.

4.6 FLOOD

Table 4-13: Flood Profile

Profile	Description
Nature	A flood occurs when the existing channel of a stream, river, canyon, or other watercourse cannot contain excess runoff from rainfall or snowmelt, resulting in overflow onto adjacent lands. In coastal areas, flooding may occur when high winds or tides result in a surge of seawater into areas that are above the normal high tide line. Secondary hazards from floods can include: • Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features. • Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects. • Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands. • Release of sewage and hazardous or toxic materials when wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed. Atmospheric rivers are strongly linked to extreme winter precipitation events in the western United States, accounting for 80 percent of extreme floods in the Sierra Nevada and surrounding lowlands.
Location	As shown on **Figure C-8,** in the Lake Tahoe Basin, three main types of flooding are known to occur: • Riverine flooding: Also known as stream flooding or overbank flooding, riverine flooding occurs in narrow, confined channels in the steep valleys of hilly and mountainous regions to wide and flat areas in plains and coastal regions. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and the land use characteristics. Riverine flooding is generally caused from large-scale weather systems generating prolonged rainfall. However, it can also be caused by snowmelt. The watercourses on the California side of the Lake Tahoe Basin that pose a potential riverine flood risk include the Upper Truckee River, Eagle Creek, Meeks Creek, General Creek, Quail Lake Creek, Madden Creek, Blackwood Creek, Ward Creek, Dollar Creek, and Trout Creek. Additionally, riverine flooding can cause lake flooding. According to the Lake Tahoe Basin Management Unit, there are 63 streams that flow into Lake Tahoe but only one (Truckee River) that flows out past Reno. • Flash flooding: Flash floods are "a rapid and extreme flow of high water into a normally dry area, or a rapid rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (National Weather Service, 2022)." Flash floods are characterized by a rapid rise in water, high velocities, and large amounts of debris. Flash floods can occur in or near burn scar areas, small creeks, and steep terrain. Recent burn scar areas in and around the Lake Tahoe Basin include the Caldor Fire burn scar area in El Dorado County. • Localized flooding: Localized flooding may occur outside of recognized drainage channels or delineated floodplains due to a combination of locally heavy precipitation, increased surface runoff, and inadequate facilities for drainage and stormwater conveyance. Modeling the location of localized flood hazard areas is extremely complex due to the presence of various human-built structures such as culverts, channels, and drains. However, such events frequently occur in flat areas and urbanized areas with large areas of impermeable surfaces such as the City of South Lake Tahoe.
History	According to the NOAA Storm Events Database, from January 1, 1950, to December 31, 2022,

Table 4-13: Flood Profile

Profile	Description
	there were 23 flood events and 75 heavy rain events in the Greater Lake Tahoe Area zone. From 1953–current, the Federal Government made the following Major Disaster Declarations (DRs) and Emergency Declarations (EMs) for heavy rain, flood, and severe storm events for Placer, El Dorado, and/or Alpine counties: • 1964, Heavy Rains and Flooding (DR 183) • 1969, Severe Storms and Flooding (DR 253) • 1986, Severe Storms and Flooding (DR 758) • 1995, Severe Winter Storms, Flooding, Landslides, and Mudflows (DRs 1044 and 1046) • 1997, Severe Winter Storms, Flooding, Landslides, and Mudflows (DR 1155) • 2006, Severe Winter Storms, Flooding, Landslides, and Mudflows (DRs 1628 and 1646) • 2017, Severe Winter Storms, Flooding, and Mudslides (DRs 4301, 4305 and 4308) • 2019, Severe Winter Storms, Flooding, Landslides, and Mudflows (DR 4434) • 2022–2023, Severe Winter Storms, Flooding, Landslides, and Mudslides (DR 4683) • 2023, Severe Winter Storms, Flooding, Landslides, and Mudslides (EMs 3591 and 3592)
Extent / Severity	The magnitude of flooding that is used as the standard for floodplain management in the United States is a flood with a probability of occurrence of 1 percent in any given year. This flood is also known as the 100-year flood (i.e., the base flood). The 100-year flood (1 percent) and the 500-year flood (0.2 percent) are areas with high and moderate-low flood risks, respectively, and are identified on FEMA's Digital Flood Insurance Rate Maps (DFIRMs). The DFIRMs for Placer and El Dorado counties within the Lake Tahoe Basin identify 3.31 square miles (1.51 percent) and 0.84 square miles (0.56 percent) respectively with a 1 percent annual chance of flooding. Also, the DFIRMs for Placer and El Dorado counties identify 0.52 square miles (0.24 percent) and 0.05 square miles (0.03 percent) respectively with a 0.2 percent annual chance of flooding. DFIRMs are not available for Alpine County. DFIRMs aren't designed to account for flooding caused by intense rainfall. Therefore, these maps likely understate vulnerable areas prone to intense precipitation caused by climate change. According to California's Fourth Climate Change Assessment, Sierra Nevada Region Report (California Energy Commission, 2018), the amount of precipitation from the largest storms (maximum annual 3-day precipitation totals) is projected to increase by 5 percent to 30 percent from historical norms by the end of the century. In fact, a recently published mega-storm study (Science Advances, 2022) projects that "end-of-the-century storms will generate 200 percent to 400 percent more runoff in the Sierra Nevada due to increased precipitation and more precipitation falling as rain, not snow." The VAIS details future flood hazard conditions in the Lake Tahoe Basin for two 30-year projections (2036 to 2065 and 2070 to 2099). The models show the maximum daily streamflow and runoff for six streams in the Lake Tahoe Basin. **Figures C-9 and C-10** show the "possible magnitude of future changes in nearby watersheds" and, as such, show the potential for up to a 21 percent increase in streamflow by the end of the century using model RCP4.5 (**Figure C-9**) and the potential for up to a 90 percent increase in streamflow by the end of the century using model RCP8.5 (**Figure C-10**). For the RCP4.5 scenario, there are 70.20 square miles (18.64 percent) of watersheds in the California side of the Lake Tahoe Basin that will potentially see an increase of 15 percent or more in maximum daily streamflow and flooding. The RCP8.5 models shows that 118.41 square miles (31.45 percent) of watersheds on in the California side of the Lake Tahoe Basin will potentially see an increase of 61 percent or greater in maximum daily streamflow and flooding.
Future Events	Floods can occur at any time in the Lake Tahoe Basin but are currently most common during annual winter storms packed with subtropical moisture. Based on historical norms, severe flooding is most likely to occur during strong El Niño events, which generally occur every 2 to 7 years. However, UCLA's Center for Climate Science reports that by year 2100 extreme wet years will occur 2.25 times more frequently than the 1895 to 2017 frequency rate of 4 times in every 100 years in

Table 4-13: Flood Profile

Profile	Description
	Northern California (including the Lake Tahoe Basin). Additionally, according to the VAIS, climate projections for flooding show a modest increase in the intensity of extreme flood events by mid-century in the areas south and west of Lake Tahoe. If emissions aren't curbed by the end of the century, these models indicate that there may be a significant increase in these flood events.

Table 4-14: Flood Vulnerability

Vulnerability	
TTD	• The proposed Homewood mobility hub is located in a SFHA (1 percent annual chance flood). • The proposed Sugar Pine and Meyers MH/TCs are in watersheds with expected streamflow increases of 15 percent or greater by the end of the century when modeled by the RCP4.5 scenario. These assets are also in watersheds with expected streamflow changes of 61 percent or greater by the end of the century when modeled by the RCP8.5 scenario.
Tahoe RCD	• Johnson Meadow ($8,324,450) and Johnson Meadow signage and tools ($2,800) are located in a high-risk (1 percent annual chance) flood hazard area. • Johnson Meadow ($8,324,450) is also located in a moderate risk (0.2 percent annual chance) flood hazard area. • Meyers inspection station (($608,500), Shakori meteorological monitoring station ($4,000), Johnson Meadow ($8,324,450), and EC stormwater monitoring site ($16,000) are in watersheds with expected streamflow increases of 15 percent or greater by the end of the century when modeled by the RCP4.5 scenario. These assets are also in watersheds with expected streamflow changes of 61 percent or greater by the end of the century when modeled by the RCP8.5 scenario.

Table 4-15: Flood Impacts

Impacts	
TTD	• Riverine and localized flooding could cause both damage and disruption to the Lake Tahoe Basin's transportation infrastructure. Flooding can cause short duration road closures (hours) that can create traffic jams for miles (VAIS). • During high flow flooding events, the structural integrity of roads, bridges, and culverts might be damaged, which could lead to extended duration road closures. As such, significant disruption impacts – including transit reroutes, delays and cancellations – could occur (VAIS). • High flow flooding events could also jeopardize public safety for transit operators and transit riders.

Tahoe RCD	• Floodwaters and/or intense precipitation events could affect the integrity and performance of electrical equipment such as meteorological stations and stormwater monitoring sites. • Flooding could cause uncontrolled runoff, which could erode streambanks, widen stream channels, damage public property, such as Johnson Meadow, as well as private property. • Flooding could cause pollution and clouded water in Lake Tahoe.

4.7 LANDSLIDE

Table 4-16: Landslide Profile

Profile	Description
Nature	Landslide is a general term for the dislodging and fall of a mass of soil or rocks along a sloped surface or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rockfalls, rockslides, debris avalanches, debris slides, and slump-earth flows. Landslides may result from a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hilly areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also occur because of indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stabilized geologic conditions. In California, landslides range from small, shallow landslides that may mobilize into rapidly moving deadly debris flows to larger, deep-seated landslides that are capable of moving entire houses and infrastructure downslope. Cliff collapses and cliff erosion are also concerns along the coast of Northern California and, more recently, debris flows from burned areas after wildfires.
Location	In 2011, CGS created a deep-seated landslide grip map to show the relative likelihood of deep-seated landslides in California. The map combines landslide inventory, geology, rock strength, slope, average annual rainfall, and layers with earthquake shaking potential to create classes of landslide susceptibility (**Figure C-11**). According to CGS, "these classes express the generalization that on very low slopes, landslide susceptibility is low even in weak materials, and that landslide susceptibility increases with slope and in weaker rocks. Very high landslide susceptibility, classes VIII, IX, and X, includes very steep slopes in hard rocks and moderate to very steep slopes in weak rocks." The areas that are most susceptible to landsliding are predominately in the northwestern and western side of the Lake Tahoe Basin but also in a smaller area along the southern portion of the basin.
History	According to the California Department of Conservation's Reported Landslide Database, Caltrans and California Highway Patrol have reported the following landslides in the Greater Lake Tahoe Area over the past 5 years: • May 28, 2018: Over 1 meter of rocks and mud-covered part of Alpine Meadows Road in Placer County. • December 2, 2019: Large boulders covered Highway 50 near Echo Summit in El Dorado County. • April 9, 2021: Large boulders covered Highway 50 near Echo Summit in El Dorado County. • October 24, 2021: Large boulders covered Highway 50 at post mile 66.8 in El Dorado County. • March 16, 2022: A car-sized boulder and several smaller boulders covered Highway 50 near Echo Summit in El Dorado County. In addition, the Federal Government has declared multiple DRs and EMs for mudslides and landslides associated with winter storms in Placer, El Dorado, and Alpine counties (including the Lake Tahoe Basin) over the past 30 years. They are: • 1995, Severe Winter Storms, Flooding, Landslides, and Mudflows (DRs 1044 and 1046) • 1997, Severe Winter Storms, Flooding, Landslides, and Mudflows (DR 1155) • 2006, Severe Winter Storms, Flooding, Landslides, and Mudflows (DRs 1628 and 1646) • 2017, Severe Winter Storms, Flooding, and Mudslides (DR 4301) • 2019, Severe Winter Storms, Flooding, Landslides, and Mudflows (DR 4434) • 2022 – 2023, Severe Winter Storms, Flooding, Landslides, and Mudslides (DR 4683) • 2023, Severe Winter Storms, Flooding, Landslides, and Mudslides (EMs 3591 and 3592)

Table 4-16: Landslide Profile

Profile	Description
Extent / Severity	Shallow landslides are generally those that are less than 10 to 15 feet deep. When shallow landslides are sufficiently wet, they may move rapidly and can be highly mobile over long distances. Deep-seated landslides are hundreds to thousands of feet long or wide and only move fractions of an inch per year; however, during heavy rainfall events, a landslide can move several yards a minute or faster. In these areas, rocks have been weakened through faulting and fracturing, uplift, and saturated soils due to heavy or prolonged rainfall. In addition, these slippages can be exacerbated by the temperature fluctuation, known as the freeze-thaw cycle, and by ongoing drought conditions, which cause soil-water repellency. As shown on **Figure C-11**, there are 73.66 square miles (19.45 percent) of land classified as classes VIII, IX, or X that are deep-seated, very high landslide susceptibility areas on the California side of the Lake Tahoe Basin.
Future Events	Shallow landslides can occur at any time during the winter but are more likely to happen when the ground is nearly saturated, which typically occurs after the first few storms in November and December. However, deep-seated landslides are generally triggered by deep infiltration of rainfall (which can take weeks or months to occur) and therefore tend to occur toward the end of the winter season in March or April. Every federally declared landslide event reported in Placer and El Dorado counties has followed a major winter storm/rain event; therefore, it is assumed that the probability of a future landslide event will be highly tied to winter storm/rain events. Based on historical occurrences, severe winter storm conditions are likely in the Lake Tahoe Basin every 2 to 7 years. However, an increase in the frequency of intense rainfall/precipitation due to climate change will mean that extreme wet years will occur 2.25 times more frequently than the 1895 to 2017 frequency rate of 4 times every 100 years while severe storm sequences will occur five times more frequently than the 1895 to 2017 frequency rate of one time every 200 years. As noted above, the areas that are most susceptible to deep-seated landslides are predominantly in the northwestern and western side of the Lake Tahoe Basin with a smaller area along the southern portion of the basin. However, annual peak daily precipitation models for mid-century and end of the century also show that mountains west and south of Lake Tahoe will have the greatest project annual peak daily precipitation and therefore potential for increased landslide hazards.

Table 4-17: Landslide Vulnerability

Vulnerability	
TTD	• According to the IVA and as shown on **Figure C-11**, on the California side of the Lake Tahoe Basin, Highway 267 at Highway 28, Highway 89 at Highway 28, and Highway 89 and Highway 50 are most vulnerable to landslides. • 1952 US 50/Al Tahoe Blvd (US Bank) and 2012 US 50/Johnson Blvd (Safeway) bus stops and the proposed Heavenly Resort – California and Meyers MH/TCs are all within 200 feet of a high (Class VIII, IX, or X) landslide susceptibility area.
Tahoe RCD	• The fringe area of Johnson Meadow ($8,324,450) is in a high (Class VIII, IX, or X) landslide susceptibility area.

Table 4-18: Landslide Impacts

Impacts	
TTD	• Landslides, debris flows, rockfalls, and other associated hazards could damage and/or block major highways and local roads, transit stops, and parking lots. This could result in transit reroutes, delays and cancellations and block transit users from getting to their destinations.
Tahoe RCD	• Landslides, debris flows, rockfalls, and other associated hazards could damage meteorological stations and stormwater monitoring sites. • Landslides could result in ecological disturbances such as forest destruction and grassland degradation.

4.8 WILDFIRE

Table 4-19: Wildfire Profile

Profile	Description
Nature	Wildfires spread by consuming flammable vegetation. This type of fire often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles away. Wildfires can be caused by human activities (e.g., unattended burns, campfires, or off-road vehicles without spark-arresting mufflers) or by natural events such as lightning. Wildfires often occur in forests or other highly vegetated areas. In addition, wildfires can be classified as forest, urban, interface or intermix, and prescribed burns. The following three factors (topography, fuel, and weather) contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas: • Topography describes slope increases, which influence wildfire spread rate increases. South-facing slopes are subject to more solar radiation than slopes facing other directions, so south-facing slopes tend to be drier and thereby intensify wildfire behavior. However, ridge tops may mark the end of wildfire spread because fire spreads more slowly (or may even be unable to spread) downhill. • Fuel refers to the type and condition of vegetation; fuel plays a significant role in wildfire spread. Certain plant types are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available as fire fuel (referred to as the "fuel load"). The living-to-dead plant matter ratio is also important. Certain climate changes may increase wildfire risk significantly during prolonged drought periods because the moisture content of both living and dead plant matter decreases. Both the horizontal and vertical fuel load continuity is also an important factor. • Weather is the most variable factor affecting wildfire behavior. Temperature, humidity, wind, and lightning can affect ignition opportunities and fire spread rate. Extreme weather (such as high temperatures and low humidity) can lead to extreme wildfire activity. Climate change increases the susceptibility of vegetation to ignition due to longer dry seasons. By contrast, cooling temperatures and higher humidities often signal reduced wildfire occurrence and easier containment. Wildfire frequency and severity sometimes result from other hazard impacts such as lightning, drought, and infestations. If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildfires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter. Indirect wildfire effects can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources; large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and exacerbate river and stream siltation; thereby increasing flood potential, harming aquatic life, and degrading water quality. Vegetation-stripped lands are also more susceptible to increased debris flow hazards.
Location	According to VAIS, the current wildfire threat in the Lake Tahoe Basin is generally highest "within a few miles of the Lake Tahoe shoreline and along stream corridors, particularly in the Crystal Bay, Kings Beach, Emerald Bay, Fallen Leaf Lake, South Lake Tahoe, and Glenbrook areas and along Truckee River, Ward Creek, Upper Truckee River, and Tunnel Creek."
History	As shown on **Figure C-12,** the Greater Lake Tahoe Area has experienced 21 wildfires of greater than 5,000 acres since record keeping began nearly 100 years ago. The Federal Government has declared the following DRs for wildfires in Placer, El Dorado, or Alpine counties over the past 20 years:

Table 4-19: Wildfire Profile

Profile	Description
	• 2002, Sierra Fire (DR 2463) • 2004, CA-Stevens Fire 08-8-2004 (DR 2541) • 2004, CA-Hollow Fire 07-14-2004 (DR 2532) • 2007, Angora Fire (DR 2700) • 2008, Gladding Fire (DR 2786) • 2009, 49 Fire (DR 2832) • 2014, Applegate Fire (DR 5082) • 2021, Caldor Fire (DRs 3571 and 5413) • 2021, River Fire (DR 5405) • 2021, Wildfires (DRs 4610 and 4619) • 2022, Mosquito Fire (DR 5453) One of the most destructive fires in the Lake Tahoe Basin in recent history was the Angora Fire (DR 2700). The Angora Fire was started near the North Upper Truckee Road subdivision near Angora Lakes, Fallen Leaf Lake, Echo Lake, and South Lake Tahoe by an illegal campfire on June 24, 2007. The fire burned 254 structures and 3,100 acres by the time it was contained on July 2, 2007.
Extent/ Severity	CAL FIRE's Fire Resource and Assessment Program (FRAP) provides vital data on California's forests and rangelands through a variety of mapping tools. The FRAP Fire Hazard Severity Zone (FHSZ) maps fire hazards based on factors such as fuel, terrain, and weather. The FHSZ areas are represented as Moderate, High, and Very High. The maps are divided into local responsibility areas (LRAs) and state responsibility areas (SRAs). LRAs generally include cities, cultivated agriculture lands, and portions of the desert. LRA fire protection is typically provided by city fire departments, fire protection districts, counties, and by CAL FIRE under contract to the local government. SRA is a legal term defining the area where the state has financial responsibility for wildfire protection. As shown on **Figure C-13**, there are 55.29 square miles (14.60 percent) on the California side of the Lake Tahoe Basin (excluding Alpine County) that are in a high or very high FHSV in the SRA. On the California side of the Lake Tahoe Basin, these areas include South Lake Tahoe and Emerald Bay up to the Nevada border. It is important to note that the CAL FIRE FHSZ maps do not include FHSZs for Federal Responsibility Areas. Over the past few years, CAL FIRE has been creating a new FHSZ model to reflect areas susceptible more accurately to wildfire. The updated model considers new climate data and improved assessment modeling, such as fire intensity scores based on the most extreme fire weather at a given location, temperature, humidity, and wind speed. According to CAL FIRE, since 2007, very high FHSZ in the SRA have increased in El Dorado County by 22 percent, in Placer County by 3 percent and in Alpine County by 2 percent. In addition to CAL FIRE, the Council of Western State Foresters and the Western Forestry Leadership Coalition use a wildfire risk assessment tool, known as the West Wide Wildfire Risk Assessment, to identify wildfire risks. The assessment includes multiple inputs, including factors "relating to the probability of fire occurrence, fire behavior, the effectiveness of fire suppression, the difficulty of suppression, and the value of impacted areas." These inputs are combined to generate the Fire Threat Index (FTI), which identifies the likelihood of an acre burning. As shown on **Figure C-14**, there are 29.91 square miles (12.36 percent) on the California side of the Lake Tahoe Basin (excluding Alpine County) that are identified as having a high or very high FTI. There are an additional 7.91 square miles (2.14 percent) that are identified as having a severe FTI.
Future Events	Based on historical occurrences, the Lake Tahoe Basin can expect to experience a wildfire of 5,000 acres or greater at least once every five years. However, according to to UCLA's Center for Climate Science, climate probabilities for year 2100 in Northern California (including the Lake Tahoe Basin) show that extreme dry years will occur 1.8 times more frequently than the 1895 to 2017 frequency rate of one time every 100 years in Northern California.

Table 4-19: Wildfire Profile

Profile	Description
	In addition, according to the VAIS, climate projections for wildfires include: • The fire intensity in the Lake Tahoe Basin is projected to increase in the mountains west and south of Lake Tahoe in all scenarios. • The average annual burned acreage in the Lake Tahoe Basin portion of El Dorado County is projected to remain about the same in mid-century and end of the century. However, baseline level of wildfire threat is already high, very high or extreme throughout much of the county, so unchanged fire threat in the future is still elevated for many areas. • The average annual burn acreage in the Lake Tahoe portion of Placer County is generally projected to increase in the western part and decrease in the northern part. While the baseline level of wildfire threat is moderate or higher for roughly half of the county, the highest levels of current fire hazard concentrated near Kings Beach and Tahoe Vista.

Table 4-20: Wildfire Vulnerability

• Vulnerability	
TTD	• According to the IVA and as shown on **Figure C-13**, on the California side of the Lake Tahoe Basin, Highway 267 at Highway 28, Highway 89 at Highway 28, and Highway 89 and Highway 50 are most vulnerable to very high to extreme wildfire risk. • The following bus stops with an estimated value of unknown to $30,000 each are located in high and very high FHSZs: 1952 US 50/Al Tahoe Blvd (US Bank),1959 US 50/Bigler Ave,1983 US 50/Lyons Ave (Middle School), 1985 US 50/Takela Dr (Bank of America), 2011 US 50/Rufus Allen Blvd (County Library), 2012 US 50/Johnson Blvd (Safeway), 2055 US 50/Wildwood Ave, 2085 South Y Transit Center, 2111 Stateline Transit Center, 4148 Spruce Ave/Herbert Ave, 4159 US 50/Tallac Ave (Visitor/Senior Center), 4168 Ski Run Blvd/Spruce Ave (Terry), 4214 Pioneer Trail/Shepherds Rd, 4217 Pioneer Trail/Aspenwald Rd, 4231 Pioneer Trail/Moss Rd, 4233 US 50/Pioneer Trail (Holiday Inn Express), 4356 Pioneer Trail/Moss Rd (7-11), 5004 US 50/Wildwood Ave, 5016 Pioneer Trail/Glen Dr, 5017 Ski Run Blvd/Willow Ave, and 5023 Al Tahoe/US 50 (LTUSD Offices). • 4042 South Ave/3rd St (Barton Hospital), 4052 3rd St (Tahoe Senior Plaza), 4173 US 50/San Jose Ave (Lakeview Commons), 4215 US 50/Ski Run Blvd all have an estimated value of $100,000 and are located in high and very high FHSZs. 4159 US 50/Tallac Ave (Visitor/Senior Center) worth an estimated $250,000 is in a high and very high FHSZ as well. • In addition, 5006 US 50/Fairway Ave (Hotel Elevation) ($30,000) bus stop is within 200 feet of the high and very high FHSZs. • The proposed South Lake Tahoe cross-lake ferry terminal, proposed Harrison Ave., Meyers, and Sugar Pine MH/TCs, proposed Homewood mobility hub, and proposed Tahoma transit center are in high and very high FHSZs. The current Maintenance building and yard and the Lake Tahoe Community College mobility hub ($1,450,562) are also located in this hazard area. • TTD does not have any critical assets in the high or very FTI hazard areas. However, the proposed Heavenly Resort – California is located within the extreme FTI hazard area.

Tahoe RCD	• The Administration building, Lake Forest launch ramp ($47,500), Meyers and Spooner Summit inspection stations ($608,500 each), Johnson Meadow ($8,324,450), Bellevue, EDYC, Hatchery, Shop, and Shakori meteorological monitoring stations ($4,000 each), and EC, Speedboat, Tahoma, TD, TV, and UT stormwater monitoring sites ($16,000 each) are in high and very high FHSZs. • Tahoe RCD does not have any critical assets in the high, very high or extreme FTI hazard areas.

Table 4-21: Wildfire Impacts

Impacts	
TTD	• Wildfires could damage and/or block major highways and access to local roads, transit stops, and parking lots thereby resulting in transit delays, reroutes and cancellations. • Wildfire smoke could severely reduce roadway visibility, thereby increasing public transit headways and evacuation times. • Wildfires could change vegetation and soil chemistry so that when it eventually rains, it can increase the chance of infrastructure washout. • According to the VAIS, in rare cases wildfires could cause structural damage to roads, bridges and culverts.
Tahoe RCD	• Wildfires could destroy the built environment, such as homes and businesses. • Wildfires could result in ecological disturbances such as forest destruction and grassland degradation. • Intense wildfires could destroy the vegetation and root systems on slopes that serve the dual purpose of absorbing moisture and holding soil in place. • Wildfires could destroy electrical equipment such as meteorological stations and stormwater monitoring sites.

4.9 WINTER STORM

Table 4-22: Winter Storm Profile

Profile	Description
Nature	In a winter storm event, snow, sleet, and/or freezing rain may be accompanied by high winds and cold temperatures. A winter storm can range from a moderate snow over a few hours to blizzard conditions with blinding, wind-driven snow that lasts several days. Some winter storms may be large enough to affect several states, though others may affect only a single community. In more temperate continental climates such as California, these storms are not necessarily restricted to the winter season and may occur in the late autumn and early spring as well. Winter storms are also more likely to cause avalanches. According to the USFS, approximately 80 percent of all avalanches occur during and shortly after winter storms. Snow falling at a rate of 1 inch or more per hour increases avalanche danger. Winter storms that start with low temperatures and dry snow and are followed by rising temperatures and heavy, wet snow are more likely to cause avalanches as the dry snow cannot support the heavy, wet snow. In addition, sustained winds of 15 miles per hour (mph) or more increases avalanche danger on the leeward side of the mountain (away from the wind) because of heavy accumulation of snow caused by wind deposition.
Location	All of the Lake Tahoe Basin is susceptible to the hazards of a winter storm. As shown on **Figure C-15**, the higher elevations of the windward side (western side) of the Sierra Nevada are most susceptible to snowfall because of the orographic lifting that occurs as Pacific storms move from lower elevations in the west to higher elevations in the east. As shown on **Figure C-16**, avalanches are most common in areas with 30-to-45-degree slopes with peak snowpack. As noted in VAIS, El Dorado County contains the greatest number of avalanche slope hazard areas in the Lake Tahoe Basin.
History	According to the NOAA Storm Events Database for the Greater Lake Tahoe Area zone, the following events were recorded from January 1, 1950, to December 31, 2022: 19 winter storm events and three blizzard events. The database cannot handle large queries, so the query timeframe for heavy snow events was limited from January 1, 2012, to December 31, 2022. Over this 10-year period, 128 heavy snow events were recorded in the Greater Lake Tahoe Area zone. In addition, the database lists 14 recorded avalanche events for the Greater Lake Tahoe Area zone since 1996. The database does not go far enough back to include the most notable avalanche in the Lake Tahoe Basin in recent history: On March 31, 1982, several days into a late-season winter storm, a massive avalanche tore through the base area of Alpine Meadows Ski Area, resulting in seven deaths and causing millions of dollars of damage to the ski resort. Since 1995, the Federal Government has declared several DRs and EMs for winter storms in and around the Lake Tahoe Basin for Placer, El Dorado, and/or Alpine counties, including: • 1995, Severe Winter Storms, Flooding, Landslides, and Mudflows (DRs 1044 and 1046) • 1997, Severe Winter Storms, Flooding, Landslides, and Mudflows (DR 1155) • 2006, Severe Winter Storms, Flooding, Landslides, and Mudflows (DRs 1628 and 1646) • 2017, Severe Winter Storms, Flooding, and Mudslides (DRs 4301, 4305, and 4308) • 2019, Severe Winter Storms, Flooding, Landslides, and Mudflows (DR 4434) • 2022 – 2023, Severe Winter Storms, Flooding, Landslides, and Mudslides (DR 4683) • 2023, Severe Winter Storms, Flooding, Landslides, and Mudslides (EMs 3591 and 3592)
Extent / Severity	The National Weather Service winter storm warnings for the Lake Tahoe Basin are generally issued for heavy snow (1 to 2 inches per hour) and gale force winds (sustained winds or frequent gusts between 39 and 54 mph, with ridgetop winds sometimes reaching over 100 mph). Often, winter storm warnings also include an urban and small stream flood advisory for low-lying and poor drainage areas where the snow may turn quickly into freezing rain or rain. In addition, avalanche warnings from the USFS Sierra Avalanche Center often accompany National Weather Service winter storm warnings, as several feet of new snow and strong winds often create

Table 4-22: Winter Storm Profile

Profile	Description
	dangerous avalanche conditions in the mountains. There are 24.42 square miles (0.06 percent) of steep slopes (30 to 45 degrees) within the California side of the Lake Tahoe Basin.
Future Events	According to UCLA's Center for Climate Science, climate probabilities in Northern California (including the Lake Tahoe Basin) by the year 2100 show more weather extremes, including: • Dry-to-wet whiplash will occur 1.25 times more frequently than the 1895 to 2017 frequency rate of four times every 100 years. • Extreme wet years will occur 2.25 times more frequently than the 1895 to 2017 frequency rate of four times every 100 years. • Severe storm sequences will occur five times more frequently than the 1895 to 2017 frequency rate of one every 200 years. In addition to more extreme weather events, Tahoe Climate Research Center notes climate change effects on winters in the Lake Tahoe Basin by the 21st century will also include: • Less desirable snow conditions • Fewer days with below-freezing temperatures • Decreasing snowpack • Snowline rising to higher elevations • Low-to-no snow winters The Tahoe Climate Research Center also states that Lake Tahoe Basin could experience episodic low-to-no snow (when more than half of a mountain basin experiences low-to-no snow for five consecutive years) as soon as the late 2040s and persistent low-to-no snow (when more than half of a mountain basin experiences low-to-no-snow 10 consecutive years) by the 2060s.

Table 4-23: Winter Storm Vulnerability

Vulnerability	
TTD	• All of TTD's critical assets are vulnerable to winter storms which generally include heavy snowfall and gale force winds. • In addition, 1985 US 50/Takela Dr (Bank of America) ($30,000) and 2011 US 50/Rufus Allen Blvd (County Library) ($250,000) bus stops, the proposed Heavenly Resort – California mobility hub and the proposed Diamond Peak and Meyers MH/TC are in avalanche hazard slope zones.
Tahoe RCD	• All of Tahoe RCD's critical assets are vulnerable to winter storms which generally include heavy snowfall and gale force winds. • The fringe area of Johnson Meadow ($8,324,450) and the Pasadena Outflow stormwater monitoring site ($16,000) are also in avalanche hazard slope zones.

Table 4-24: Winter Storm Impacts

Impacts	
TTD	• Snow, flooding, avalanches, landslides, and high winds associated with large winter storms could cause damage to and/or block major highways and local roads, transit stops, and parking lots and can also cause transit delays, reroutes and cancellations. • Snow and ice could also reduce pavement friction and vehicle maneuverability thereby causing slower speeds, reduced roadway capacity, and increased crash risk.
Tahoe RCD	• Snow, flooding, avalanches, landslides, and high winds associated with large winter storms could damage meteorological stations and stormwater monitoring sites. • Snow, flooding, avalanches, landslides, and high winds associated with large winter storms could result in ecological disturbances such as forest destruction and grassland degradation.

4.10 NATIONAL FLOOD INSURANCE PROGRAM-INSURED STRUCTURES (B4)

TTD and Tahoe RCD are not eligible to participate as local communities in the National Flood Insurance Program (NFIP), and as such, they do not have any NFIP-insured structures.

5.0 MITIGATION STRATEGY

This section addresses Element C – Mitigation Strategy of the Local Mitigation Plan Regulation Checklist.

Element C: Mitigation Strategy	
C1.	Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))
C1-a.	Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?
C1-b.	Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?
C2.	Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))
C2-a.	Does the plan contain a narrative description or a table/list of their participation activities?
C3.	Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))
C3.-a.	Does the plan include goals to reduce the risk from the hazards identified in the plan?
C4.	Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))
C4-a.	Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?
C4-b.	Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?
C5.	Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
C5-a.	Does the plan describe the criteria used for prioritizing actions?
C5-b.	Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?

5.1 AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES (C1)

Lists of TTD's and Tahoe RCD's existing authorities, policies, programs, and financial resources available for hazard mitigation are provided in **Appendix D (Tables D-1** through **D-3)** and **Appendix E (Tables D-1** through **D-3)**, respectively. In California, the State delegates most local land use and development authorities and decisions to cities and counties (not districts), and therefore a discussion of existing building codes and land use development ordinances and regulations is not included in these capability assessments.

Appendices D and **E** also identify each district's respective ability to expand and improve on its hazard mitigation capabilities, when possible (**Table D-4** and **Table E-4**).

5.2 NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION (C2)

The NFIP aims to reduce the impact of flooding on residential and nonresidential buildings by providing insurance to property owners and encouraging communities to adopt and enforce floodplain management regulations. Participation in the NFIP is based on an agreement between local communities and the Federal Government. TTD and Tahoe RCD are not eligible to participate in the NFIP.

5.3 MITIGATION GOALS (C3)

Mitigation goals are defined as general guidelines that explain what TTD and Tahoe RCD want to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing a community-wide vision. The Tahoe Climate Resilience Action Strategy provided the basis for the goals for the 2023 HMP. The four goals are:

- Build sustainable recreation and transportation systems to prepare for/mitigate from hazards identified in this plan, including climate change, dam failure, drought, earthquake, flood, landslide, wildfire, and winter storm.
- Upgrade infrastructure and protect vulnerable communities from hazards identified in this plan, including climate change, dam failure, drought, earthquake, flood, landslide, wildfire, and winter storm.
- Reduce wildfire risk and build forest resilience.
- Increase watershed resilience and biodiversity.

5.4 DRAFT MITIGATION ACTION LIST (C4)

Mitigation actions help achieve the goals of the 2023 HMP. A list of recommended draft mitigation actions is provided for TTD in **Appendix D (Table D-5)** and for Tahoe RCD in **Appendix E (Table E-5)**.

Projects listed include local planning, structure and infrastructure projects, natural systems protection, and educational and awareness programs. In addition, projects have been developed for preparedness, response and recovery activities. The draft mitigation actions are based on the plan's risk assessment, lessons learned from recent disasters, FEMA success stories and best management practices, FEMA job aids, local and regional plans and reports, and input from the advisory committee and other relevant practitioners.

For each mitigation action, an overview of the project, the hazards it addresses, the building and infrastructure it protects, the associated benefits and costs, and the project source are provided.

As required, at least one mitigation action has been developed to address each hazard profiled in this plan.

TTD mitigation action items are broken down as follows:

- Climate change mitigation actions # 3, 4 and 11
- Dam failure mitigation action # 11
- Drought mitigation actions # 4 and 11
- Earthquake mitigation actions # 3, 4, 10, and 11
- Flood mitigation actions # 3, 4, 10, and 11
- Landslide mitigation actions # 4 and 11
- Wildfire mitigation actions # 3, 4 and 11

- Winter storm mitigation actions # 3, 4 and 11

In addition, TTD has developed preparedness, response and recovery actions # 1, 2, 5, 6, 7, 8, and 9.

Tahoe RCD mitigation action items are broken down as follows:

- Climate change mitigation actions # 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15
- Dam failure mitigation actions #1 and 14
- Drought mitigation actions # 1, 2, 10, 13, and 15
- Earthquake mitigation actions # 3 and 14
- Flood mitigation actions # 1, 2, 3, 4, 11, 12, 14, and 15
- Landslide mitigation actions # 3 and 14
- Wildfire mitigation actions # 3, 6, 7, 8, 9, 10, 13, and 14
- Winter storm mitigation actions # 3 and 14

5.5 FINALIZED MITIGATION ACTION PLAN (C5)

A finalized mitigation action plan is an itemized list of mitigation actions that each district hopes to put into practice to reduce its risks and vulnerabilities.

For the 2023 HMP, a two-tier "high and highest" prioritization process was created based on the following:

- Highest priority mitigation actions are those that address hazards of immediate concern and are also cost-effective (as described in the Draft Mitigation Action tables as "benefits / costs") and have an identified funding source.
- High mitigation actions are those that address hazards that are not of immediate concern and/or those that are of immediate concern but are not as cost-effective and/or do not have an identified funding source.

TTD and Tahoe RCD determined the hazards and threats of immediate concern based on the 2023 HMP's hazard profiles, risk assessments, and capability assessments, as follows:

- TTD: climate change, earthquake, flood, wildfire, and winter storm
- Tahoe RCD: climate change, drought, flood, wildfire, and winter storm

The results of the above prioritization process are provided in **Appendix D (Table D-6)** and **Appendix E (Table E-6)**. For each mitigation action listed, potential funding sources, responsible departments or agencies, and implementation timelines have been identified.

6.0 PLAN MAINTENANCE

This section addresses Element D – Plan Maintenance of the Local Mitigation Plan Regulation Checklist.

Element D: Plan Maintenance	
D1.	Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))
D1-a.	Does the plan describe how communities will continue to seek future public participation after the plan has been approved?
D2.	Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))
D2-a.	Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?
D2-b.	Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible
D2-c.	Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?
D3.	Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))
D3-a.	Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?
D3-b.	Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?
D3-c.	For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?

6.1 CONTINUED PUBLIC PARTICIPATION (D1)

A copy of the 2023 HMP will be available on TTD's and Tahoe RCD's websites, along with contact information for the HMP project Manager. Additionally, the HMP project manager will use the TTD website and social media accounts to notify the public of, and seek input on, any changes or updates to the 2023 HMP, including the implementation of the mitigation action plans and the 2028 HMP kickoff.

6.2 PLAN EVALUATION PROCESS, UPDATE METHOD AND SCHEDULE (D2)

The HMP project manager will complete the Annual Review Tracker every January and to ensure that the 2023 HMP is relevant and effective in achieving the plan's goals. The HMP project manager will ask for and/or receive input from specific advisory committee members during this evaluation process, as needed. Annual reviews will be tracked in a table in this document (**Table 6-1**).

In addition, FEMA-funded mitigation projects will continue to be tracked and reviewed by each project lead using FEMA Mitigation Progress Report or other similar forms. The project lead will submit these progress summaries to the HMP project manager annually and the HMP project manager will include in/attached to Annual Review Tracker (**Table 6-1**).

The HMP project manager will kick off the 2028 HMP in January 2028 with the following activities:

- The HMP project manager will reconvene the advisory committee and update membership, if necessary.
- The advisory committee will review **Table 6-1**, which provides annual summaries of the disasters that have occurred; new permanent information that has become available; implementation measures; and public outreach and response to determine the hazards and other related information to be included in the 2028 HMP.
- The HMP project manager will develop a new work plan.
- The HMP project manager—with support from the advisory committee—will begin the plan update process, which is expected to take up to 6 months.

Table 6-1: Annual Review Tracker

Review Period	Disasters That Occurred	Mitigation Actions Implemented	New Relevant Studies/Reports to Include in 2028 HMP	Public Outreach Conducted	Changes Made to 2023 HMP and/or Changes Needed to be Made to the 2028 HMP
Review of 2024					
Review of 2025					
Review of 2026					
Review of 2027					

6.3 PLAN INTEGRATION (D3)

Identification of how the 2023 HMP will be integrated into both TTD-specific and Tahoe RCD-specific relevant plans and programs moving forward is also provided in **Appendix D (Table D-7)** and **Appendix E (Table E-7)**.

7.0 PLAN UPDATE

This section addresses Element E – Plan Update of the Local Mitigation Plan Regulation Checklist.

Element E: Plan Update	
E1.	Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))
E2.	Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))
E2-a.	Does the plan describe how it was revised due to changes in community priorities?
E2-b.	Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?
E2-c.	Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?

The 2023 HMP is a new plan and not a plan update. Therefore, Element E is not addressed in the 2023 HMP.

8.0 PLAN ADOPTION

This section addresses Element F – Plan Adoption of the Local Mitigation Plan Regulation Checklist.

Element F: Plan Adoption	
F1.	For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))
F1-a.	Does the participant include documentation of adoption?
F2.	For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))
F2-a.	Did each participant adopt the plan and provide documentation of that adoption?

8.1 FORMAL ADOPTION (F1 – F2)

The 2023 HMP was adopted by the TTD Board of Directors on X date and by the Tahoe RCD Board of Directions on X date.

8.2 MULTI-JURISDICTIONAL ADOPTION (F2)

A copy of the TTD adoption resolution and Tahoe RCD adoption resolution are kept on file with each respective district, Cal OES and FEMA Region IX.

APPENDIX A—HMP CHECKLIST

Local Mitigation Plan Review Tool

Cover Page

The Local Mitigation Plan Review Tool (PRT) demonstrates how the local mitigation plan meets the regulation in 44 CFR § 201.6 and offers states and FEMA Mitigation Planners an opportunity to provide feedback to the local governments, including special districts.

1. The Multi-Jurisdictional Summary Sheet is a worksheet that is used to document how each jurisdiction met the requirements of the plan elements (Planning Process; Risk Assessment; Mitigation Strategy; Plan Maintenance; Plan Update; and Plan Adoption).
2. The Plan Review Checklist summarizes FEMA's evaluation of whether the plan has addressed all requirements.

For greater clarification of the elements in the Plan Review Checklist, please see Section 4 of this guide. Definitions of the terms and phrases used in the PRT can be found in Appendix E of this guide.

Plan Information	
Jurisdiction(s)	Tahoe Transportation District and Tahoe Resource Conservation District
Title of Plan	Tahoe Transportation District and Tahoe Resource Conservation District 2023 Hazard Mitigation Plan
New Plan or Update	New Plan
Single- or Multi-Jurisdiction	Multi-jurisdiction
Date of Plan	10/19/2023
Local Point of Contact	
Title	Judi Allen, Executive Assistant
Agency	Tahoe Transportation District
Address	P.O. Box 499 Zephyr Cove, NV 89448
Phone Number	775-589-5500
Email	jallen@tahoetransportation.org

Additional Point of Contact	
Title	Anna Davis, Senior Urban Planner
Agency	AECOM
Address	2020 L St, Sacramento, CA 95811
Phone Number	415-994-5157
Email	anna.davis@aecom.com

Review Information	
State Review	
State Reviewer(s) and Title	Click or tap here to enter text.
State Review Date	Click or tap to enter a date.
FEMA Review	
FEMA Reviewer(s) and Title	Click or tap here to enter text.
Date Received in FEMA Region	Click or tap to enter a date.
Plan Not Approved	Click or tap to enter a date.
Plan Approvable Pending Adoption	Click or tap to enter a date.
Plan Approved	Click or tap to enter a date.

Multi-Jurisdictional Summary Sheet

In the boxes for each element, mark if the element is met (Y) or not met (N).

#	Jurisdiction Name	A. Planning Process	B. Risk Assessment	C. Mitigation Strategy	D. Plan Maintenance	E. Plan Update	F. Plan Adoption	G. State Requirements
1	Tahoe Transportation District							
2	Tahoe Resource Conservation District							
3								
4								
5								
6								
7								
8								
9								
10								

Plan Review Checklist

The Plan Review Checklist is completed by FEMA. States and local governments are encouraged, but not required, to use the PRT as a checklist to ensure all requirements have been met prior to submitting the plan for review and approval. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been "met" or "not met." FEMA completes the "required revisions" summary at the bottom of each element to clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is "not met." Sub-elements in each summary should be referenced using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each element and sub-element are described in detail in Section 4: Local Plan Requirements of this guide.

Plan updates must include information from the current planning process.

If some elements of the plan do not require an update, due to minimal or no changes between updates, the plan must document the reasons for that.

Multi-jurisdictional elements must cover information unique to all participating jurisdictions.

Element A: Planning Process

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement 44 CFR § 201.6(c)(1))		
A1-a. Does the plan document how the plan was prepared, including the schedule or time frame and activities that made up the plan's development, as well as who was involved?	Section 2.1	Choose an item.
A1-b. Does the plan list the jurisdiction(s) participating in the plan that seek approval, and describe how they participated in the planning process?	Section 2.1	Choose an item.

Element A Requirements	Location in Plan (section and/or page number)	Met / Not Met
A2. Does the plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development as well as businesses, academia, and other private and non-profit interests to be involved in the planning process? (Requirement 44 CFR § 201.6(b)(2))		
A2-a. Does the plan identify all stakeholders involved or given an opportunity to be involved in the planning process, and how each stakeholder was presented with this opportunity?	Section 2.2	Choose an item.
A3. Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (Requirement 44 CFR § 201.6(b)(1))		
A3-a. Does the plan document how the public was given the opportunity to be involved in the planning process and how their feedback was included in the plan?	Section 2.3, Appendix B	Choose an item.
A4. Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement 44 CFR § 201.6(b)(3))		
A4-a. Does the plan document what existing plans, studies, reports and technical information were reviewed for the development of the plan, as well as how they were incorporated into the document?	Section 2.4	Choose an item.
ELEMENT A REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element B: Risk Assessment

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (Requirement 44 CFR § 201.6(c)(2)(i))		
B1-a. Does the plan describe all natural hazards that can affect the jurisdiction(s) in the planning area, and does it provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area?	Overview: Section 4.1. identifies hazards addressed in this HMP. A description of each hazard is included in Sections 4.2-4.9 “nature”.	Choose an item.
B1-b. Does the plan include information on the location of each identified hazard?	Hazard location for each identified hazard is addressed in Sections 4.2 – 4.9 “location”.	Choose an item.
B1-c. Does the plan describe the extent for each identified hazard?	Extent for each identified hazard is addressed in Section 4.2 – 4.9 “extent/severity”.	Choose an item.
B1-d. Does the plan include the history of previous hazard events for each identified hazard?	Previous hazard events for each identified hazard addressed in Section 4.2 – 4.9 “history”.	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B1-e. Does the plan include the probability of future events for each identified hazard? Does the plan describe the effects of future conditions, including climate change (e.g., long-term weather patterns, average temperature and sea levels), on the type, location and range of anticipated intensities of identified hazards?	Probability of future events for each identified hazard addressed in Section 4.2 – 4.9 "future events".	Choose an item.
B1-f. For participating jurisdictions in a multi-jurisdictional plan, does the plan describe any hazards that are unique to and/or vary from those affecting the overall planning area?	See Section 4.1., 2nd paragraph.	Choose an item.
B2. Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (Requirement 44 CFR § 201.6(c)(2)(ii))		
B2-a. Does the plan provide an overall summary of each jurisdiction's vulnerability to the identified hazards?	Overall summary of each district's vulnerability to the identified hazards is addressed in Section 4.2 – 4.9 "vulnerability" tables. Please note that as addressed in Section 3.3, Tahoe RCD does not have any current plans for future assets.	Choose an item.
B2-b. For each participating jurisdiction, does the plan describe the potential impacts of each of the identified hazards on each participating jurisdiction?	Potential impacts of each of the identified hazards on each participating district is addressed in Section 4.2 – 4.9 "impact" tables.	Choose an item.

Element B Requirements	Location in Plan (section and/or page number)	Met / Not Met
B2-c. Does the plan address NFIP-insured structures within each jurisdiction that have been repetitively damaged by floods?	Section 4.10. TTD and Tahoe RCD are not eligible to participate as local communities in the NFIP, and as such, they do not have any NFIP-insured structures.	Choose an item.
ELEMENT B REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element C: Mitigation Strategy

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C1. Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement 44 CFR § 201.6(c)(3))		
C1-a. Does the plan describe how the existing capabilities of each participant are available to support the mitigation strategy? Does this include a discussion of the existing building codes and land use and development ordinances or regulations?	Appendix D: Tables D-1 through D-3 Appendix E: Tables E-1 through E-3 Note: As stated in Section 5.1, neither plan participant/district has the authority to have building codes or land use/development ordinances.	Choose an item.
C1-b. Does the plan describe each participant's ability to expand and improve the identified capabilities to achieve mitigation?	Appendix D: Table D-4 Appendix E: Table E-4	Choose an item.

Element C Requirements	Location in Plan (section and/or page number)	Met / Not Met
C2. Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C2-a. Does the plan contain a narrative description or a table/list of their participation activities?	Not applicable	Choose an item.
C3. Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement 44 CFR § 201.6(c)(3)(i))		
C3-a. Does the plan include goals to reduce the risk from the hazards identified in the plan?	Section 5.3	Choose an item.
C4. Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement 44 CFR § 201.6(c)(3)(ii))		
C4-a. Does the plan include an analysis of a comprehensive range of actions/projects that each jurisdiction considered to reduce the impacts of hazards identified in the risk assessment?	Appendix D: Table D-5 Appendix E: Table E-5	Choose an item.
C4-b. Does the plan include one or more action(s) per jurisdiction for each of the hazards as identified within the plan's risk assessment?	Appendix D: Table D-5 Appendix E: Table E-5	Choose an item.
C5. Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (Requirement 44 CFR § 201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))		
C5-a. Does the plan describe the criteria used for prioritizing actions?	Section 5.5	Choose an item.
C5-b. Does the plan provide the position, office, department or agency responsible for implementing/administrating the identified mitigation actions, as well as potential funding sources and expected time frame?	Appendix D: Table D-6 Appendix E: Table E-6	Choose an item.

ELEMENT C REQUIRED REVISIONS
Required Revision**:** Click or tap here to enter text.

Element D: Plan Maintenance

Element D Requirements	Location in Plan (section and/or page number)	Met / Not Met
D1. Is there discussion of how each community will continue public participation in the plan maintenance process? (Requirement 44 CFR § 201.6(c)(4)(iii))		
D1-a. Does the plan describe how communities will continue to seek future public participation after the plan has been approved?	Section 6.1	Choose an item.
D2. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (Requirement 44 CFR § 201.6(c)(4)(i))		
D2-a. Does the plan describe the process that will be followed to track the progress/status of the mitigation actions identified within the Mitigation Strategy, along with when this process will occur and who will be responsible for the process?	Section 6.2	Choose an item.
D2-b. Does the plan describe the process that will be followed to evaluate the plan for effectiveness? This process must identify the criteria that will be used to evaluate the information in the plan, along with when this process will occur and who will be responsible.	Section 6.2	Choose an item.
D2-c. Does the plan describe the process that will be followed to update the plan, along with when this process will occur and who will be responsible for the process?	Section 6.2	Choose an item.
D3. Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement 44 CFR § 201.6(c)(4)(ii))		
D3-a. Does the plan describe the process the community will follow to integrate the ideas, information and strategy of the mitigation plan into other planning mechanisms?	Appendix D: Table D-7 Appendix E: Table E-7	Choose an item.
D3-b. Does the plan identify the planning mechanisms for each plan participant into which the ideas, information and strategy from the mitigation plan may be integrated?	Appendix D: Table D-7 Appendix E: Table E-7	Choose an item.
D3-c. For multi-jurisdictional plans, does the plan describe each participant's individual process for integrating information from the mitigation strategy into their identified planning mechanisms?	Appendix D: Table D-7 Appendix E: Table E-7	Choose an item.

ELEMENT D REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element E: Plan Update

Element E Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Was the plan revised to reflect changes in development? (Requirement 44 CFR § 201.6(d)(3))		
E1-a. Does the plan describe the changes in development that have occurred in hazard-prone areas that have increased or decreased each community's vulnerability since the previous plan was approved?	Not applicable	Choose an item.
E2. Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (Requirement 44 CFR § 201.6(d)(3))		
E2-a. Does the plan describe how it was revised due to changes in community priorities?	Not applicable	Choose an item.
E2-b. Does the plan include a status update for all mitigation actions identified in the previous mitigation plan?	Not applicable	Choose an item.
E2-c. Does the plan describe how jurisdictions integrated the mitigation plan, when appropriate, into other planning mechanisms?	Not applicable	Choose an item.

ELEMENT E REQUIRED REVISIONS
Required Revision: Click or tap here to enter text.

Element F: Plan Adoption

Element F Requirements	Location in Plan (section and/or page number)	Met / Not Met
F1. For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F1-a. Does the participant include documentation of adoption?	To be completed pending FEMA approval	Choose an item.
F2. For multi-jurisdictional plans, has the governing body of each jurisdiction officially adopted the plan to be eligible for certain FEMA assistance? (Requirement 44 CFR § 201.6(c)(5))		
F2-a. Did each participant adopt the plan and provide documentation of that adoption?	To be completed pending FEMA approval	Choose an item.
ELEMENT F REQUIRED REVISIONS		
Required Revision: Click or tap here to enter text.		

Element G: High Hazard Potential Dams (Optional)

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1. Did the plan describe the incorporation of existing plans, studies, reports and technical information for HHPDs?		
HHPD1-a. Does the plan describe how the local government worked with local dam owners and/or the state dam safety agency?	Click or tap here to enter text.	Choose an item.
HHPD1-b. Does the plan incorporate information shared by the state and/or local dam owners?	Click or tap here to enter text.	Choose an item.

HHPD Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD2. Did the plan address HHPDs in the risk assessment?		
HHPD2-a. Does the plan describe the risks and vulnerabilities to and from HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD2-b. Does the plan document the limitations and describe how to address deficiencies?	Click or tap here to enter text.	Choose an item.
HHPD3. Did the plan include mitigation goals to reduce long-term vulnerabilities from HHPDs?		
HHPD3-a. Does the plan address how to reduce vulnerabilities to and from HHPDs as part of its own goals or with other long-term strategies?	Click or tap here to enter text.	Choose an item.
HHPD3-b. Does the plan link proposed actions to reducing long-term vulnerabilities that are consistent with its goals?	Click or tap here to enter text.	Choose an item.
HHPD4-a. Did the plan include actions that address HHPDs and prioritize mitigation actions to reduce vulnerabilities from HHPDs?		
HHPD4-a. Does the plan describe specific actions to address HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD4-b. Does the plan describe the criteria used to prioritize actions related to HHPDs?	Click or tap here to enter text.	Choose an item.
HHPD4-c. Does the plan identify the position, office, department or agency responsible for implementing and administering the action to mitigate hazards to or from HHPDs?	Click or tap here to enter text.	Choose an item.

HHPD Required Revisions
Required Revision**:** Click or tap here to enter text.

Element H: Additional State Requirements (Optional)

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements.		
Click or tap here to enter text.	Click or tap here to enter text.	Choose an item.

Plan Assessment

These comments can be used to help guide your annual/regularly scheduled updates and the next plan update.

Element A. Planning Process

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element B. Risk Assessment

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element C. Mitigation Strategy

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element D. Plan Maintenance

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element E. Plan Update

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element G. HHPD Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

Element H. Additional State Requirements (Optional)

Strengths

- [insert comments]

Opportunities for Improvement

- [insert comments]

APPENDIX B—PLANNING PROCESS DOCUMENTS

Tahoe Basin Hazard Mitigation Plan

Danielle Hughes <dhughes@tahoetransportation.org>

Tue 12/6/2022 2:29 PM

Cc: dhughes <dhughes@tahoetransportation.org>

Good Afternoon,

The Tahoe Transportation District and Tahoe Resource Conservation District, in coordination with regional partners, are developing a Hazard Mitigation Plan (HMP). The purpose of this plan is to profile the natural and human-caused hazards in our area, building off previous local and regional efforts to determine the impacts of hazards on our multi-modal transportation system and land conservation efforts, and develop strategies to mitigate future disasters.

The planning process, a requirement of the Federal Emergency Management Agency (FEMA), which will include a public review period, is expected to occur over this winter and into early spring. Once approved by FEMA and adopted by both agencies, the Tahoe Transportation District and Tahoe Resource Conservation District will be eligible for certain types of federal funding to help create a more disaster resilient Lake Tahoe Basin. Because this plan is funded through the California Office of Emergency Services, certain requirements in the plan will only address the California side of the Lake Tahoe Basin. It is our hope that future updates of the plan will include the Nevada side of our communities.

If you would like to participate in our planning process, please contact me at the Tahoe Transportation District. You can also follow our progress on our Facebook page @TahoeTransportationDistrict.

If you would like to learn more about hazard mitigation planning, please visit: https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning

I will be sending out a follow-up email when our Public Draft HMP is available for review and comment.

Thank you,

Danielle Hughes
Capital Program Manager
Tahoe Transportation District
P.O. Box 499
Zephyr Cove, NV 89448
www.tahoetransportation.org
Direct: 775-557-4901
Cell: 530-721-1070
Office: 775-589-5500
dhughes@tahoetransportation.org

Transit | Projects | Initiatives | Explore | Parking

News & Blog

Tahoe Basin Hazard Mitigation Plan Notification
Read More >

The East Shore Express (Route 28) has ended its summer service to Sand Harbor. Thank you for riding transit!
Read More >

Paid Parking at Tahoe East Shore Trailhead Resumes for the 2022 Season
Read More >

View all News & Blog >

Meetings

5 Oct — **TTD/C Board and Finance Committee Meeting – October 5, 2022**
Read More >

7 Oct — **TTD Program Implementation Committee – October 7, 2022**
Read More >

7 Dec — **TTD/C Board Meeting – December 7, 2022**
Read More >

View all Meetings >

Service Alerts

Route 50 Reduced Frequency – September 30, 2022
Read More >

Route 22 Reduced Frequency – September 30, 2022
Read More >

Mask Mandate Change
Read More >

View all Service Alerts >

Highlights

ParkTahoe Mobile Payment Option
Pay by phone is now available!
Read More >

Now Hiring!!
New hourly wage of $22 for Transit Bus Operators.
Read More >

Fare Free for Safety
TTD rolls out fare-free service to minimize health risks to passengers and operators.
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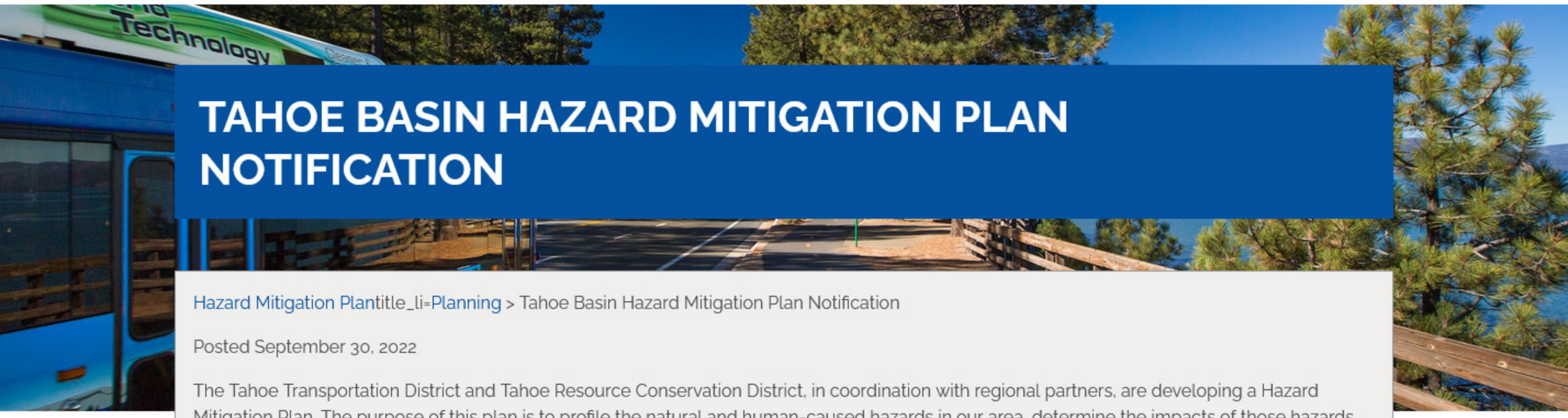
APPLY NOW

Connect
(775) 589-5500
info@tahoetransportation.org
P.O. Box 499
Zephyr Cove, NV 89448



TAHOE BASIN HAZARD MITIGATION PLAN NOTIFICATION

Posted September 30, 2022

The Tahoe Transportation District and Tahoe Resource Conservation District, in coordination with regional partners, are developing a Hazard Mitigation Plan. The purpose of this plan is to profile the natural and human-caused hazards in our area, determine the impacts of those hazards on our multi-modal transportation system and land conservation efforts, and develop strategies to mitigate future disasters.

The planning process, a requirement of the Federal Emergency Management Agency (FEMA), will include a public review period, expected to occur this winter. Once approved by FEMA and adopted by both agencies, Tahoe Transportation District and Tahoe Resource Conservation District will be eligible for certain types of federal funding to help create a more disaster resilient Lake Tahoe Basin. Because this plan is funded through the California Office of Emergency Services, certain requirements in the plan will only address the California side of the Lake Tahoe Basin. It is our hope that future updates of the plan will include the Nevada side of our community. In the meantime, to learn more about hazard mitigation, please visit: https://www.fema.gov/emergency-managers/risk-management/hazard-mitigation-planning

Hazard Mitigation Plan, Planning Edit

Leave a Reply

Logged in as Judi Allen. Log out? Required fields are marked *

Comment *

Post Comment

Tahoe Transportation District

@TahoeTransportationDistrict · Transportation Service

Send message

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Coronavirus (COVID-19) update from Tahoe Transportation District

Due to coronavirus (COVID-19), we've made changes to some of our policies, which may affect the services we provide.

About

See all

The Tahoe Transportation District (TTD) is a bi-state agency responsible for the management and implementation of safe, environmentally sound, multi-m... **See more**

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http://www.tahoetransportation.org/

(775) 589-5500

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Tahoe Transportation District
4d ·

The Tahoe Transportation District and Tahoe Resource Conservation District, in coordination with regional partners, are developing a Hazard Mitigation Plan. The purpose of this plan is to profile the natural and human-caused hazards in our area, determine the impacts of those hazards on our multi-modal transportation system and land conservation efforts, and develop strategies to mitigate future disasters.

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In the meantime, to learn more about hazard mitigation, please visit: https://www.fema.gov/.../risk.../hazard-mitigation-planning

DEPARTMENT OF HOMELAND SECURITY

FEMA

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Hazard Mitigation Planning

Hazard mitigation planning reduces loss of life and property by mi...

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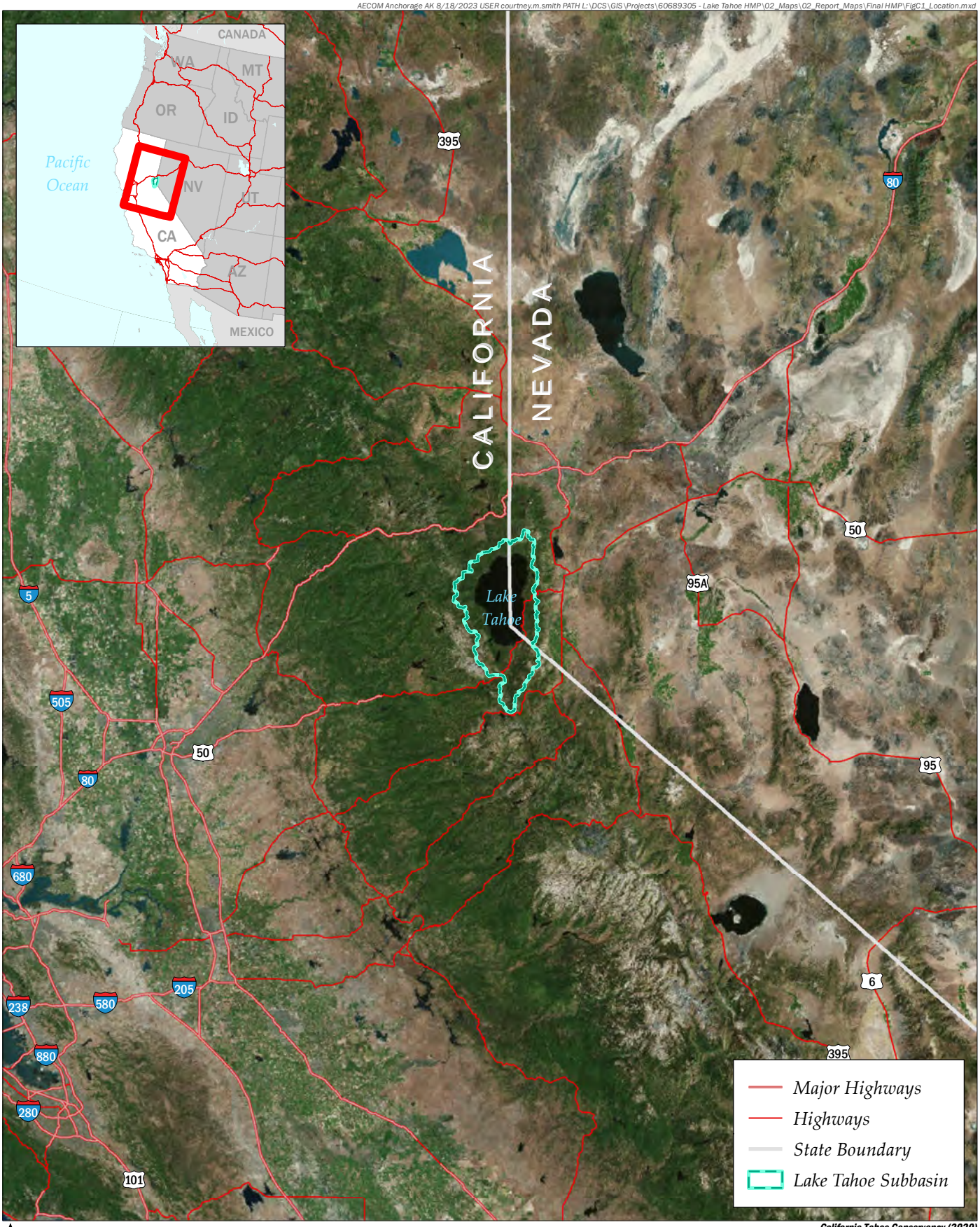
APPENDIX C—FIGURES



California Tahoe Conservancy (2020)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

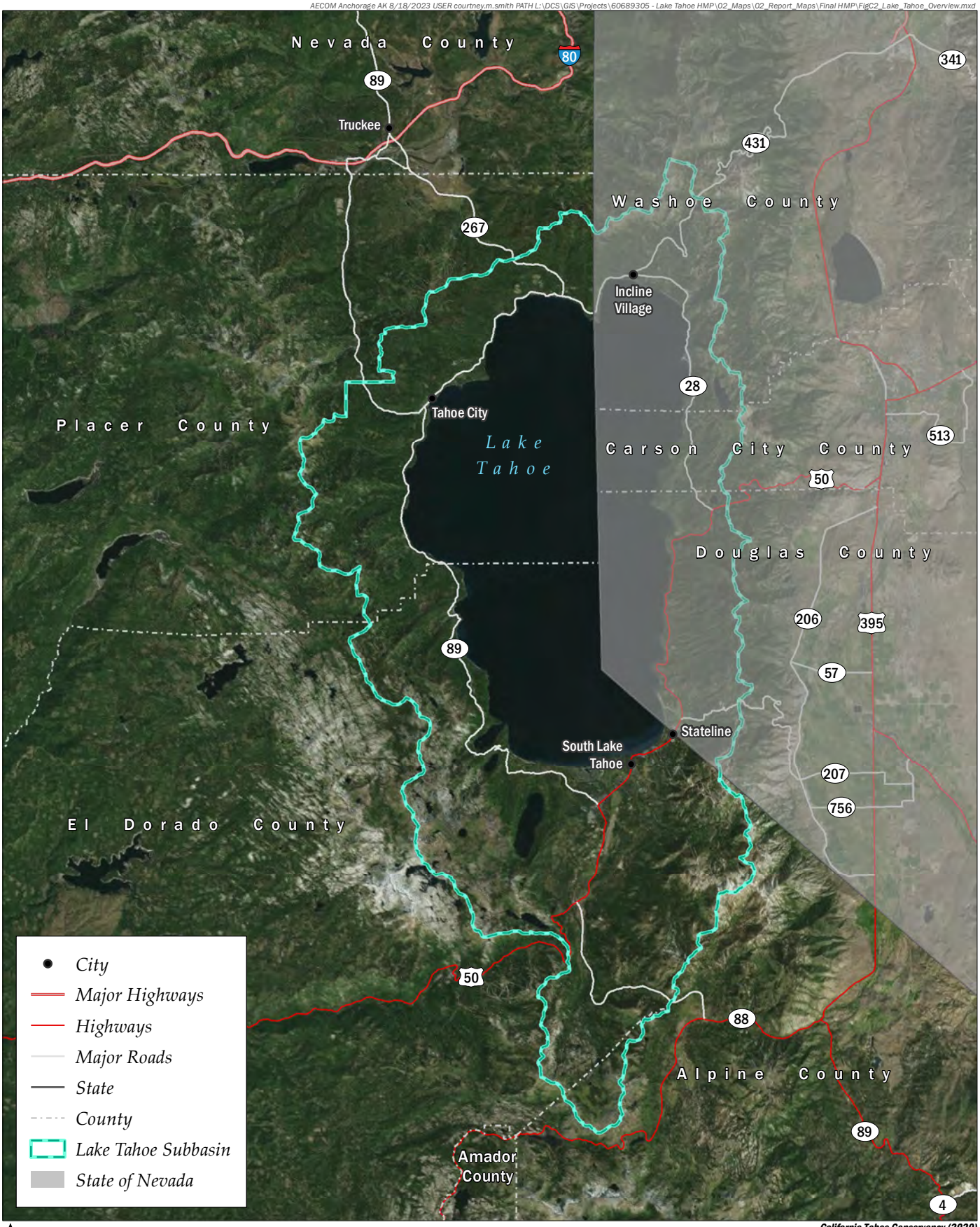
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

LOCATION

Figure C-1



California Tahoe Conservancy (2020)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

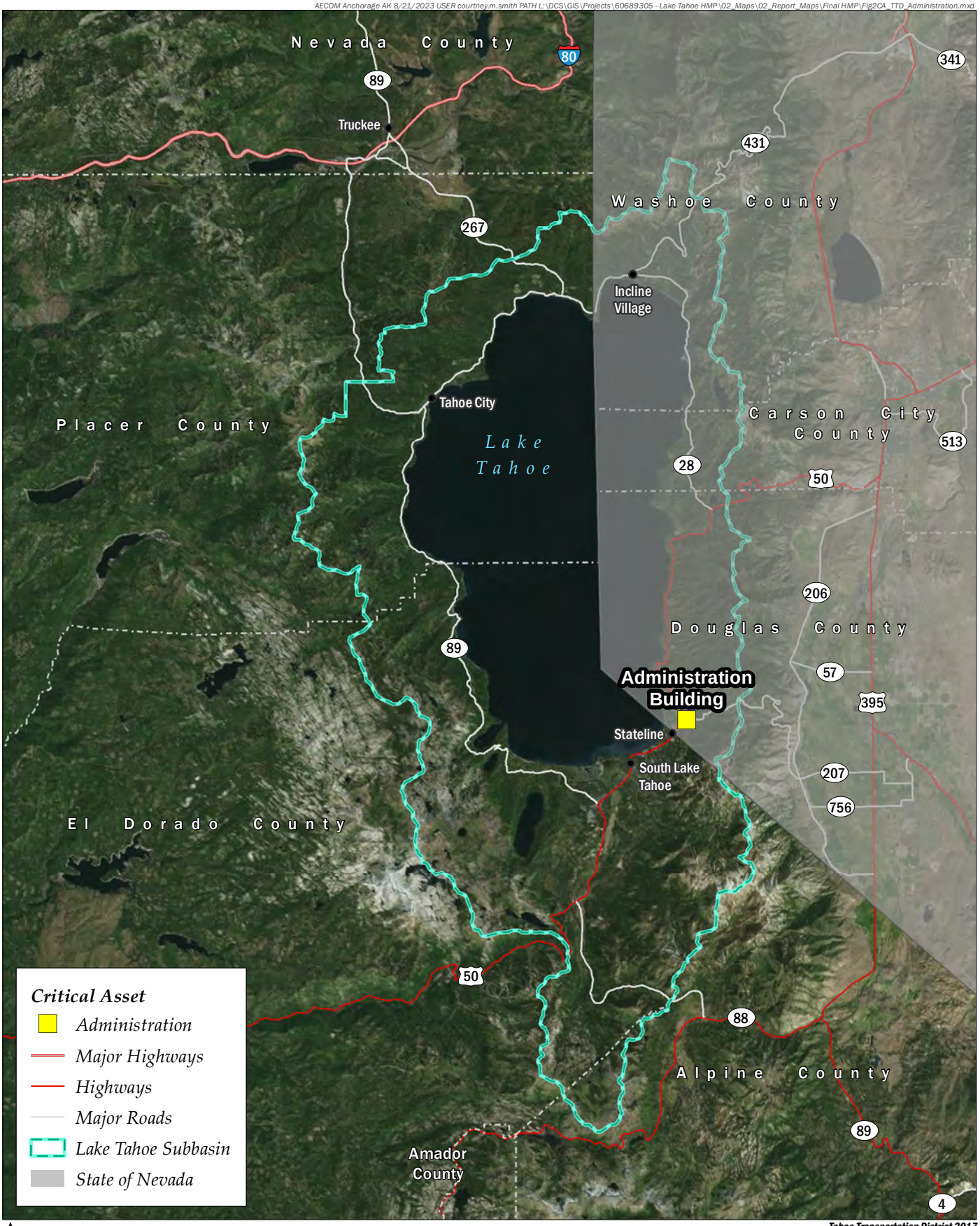
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE TRANSPORTATION DISTRICT

Figure C-2



Tahoe Transportation District 2017
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

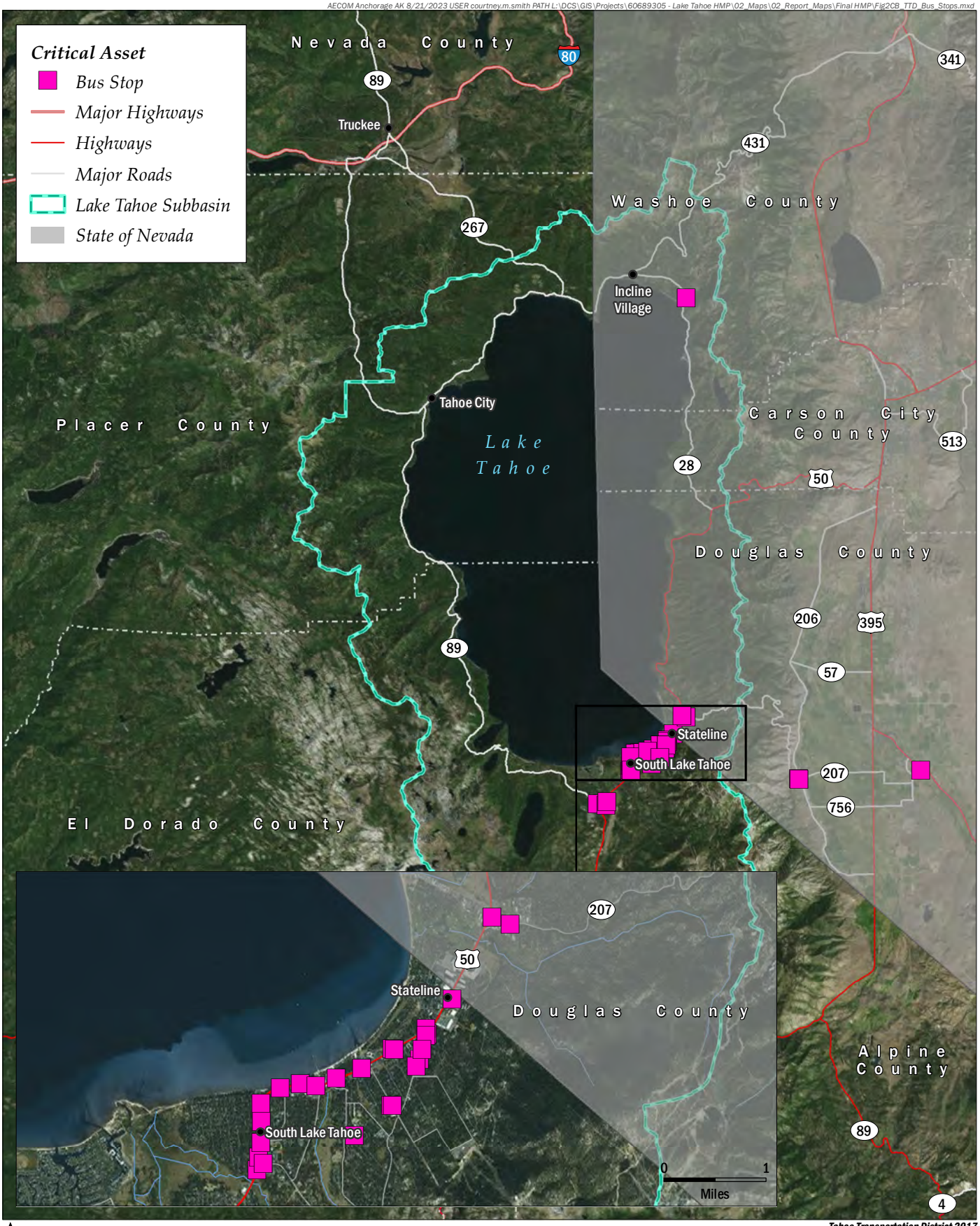
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE TRANSPORTATION DISTRICT ADMINISTRATION

Figure 2C-A



Tahoe Transportation District 2017
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

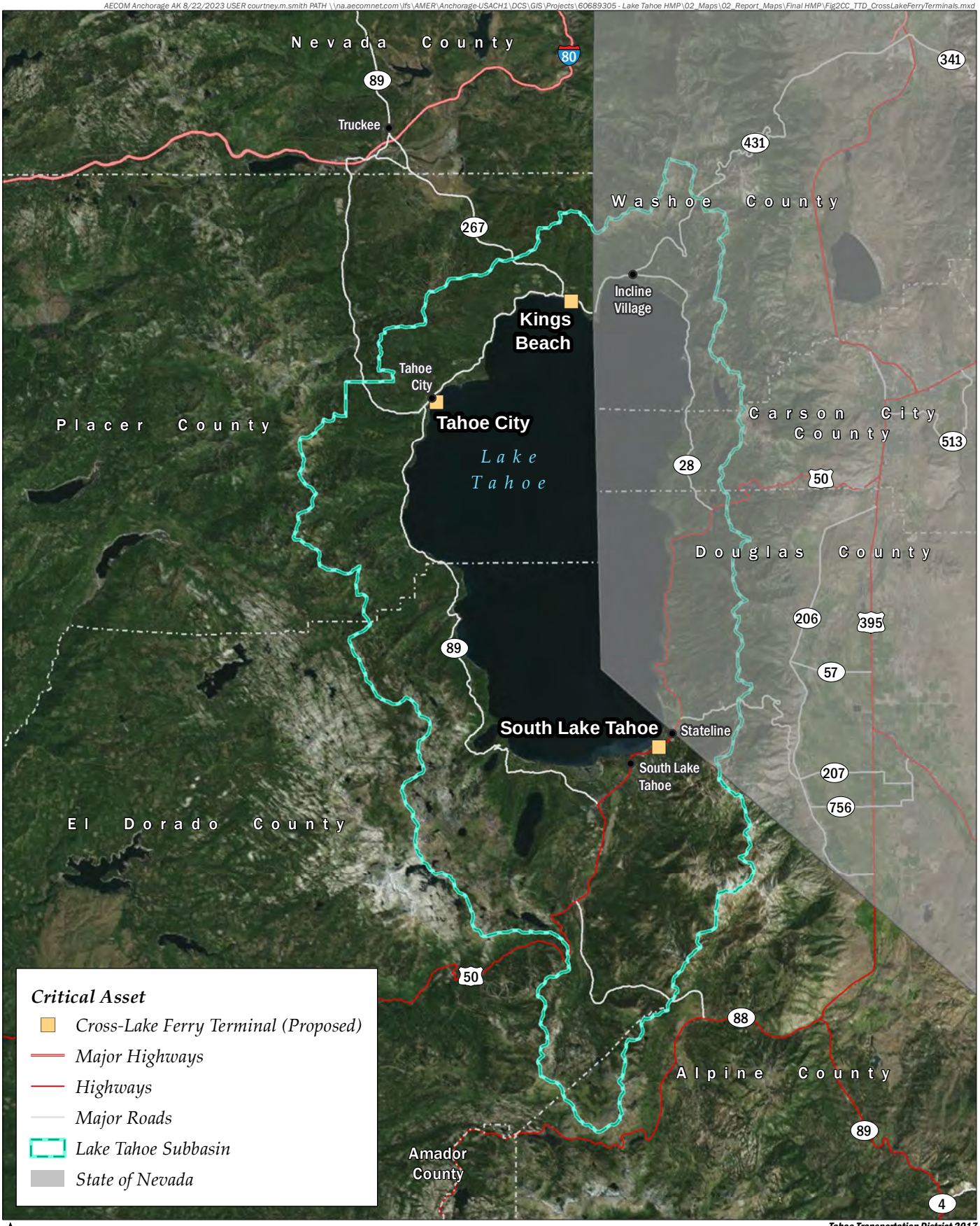
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE TRANSPORTATION DISTRICT
BUS STOPS

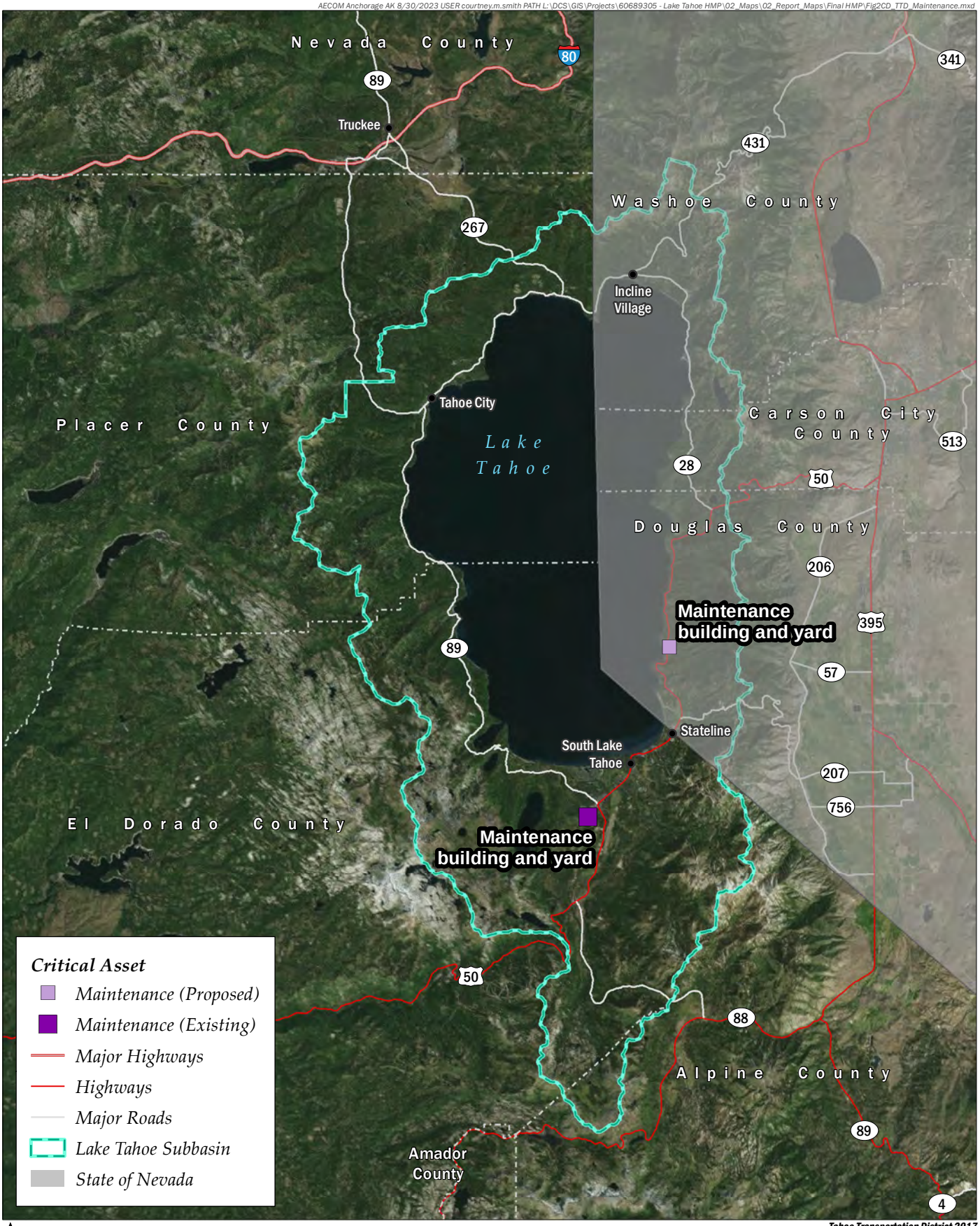
Figure 2C-B



Tahoe Transportation District 2017
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM
Tahoe Transportation District
Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE TRANSPORTATION DISTRICT
CROSS-LAKE FERRY TERMINALS
Figure 2C-C



Tahoe Transportation District 2017
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

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Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE TRANSPORTATION DISTRICT MAINTENANCE

Figure 2C-D

AECOM Anchorage AK 8/30/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\Fig2CE_TTD_MH_TC.mxd

Tahoe Transportation District 2017
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

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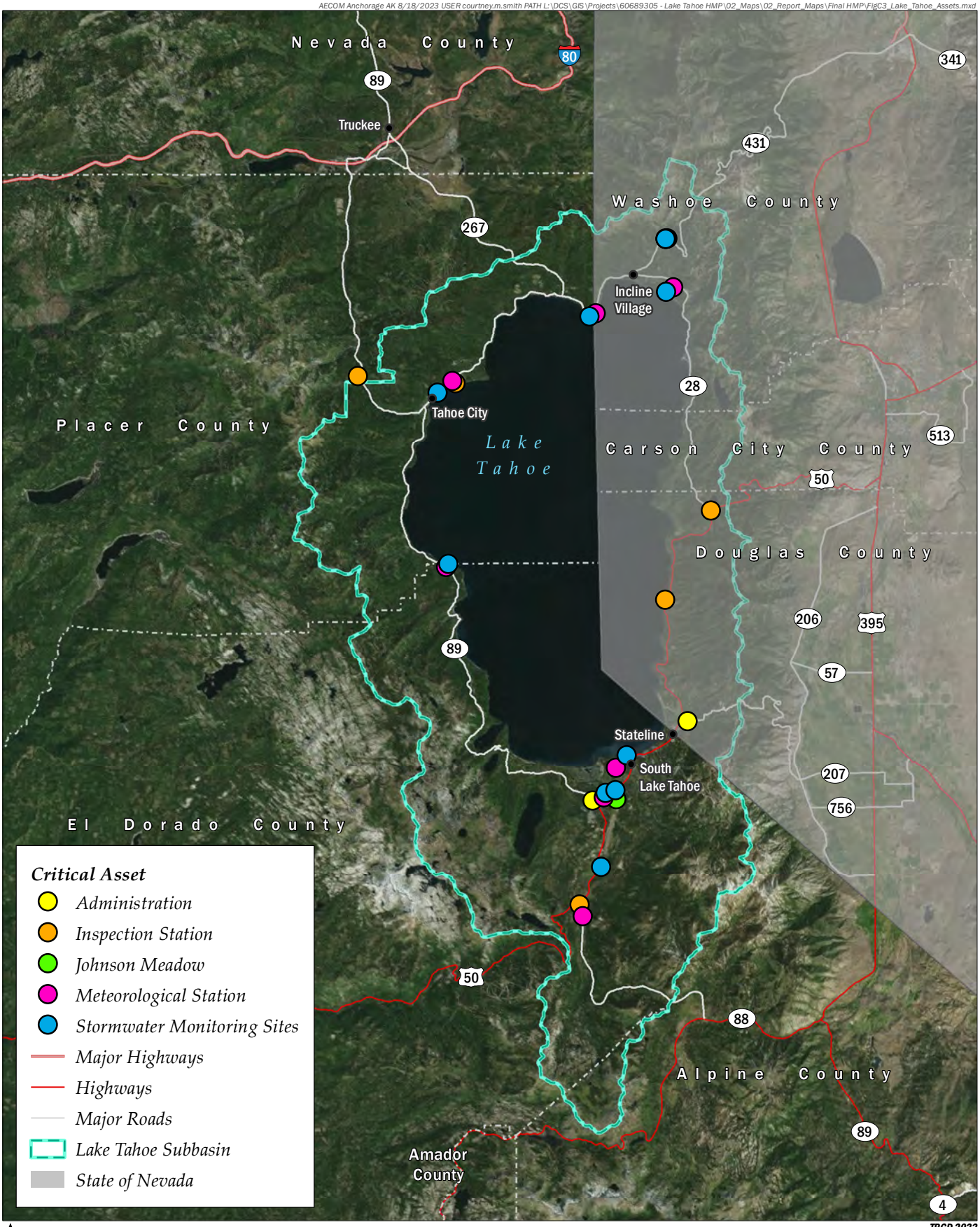
Tahoe Transportation District
Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE TRANSPORTATION DISTRICT
MOBILITY HUBS
Figure 2C-E

AECOM Anchorage AK 8/18/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC3_Lake_Tahoe_Assets.mxd



TRCD 2022

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

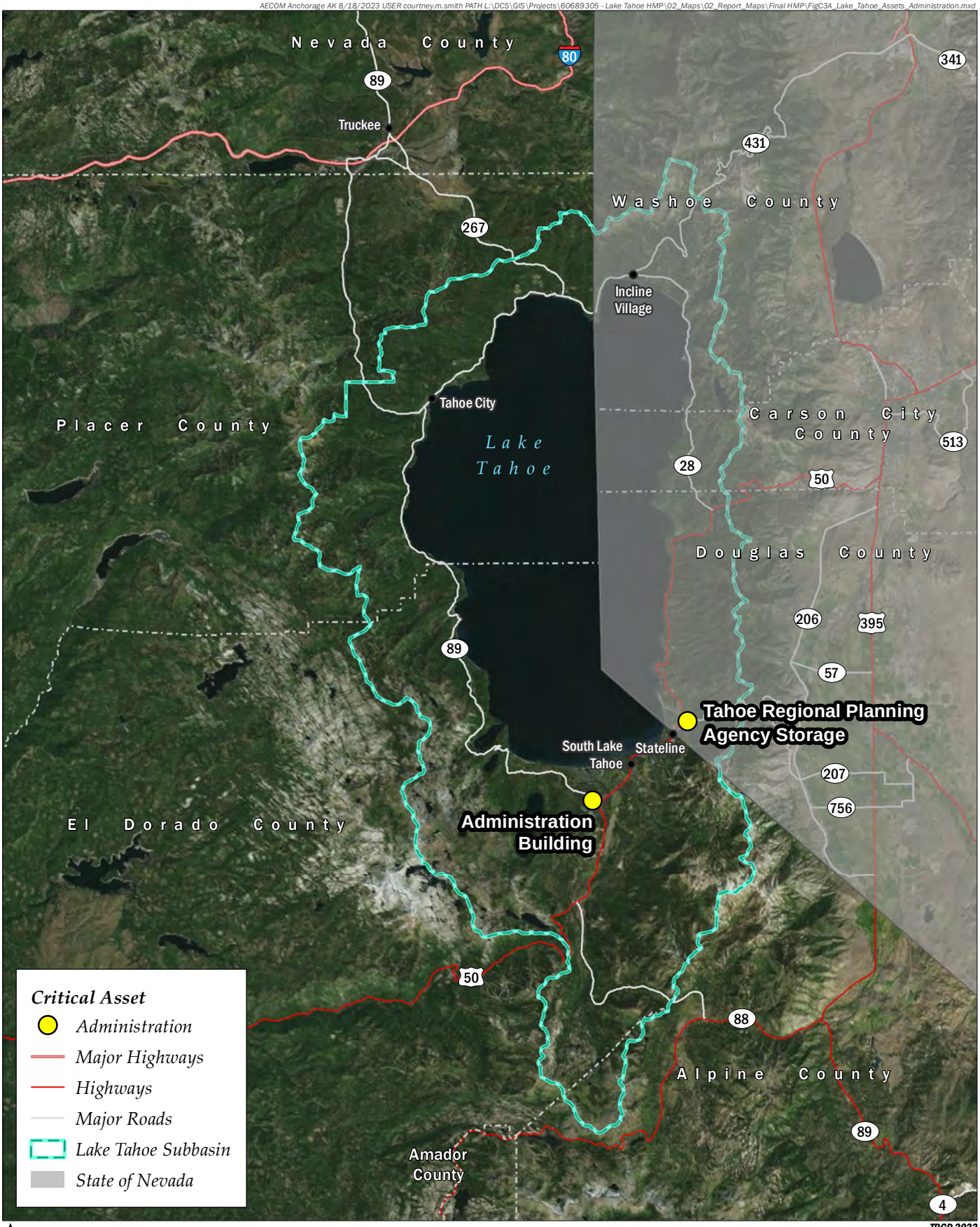
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE RESOURCE CONSERVATION DISTRICT

Figure C-3



TRCD 2022

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM

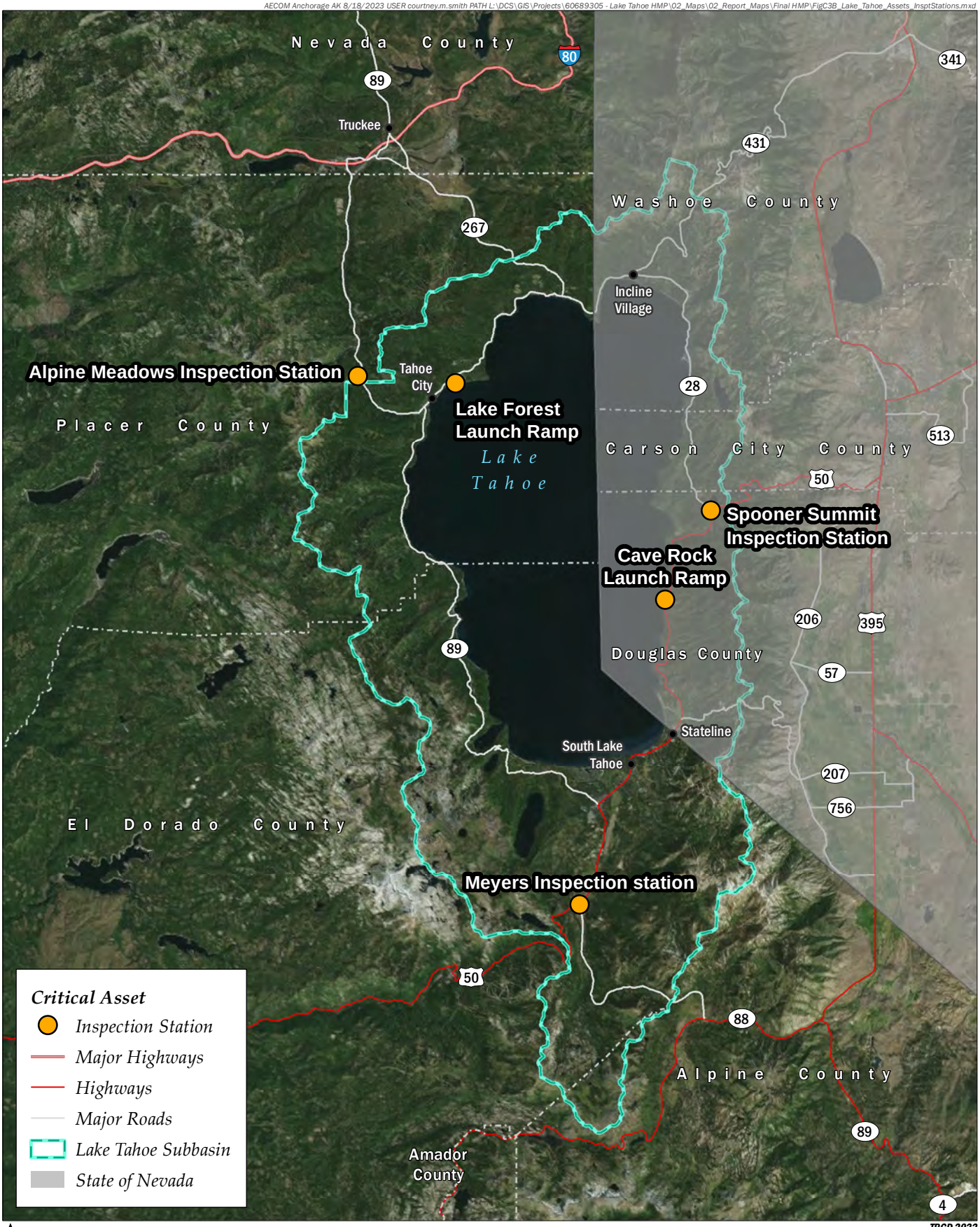
Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE RESOURCE CONSERVATION DISTRICT ADMINISTRATION

Figure C-3A

AECOM Anchorage AK 8/18/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC3B_Lake_Tahoe_Assets_InsptStations.mxd



TRCD 2022

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM

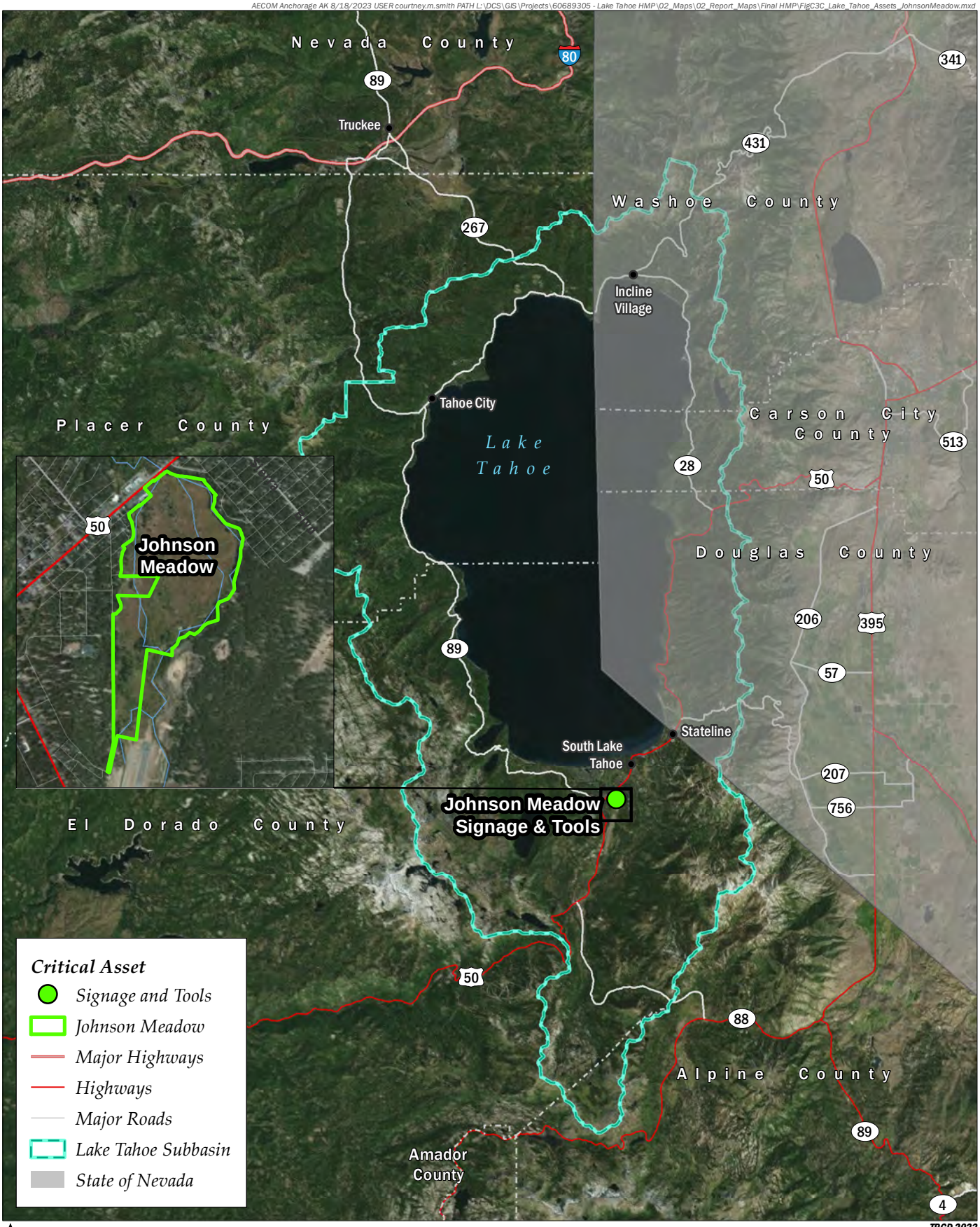
Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE RESOURCE CONSERVATION DISTRICT INSPECTION STATIONS

Figure C-3B

AECOM Anchorage AK 8/18/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC3C_Lake_Tahoe_Assets_JohnsonMeadow.mxd



TRCD 2022

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM

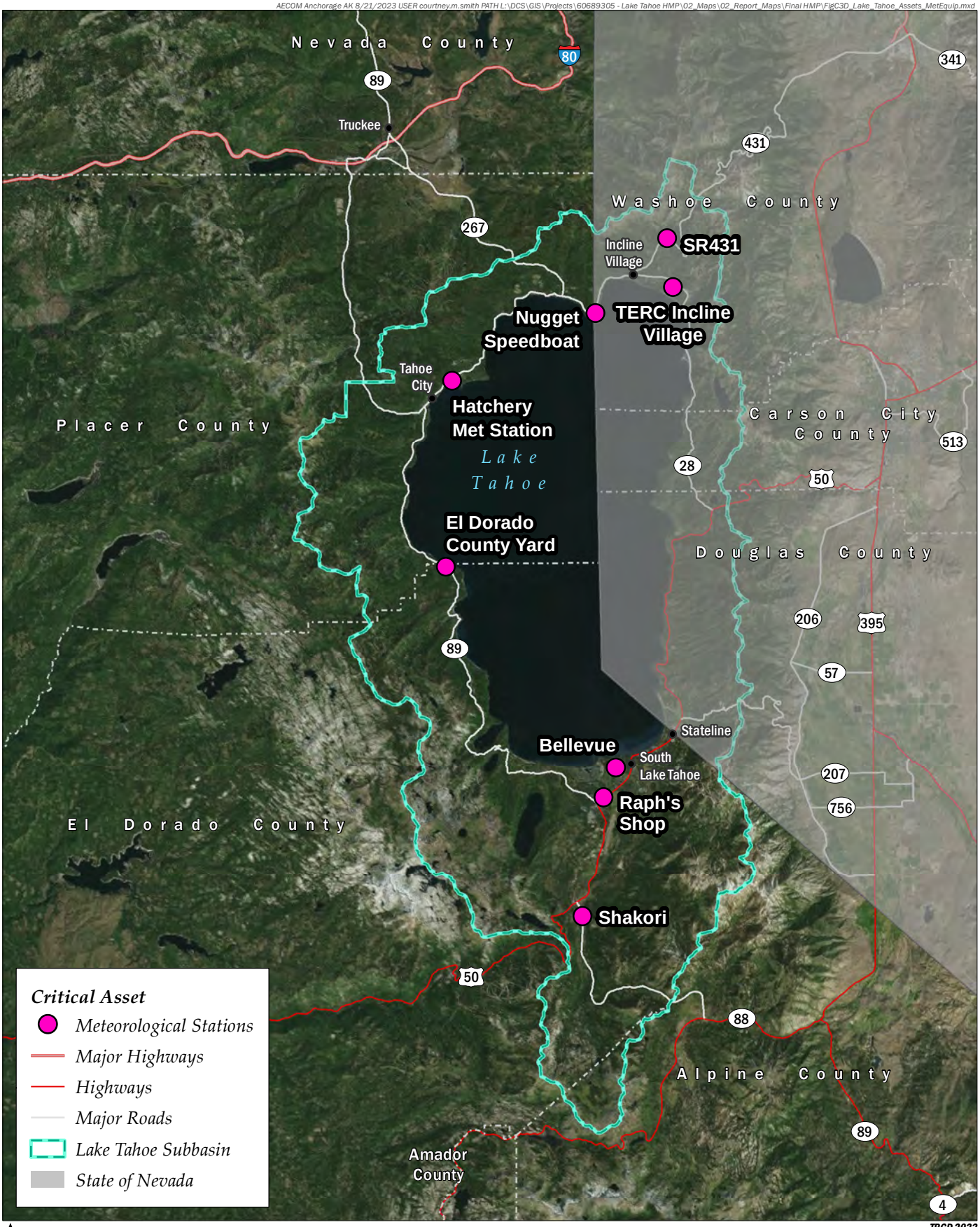
Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE RESOURCE CONSERVATION DISTRICT
JOHNSON MEADOW

Figure C-3C

AECOM Anchorage AK 8/21/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC3D_Lake_Tahoe_Assets_MetEquip.mxd



TRCD 2022

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM

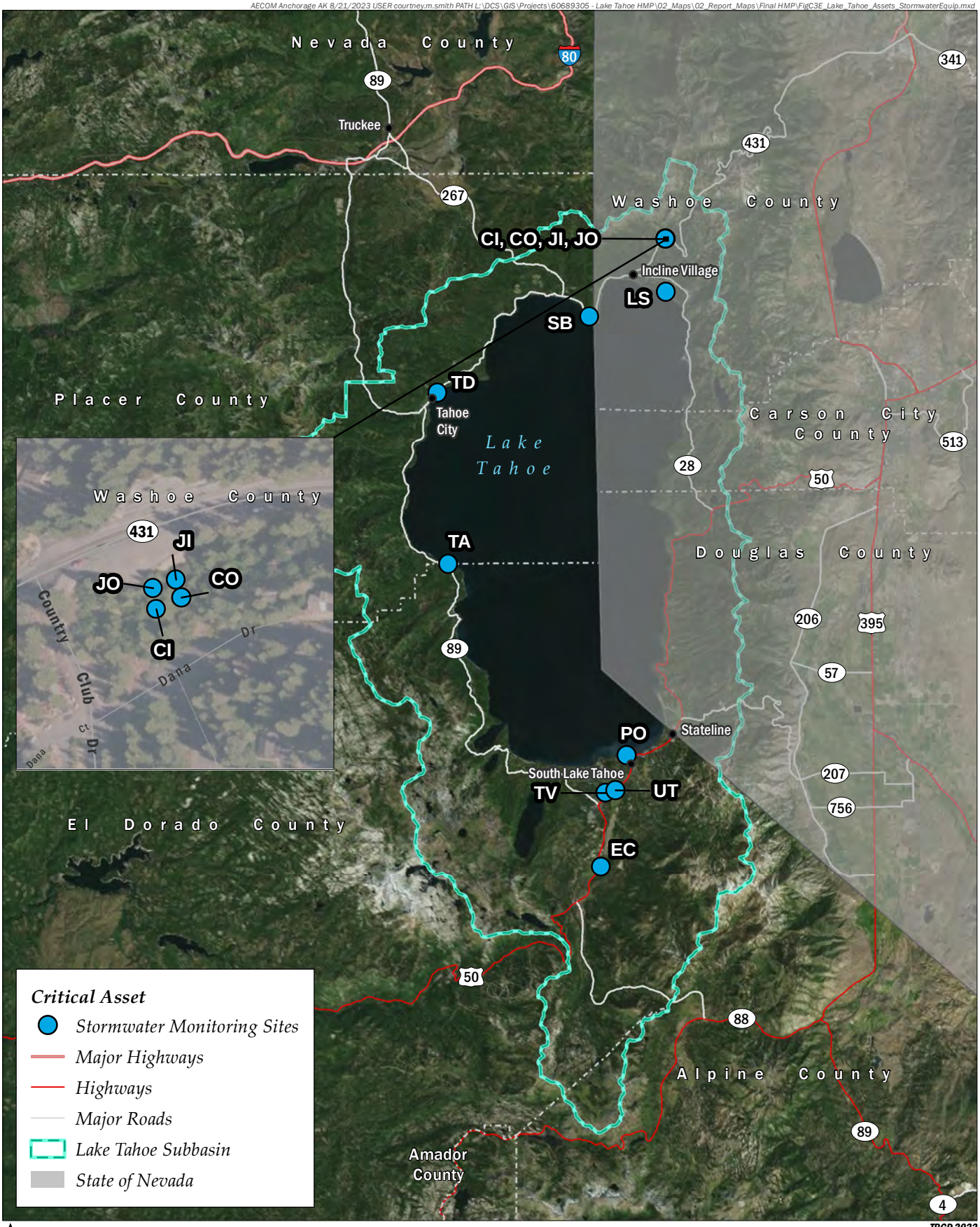
Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE RESOURCE CONSERVATION DISTRICT METEOROLOGICAL MONITORING STATIONS

Figure C-3D

AECOM Anchorage AK 8/21/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC3E_Lake_Tahoe_Assets_StormwaterEquip.mxd



TRCD 2022

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

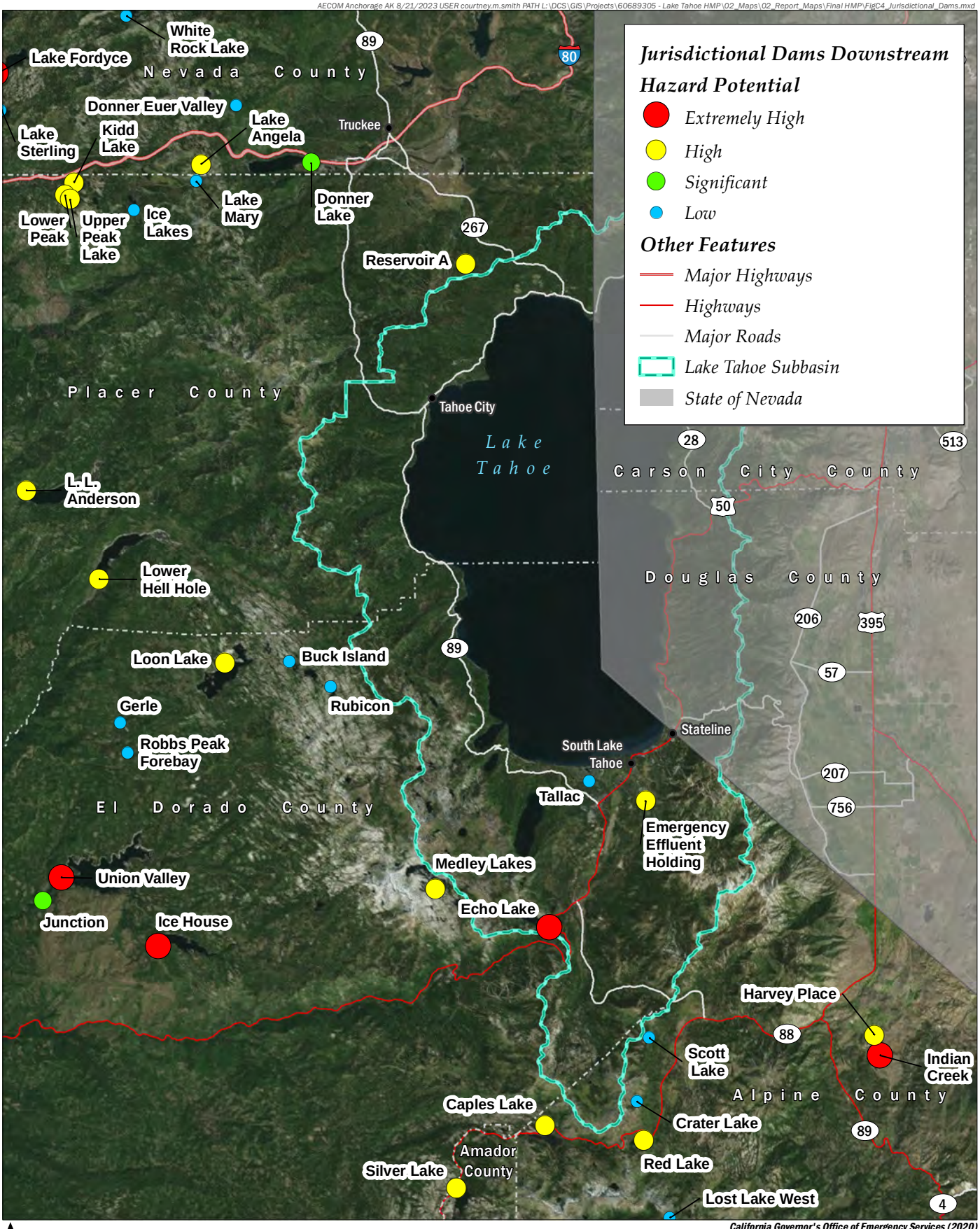
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

TAHOE RESOURCE CONSERVATION DISTRICT STORMWATER MONITORING SITES

Figure C-3E



California Governor's Office of Emergency Services (2020)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

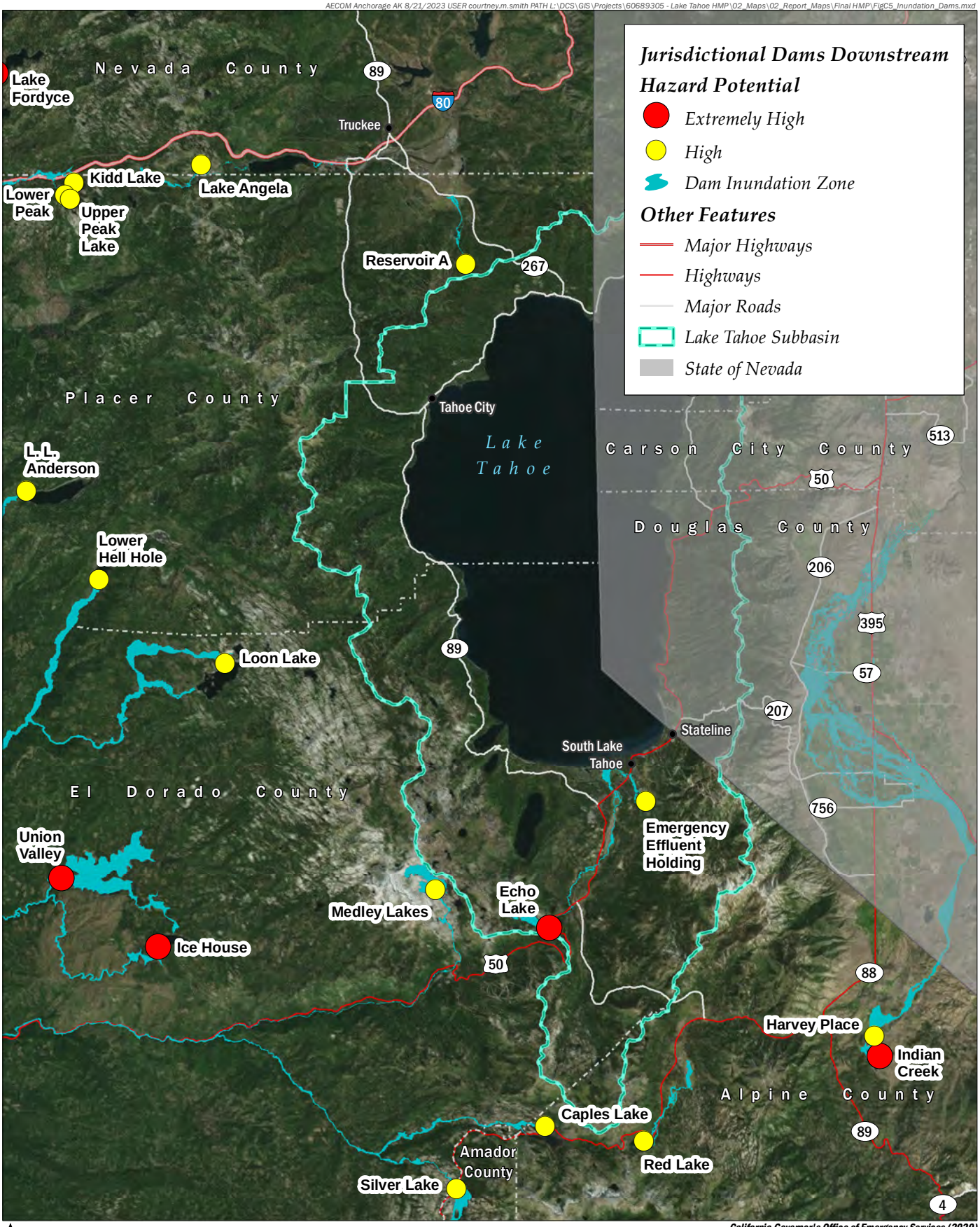
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

CALIFORNIA JURISDICTIONAL DAMS

Figure C-4



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California Governor's Office of Emergency Services (2020)
California Department of Water Resources (2022)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

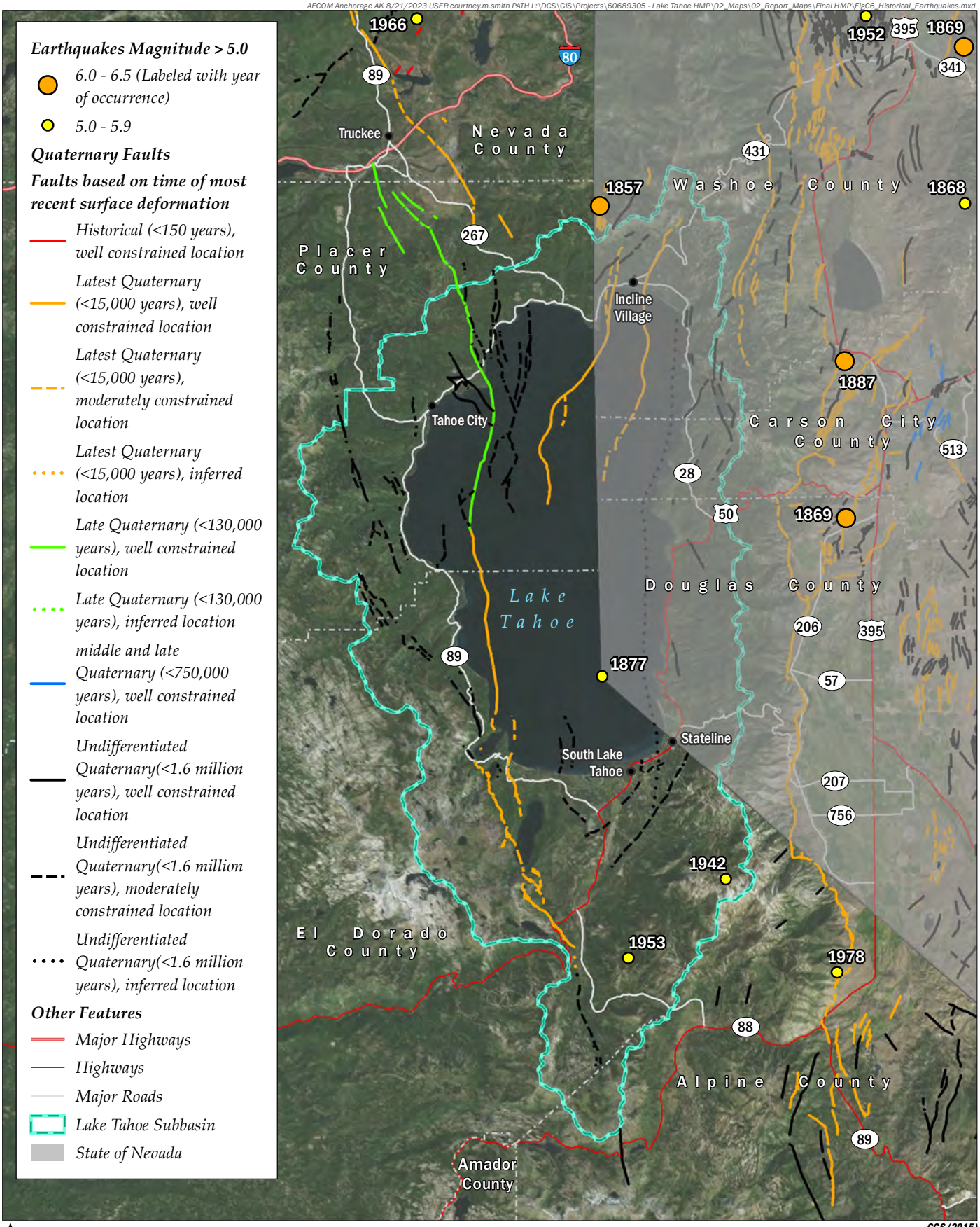
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

DAM BREACH INUNDATION AREAS

Figure C-5



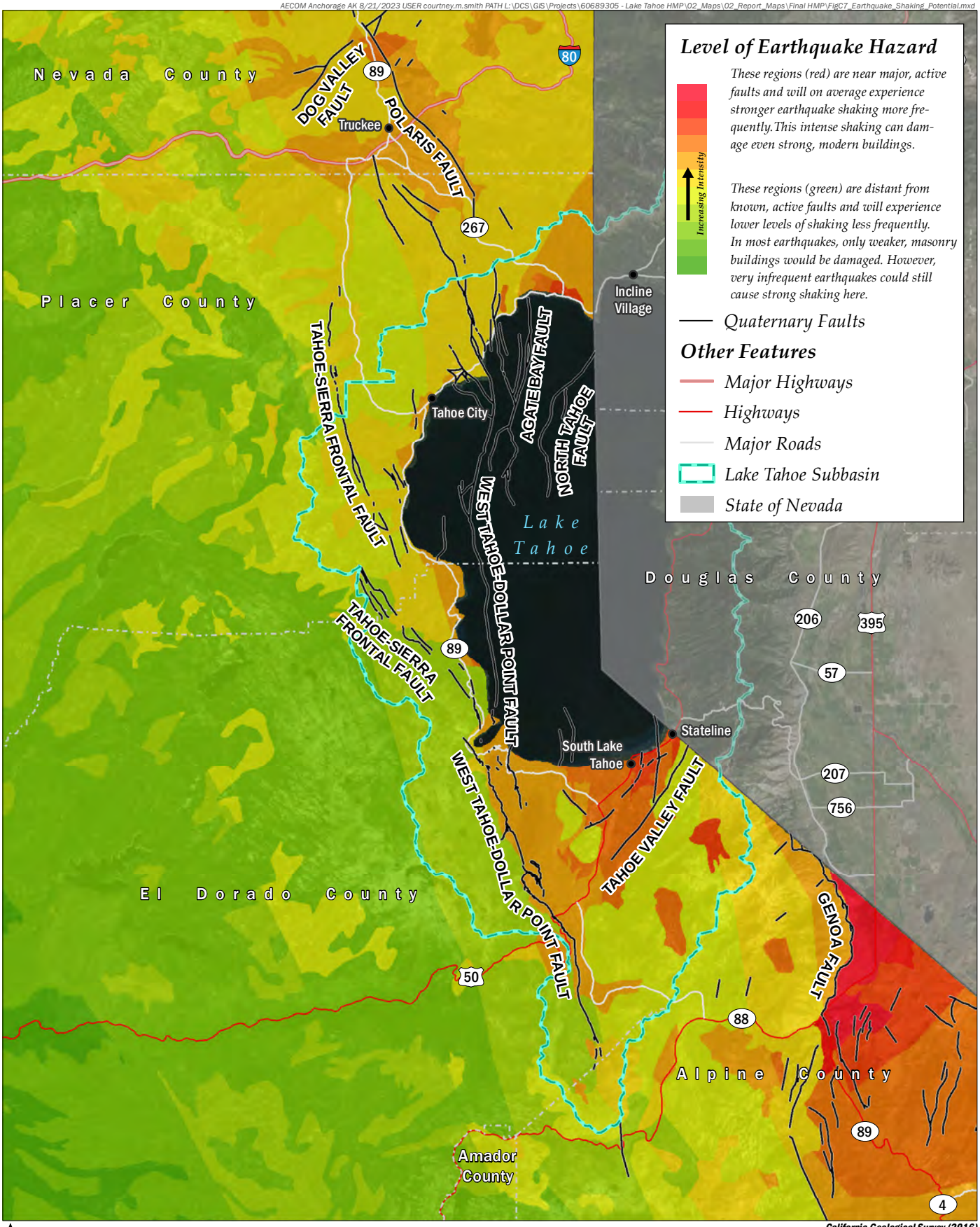
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

HISTORICAL EARTHQUAKES (1769-2015)

Figure C-6



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California Geological Survey (2016)
Basemap: Service Layer Credits: D. Branum, R. Chen, C. Wills (California Geological Survey); M. Petersen (United States Geological Survey).
Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

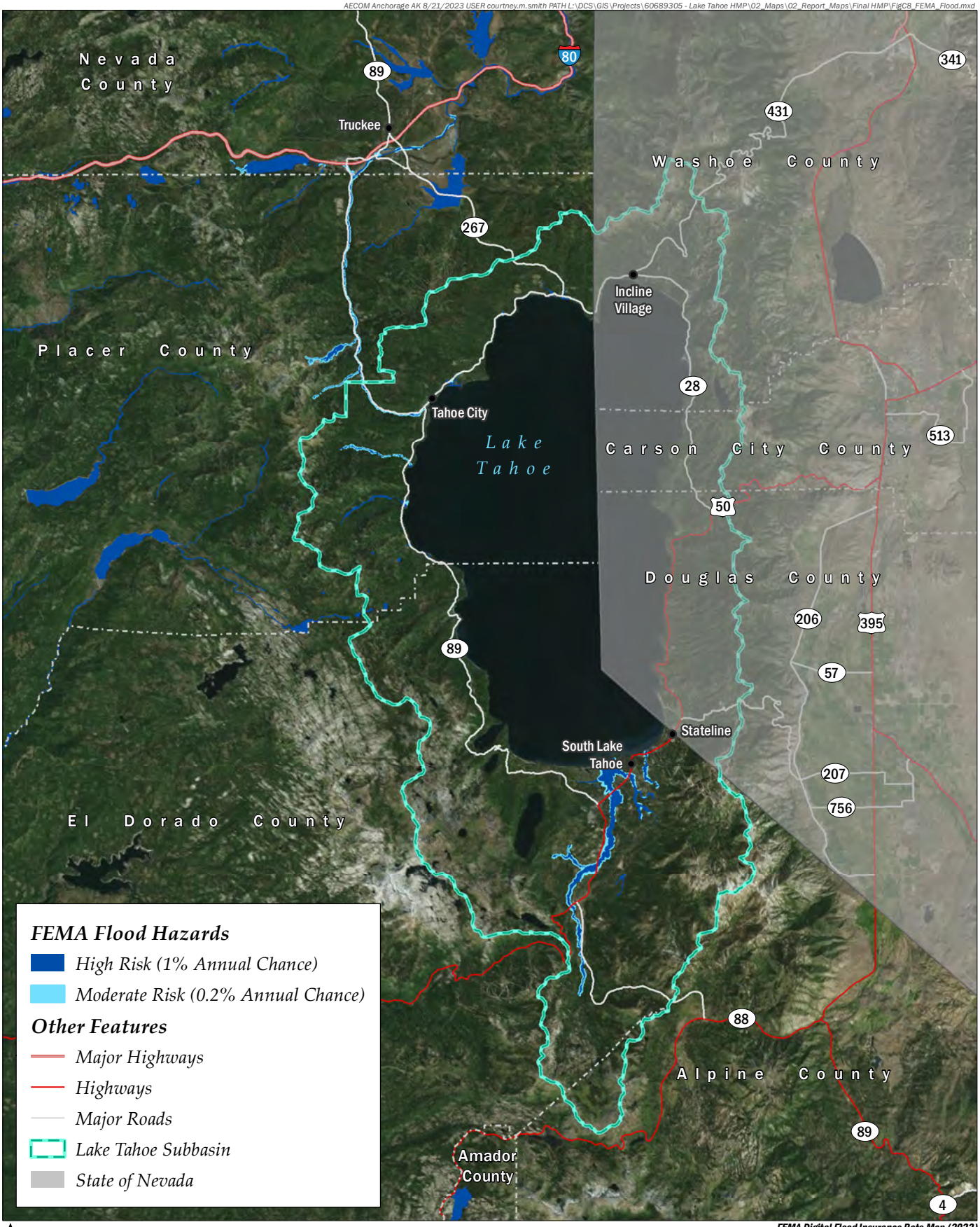
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

EARTHQUAKE SHAKING POTENTIAL

Figure C-7



FEMA Digital Flood Insurance Rate Map (2022)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM

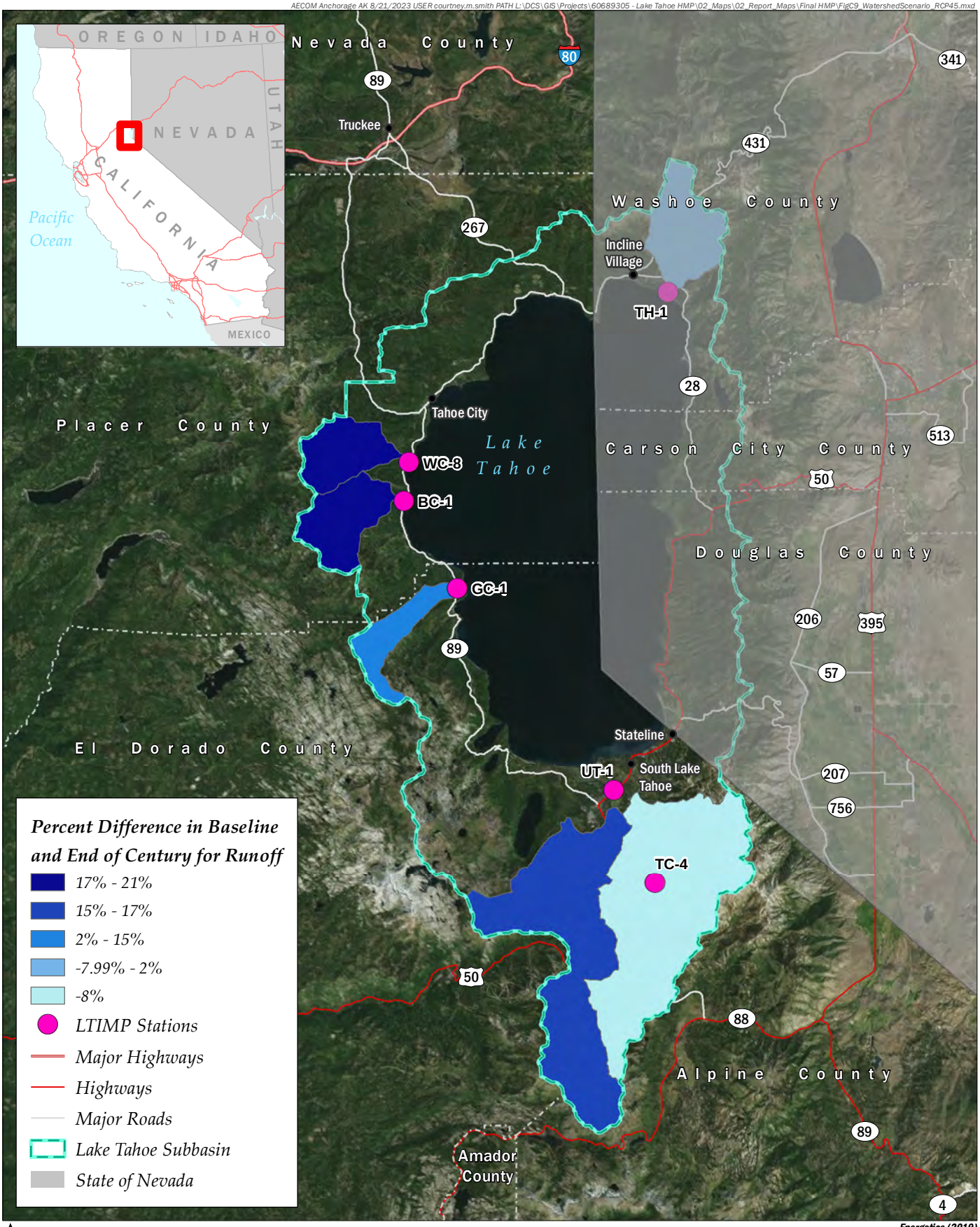
Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

SPECIAL FLOOD HAZARD AREA

Figure C-8

AECOM Anchorage AK 8/21/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC9_WatershedScenario_RCP45.mxd



Energetics (2019)

Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

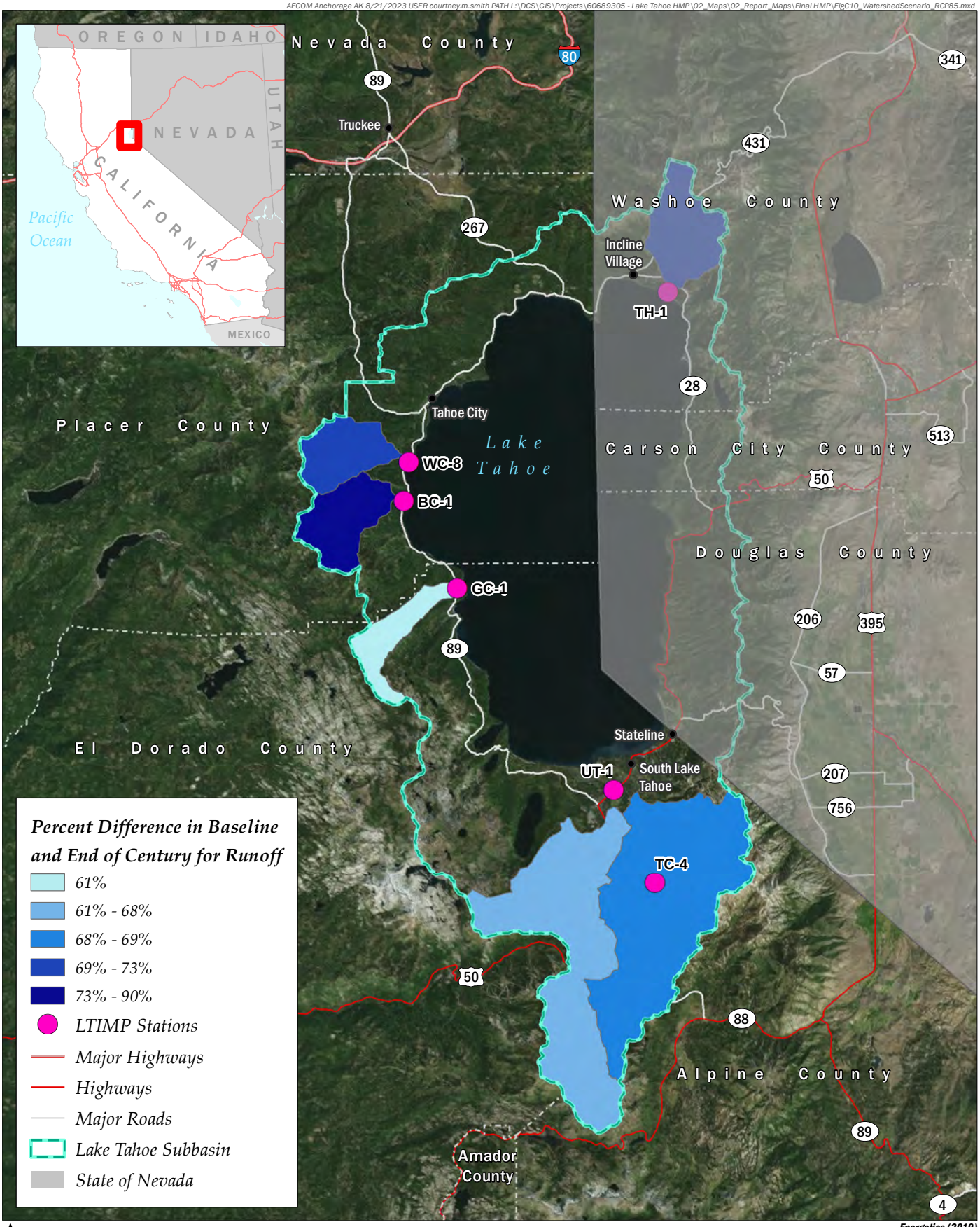
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

POSSIBLE MAGNITUDE OF FUTURE CHANGES IN NEARBY WATERSHEDS RCP4.5 SCENARIO (2006-2035 TO 2070-2099)

Figure C-9



Energetics (2019)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

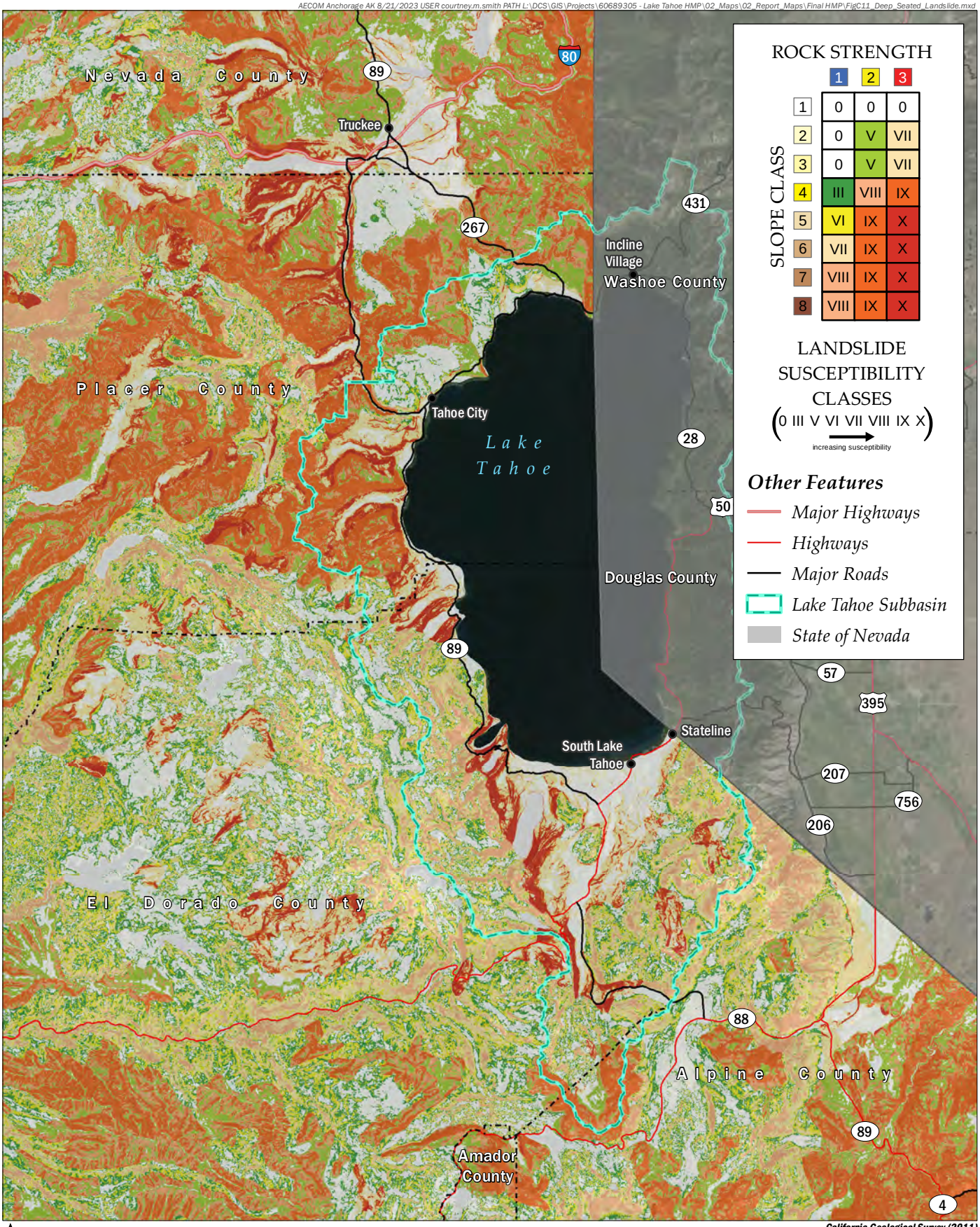
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

POSSIBLE MAGNITUDE OF FUTURE CHANGES IN NEARBY WATERSHEDS RCP8.5 SCENARIO (2006-2035 TO 2070-2099)

Figure C-10



California Geological Survey (2011)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

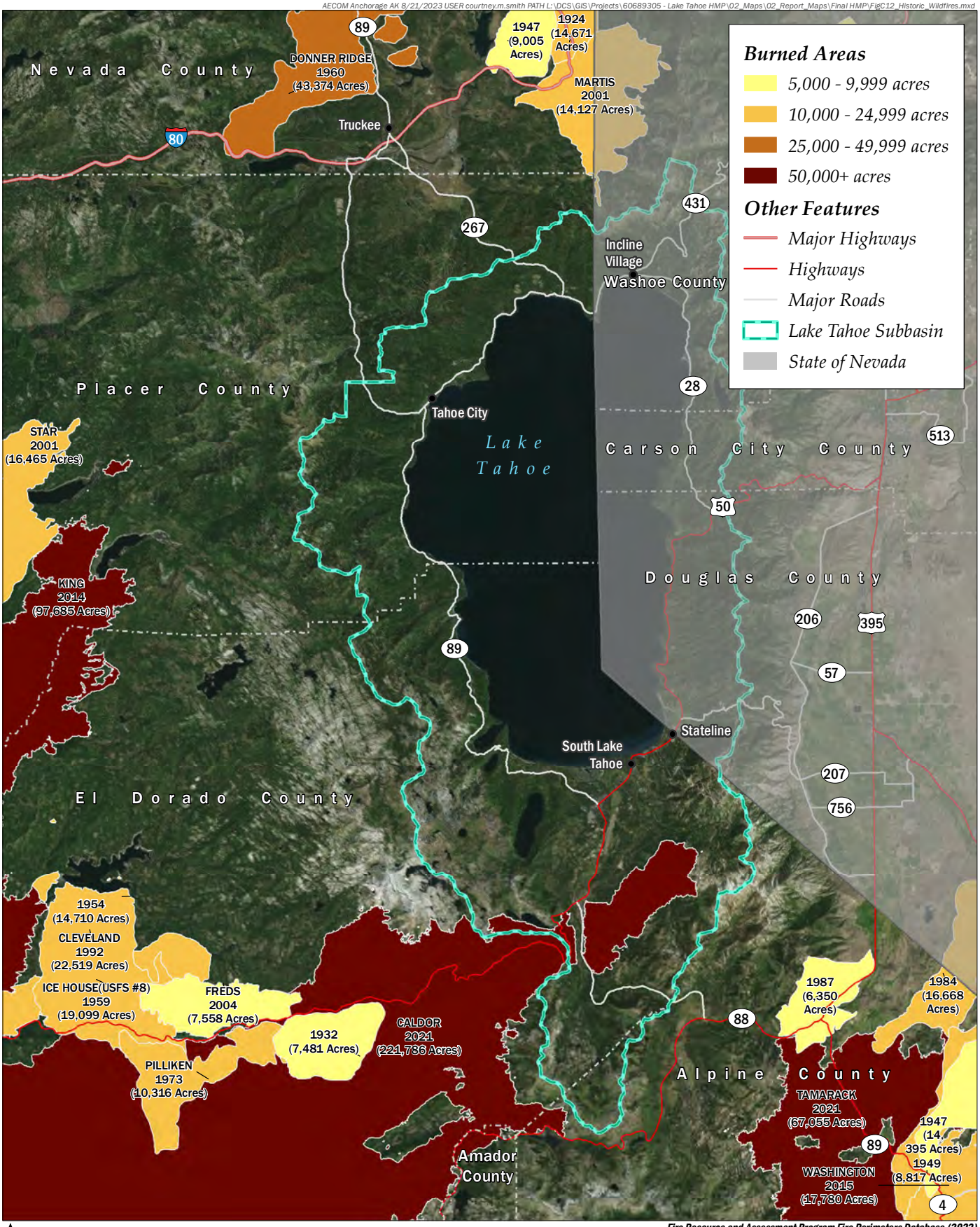
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

DEEP-SEATED LANDSLIDE SUSCEPTIBILITY

Figure C-11



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Miles

Fire Resource and Assessment Program Fire Perimeters Database (2022)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

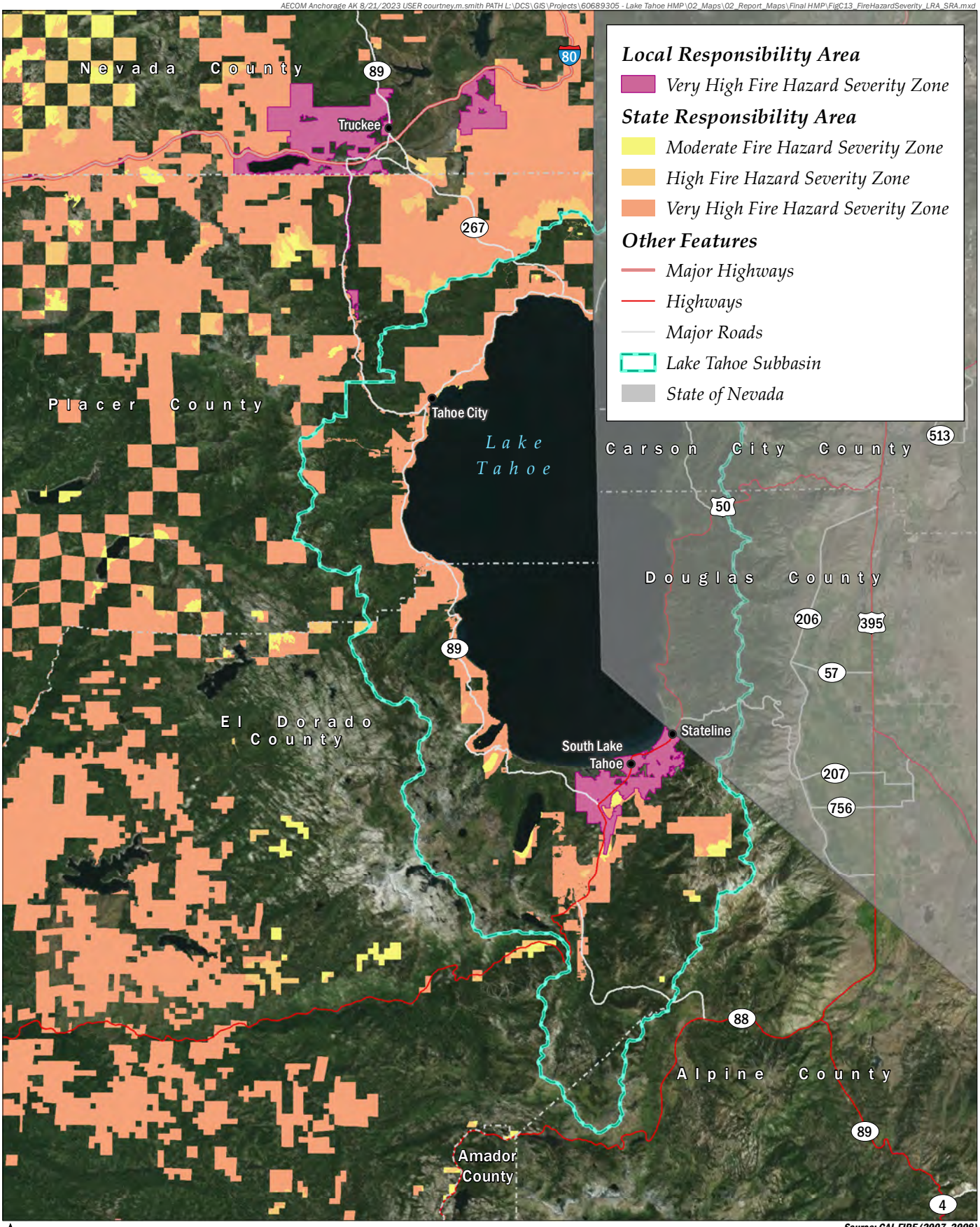
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

HISTORICAL WILDFIRES (1924-2021)

Figure C-12



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Miles

Source: CAL FIRE (2007, 2008)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

AECOM

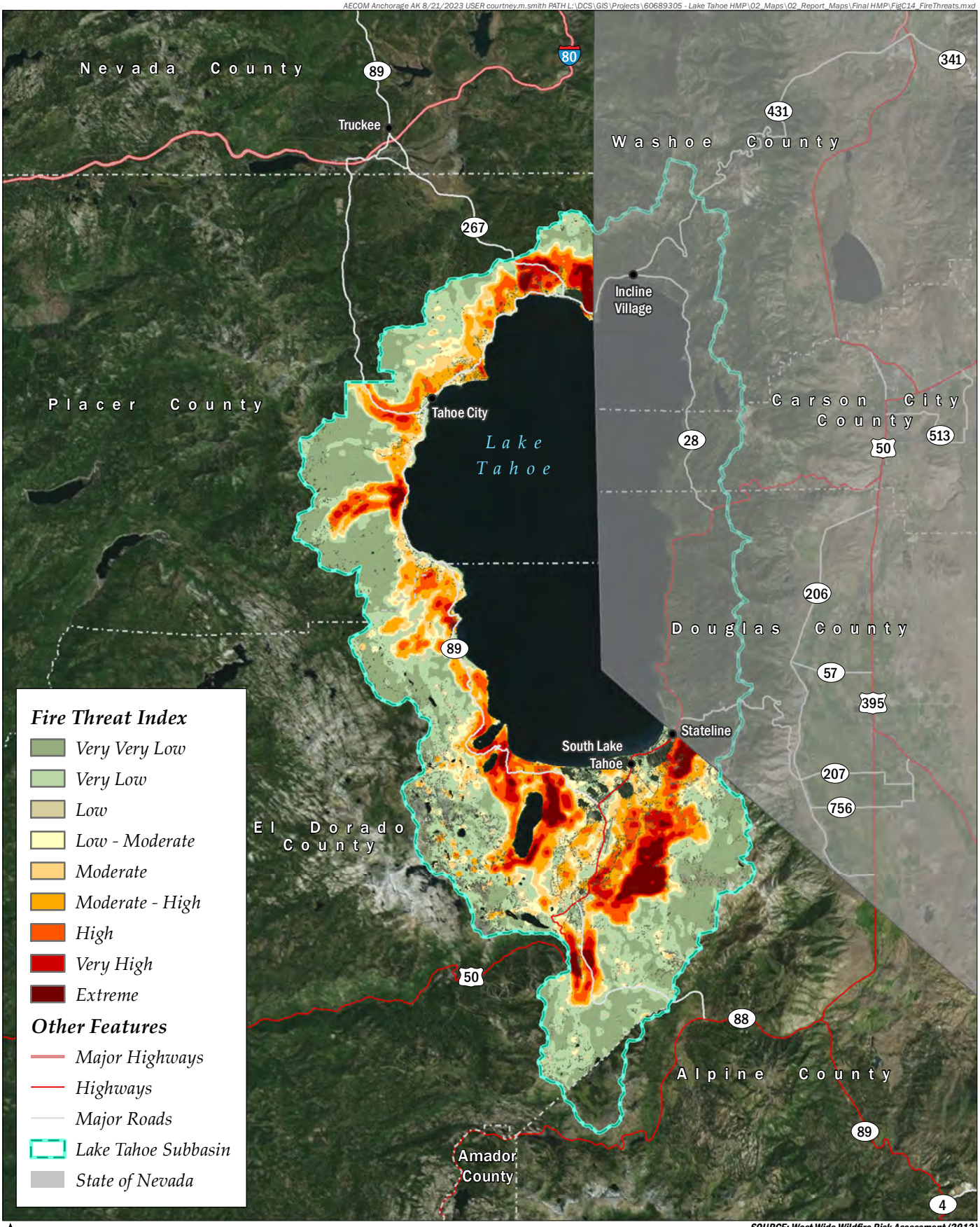
Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

FIRE HAZARD SEVERITY ZONES

Figure C-13

AECOM Anchorage AK 8/21/2023 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60689305 - Lake Tahoe HMP\02_Maps\02_Report_Maps\Final HMP\FigC14_FireThreats.mxd



SOURCE: West Wide Wildfire Risk Assessment (2012)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

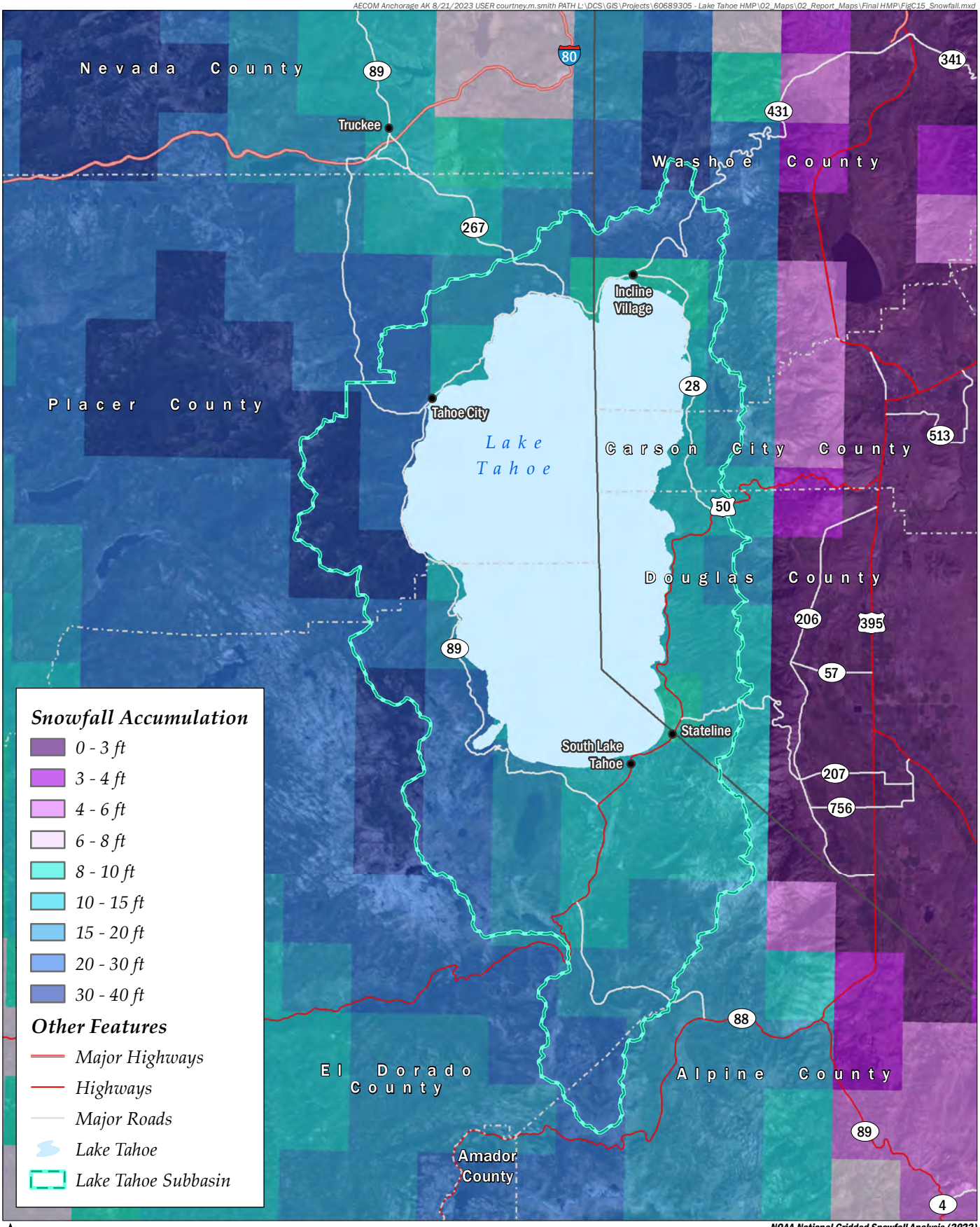
AECOM

Tahoe Transportation District

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

FIRE THREATS

Figure C-14



NOAA National Gridded Snowfall Analysis (2022)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

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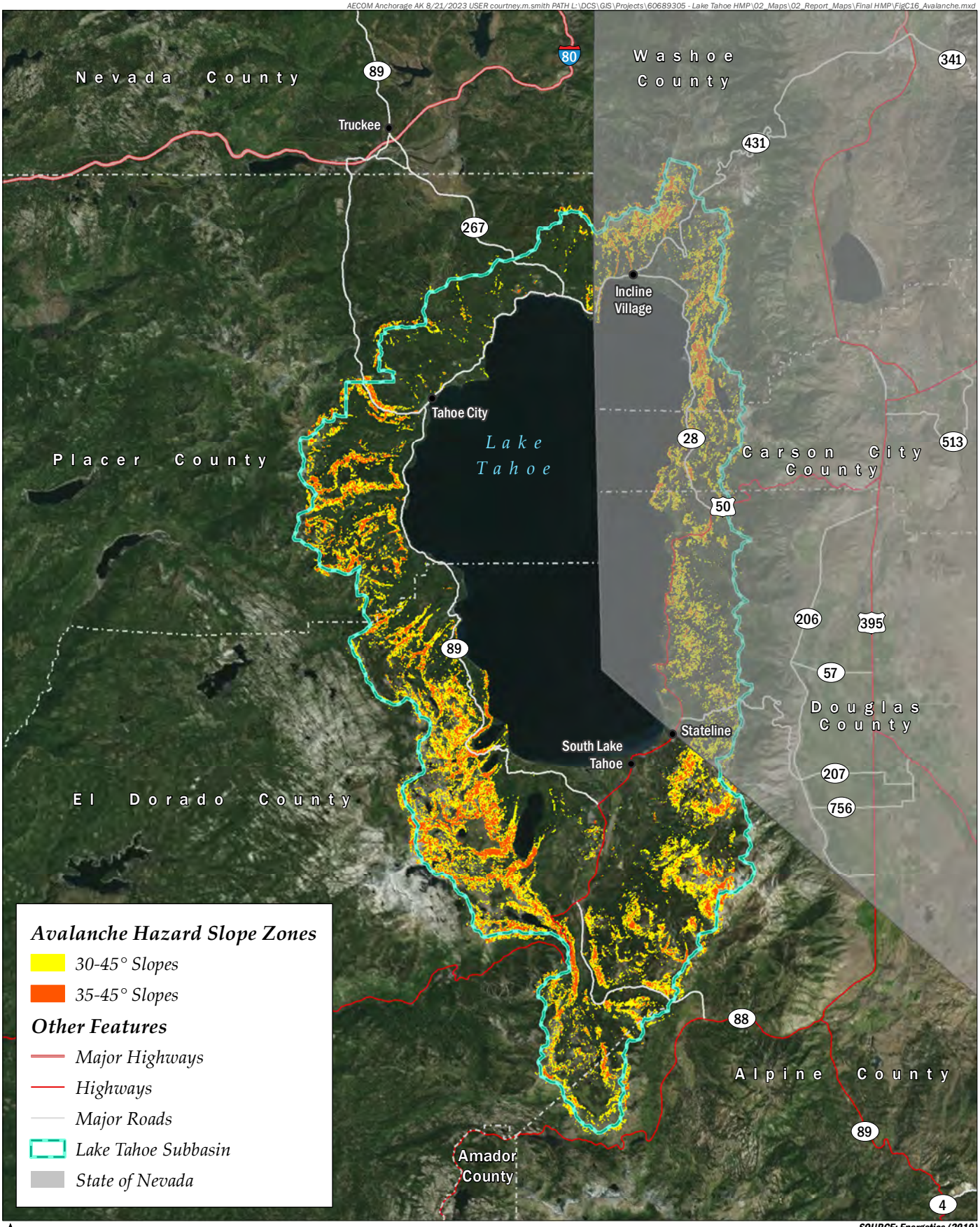
Tahoe Transportation District

ANNUAL SNOWFALL ACCUMULATION (2022 WATER YEAR)

Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

Figure C-15



SOURCE: Energetics (2019)
Basemap: Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, IGN, and the GIS User Community

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Tahoe Transportation District - Tahoe Resource Conservation District Hazard Mitigation Plan

AVALANCHE HAZARD SLOPE ZONES

Figure C-16

APPENDIX D—TAHOE TRANSPORTATION DISTRICT

Table D-1: TTD—Human and Technical Resources for Hazard Mitigation

Program	Principal Activities Related to Hazard Mitigation
Management	TTD's Management Department plans, organizes, manages, and provides direction and oversight for the district's Internal Services, Capital Programs, and Operations Departments. It also directs, administers, and coordinates activities to support district policies, strategic goals, and objectives as established by management and the Board of Directors. It fosters relationships and coordinates with other TTD departments, government officials, outside agencies, and the public.
Capital Programs	The Capital Programs Department is responsible for TTD's capital improvement program (CIP) which includes the coordinating, contracting, managing, and administering of project and program activity that relate to improvements with waterborne transit, transit capital improvements, highways, streets and roads, bike and other multi-modal support infrastructure within the Tahoe Basin.
Operations	TTD's Operations Department manages the flow of the workplace, and the day-to-day operational activities of the district's transit services, including entering timekeeping and manifests, incident reports, completing surveys, and daily, weekly, and monthly reports from paratransit scheduling software and information systems; monitoring and updating fuel logs and records; and monitoring real time systems.
Transit Systems	Transit Systems Department oversees all transit efforts. The department's Chief Safety Officer allocates funds to transit safety programs (capital and operating), participates in root cause investigations, reviews route development for safety consideration, ensures compliance to include monitoring the industry for best practices, new regulations, and trainings.
Public Information	TTD's Public Information Officer responsible for the development of a pro-active and strategic communications plan, public relations, community outreach, and the growth and maintenance of media relations, as well as assisting with writing and production of TTD's newsletters, brochures, speeches, and other materials; content management of the TTD's website; implementing public outreach programs; undertaking research for a variety of public affairs projects; executing media relations responsibilities and responding to public information inquiries.

Table D-2: TTD—Financial Resources for Hazard Mitigation

Name	Purpose
Caltrans Transportation Development Act (TDA) – Local Transportation Fund (LTF) and State Transportation Assistance (STA)	The Mills-Alquist-Deddeh Act (SB 325), known as TDA, was enacted by the California Legislature to improve existing public transportation services and encourage regional transportation coordination by providing funding to transit and non-transit related purposes that comply with regional transportation plans. TDA established two funding sources – TDA and STA. LTF funds are derived from a ¼ cent of the general sales tax collected statewide. Each county receives the returns of these general sales tax revenues and then apportions the LTF funds within the country based on population. LTF can be used for local streets and roads and construction and maintenance. The STA funds are allocated tax revenue given by the State to planning agencies and other selected agencies. STA funding can only be used for transportation planning and mass transportation purposes and State law requires that 50 percent of STA funds be allocated according to population and 50 percent be allocated according to transit operator revenues from the previous year.
Caltrans Low Carbon Transit Operations Program (LCTOP)	The LCTOP is one of several programs that are part of the Transit, Affordable Housing, and Sustainable Communities Program established by the California Legislature in 2014 (SB 862). LCTOP provides operating and capital assistance for transit agencies to reduce GHG emissions and improve mobility, particularly in servicing disadvantaged communities. Transit agencies are awarded funds based on a noncompetitive, formula-based list prepared by the State Controller's Office and administered by Caltrans.
FEMA: Emergency Operations Center (EOC) Grant Program	The EOC Grant Program is an annual competitive pass-through grant program that is intended to improve emergency management and preparedness capabilities by "supporting flexible, sustainable, secure, strategically located, and fully interoperable emergency operations centers with a focus on addressing identified deficiencies and needs" to ensure the continuity of operations and continuity of government during and after any major disaster or emergency (FEMA, 2022). Mitigation staff are often present in an EOC during disaster or emergency response, and the EOC creates and maintains documentation for immediate or future mitigation opportunities.

Table D-2: TTD—Financial Resources for Hazard Mitigation

Name	Purpose
FEMA Hazard Mitigation Assistance (HMA) Grants	The HMA grant program provides technical and financial assistance to help mitigate hazards through the following grants: Building Resilient Infrastructure and Communities (BRIC): BRIC is an annual competitive pass-through grant program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area. BRIC was created in 2020 as part of the Disaster Recovery Reform Act of 2018 and replaces FEMA's legacy Pre-Disaster Mitigation grant program. BRIC funds a wide variety of mitigation activities, including microgrids, flood control, wetland restoration, community relocation / buyouts, seismic retrofits, and nature-based solutions. BRIC Direct Technical Assistance as a non-financial assistance grant program for: local hazard mitigation plan development initial support, identifying solutions for specific hazards, assisting with hazard mitigation project planning, requesting application development support, demonstrating cost-effectiveness of a BRIC sub application submission, and understanding hazard mitigation grant management. Hazard Mitigation Grant Program (HMGP): HMGP is pass-through grant program that supports pre- and post-disaster mitigation plans and projects for state and local agencies and federally recognized tribal governments. HMGP funding is authorized with a Presidential Major Disaster Declaration. A governor or tribal chief executive may request HMGP funding when submitting a disaster declaration. The amount of funding made available to the applicant is generally 15 percent of the total federal assistance amount provided for recovery from the Presidential Major Disaster Declaration.
FEMA National Exercise Program (NEP)	The FEMA NEP is the "primary national-level mechanism for validating national preparedness. As part of the National Preparedness System, the NEP is a key component in developing a culture of preparedness, empowering communities, and promoting resilience against threats and hazards Americans face (FEMA, 2023)." FEMA's National Exercise Division accepts exercise support requests for exercise planning, design, scenario development, conduct, and subject-matter expertise evaluation, material production, and/or facilitation for exercises, annually.
Federal Highway Administration Surface Transportation Block Grant (STBG) Programs	The STBG program provides "flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals (Federal Highway Administration, 2023)." The program has recently been expanded to include ferry boats and terminals, vehicle-to-grid infrastructure, protective features to enhance resilience of an eligible transportation facility, and projects to enhance travel and tourism.

Table D-2: TTD—Financial Resources for Hazard Mitigation

Name	Purpose
Federal Transit Administration (FTA) 5307 Urbanized Area Formula Funding Program	The Urbanized Area Formula Funding program makes federal resources available to urbanized areas and to governors for transit capital and operating assistance, and for transportation related planning in urbanized areas. Eligible activities for this grant program include planning, engineering, design and evaluation of transit projects and other technical transportation-related studies; capital investments in bus and bus-related activities, and capital investments in new and existing fixed guideway systems. TTD operates within a designated urbanized area and utilizes 5307 funds to support the preventative maintenance program, operations, and supplement TTD's capital projects where available.
FTA 5339 Bus and Bus Facilities Formula Program	The Grants for Buses and Bus Facilities program makes "Federal resources available to States and designated recipients to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities including technological changes or innovations to modify low or no emission vehicles or facilities (FTA, 2023)." Funding is in the form formula allocations as well as competitive grants. Additionally, a sub-program provides competitive grants for bus and bus facility projects that support low and zero-emission vehicles.
FTA Standards Development for Bus Exportable Power Systems (BEPS) grant	The BEPS grant enables public transportation agencies, communities and states to "access resilient and flexible power options through bus fleet vehicles during major power disruptions" (FTA, 2023). The major goal of the program is to develop national interoperable BEPS standard so that different manufacturers' systems can use the same technology base and applications for BEPS solutions.
Tahoe Regional Planning Agency Rental Car Mitigation Fee	The Rental Car Mitigation Program was adopted by the Tahoe Regional Planning Agency Governing Board in 1993. The purpose of the program is to offset impacts of rental car use in the Tahoe region and mitigate vehicle miles traveled. Rental car businesses charge and collect the fee to those that rent or deliver rental cars to persons in the Tahoe region. Mitigation fees are remitted to the Tahoe Regional Planning Agency quarterly and then disbursed to TTD. The current fee is $5.75/day per rental car.
U.S. Department of Transportation (USDOT) Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program (PROTECT) Discretionary Grant Program	PROTECT Discretionary Grant Program "provides funding to ensure surface transportation resilience to natural hazards including climate change, sea level rise, flooding, extreme weather events, and other natural disasters through support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure (USDOT, 2023)." The program has two types of awards: planning grants and Competitive Resilience Improvement Grants.

Notes:
BEPS = Bus Exportable Power Systems
BRIC = Building Resilient Infrastructure and Communities
Caltrans = California Department of Transportation

FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
FTA = Federal Transit Administration
NEP = National Exercise Program
PROTECT = Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program
STBG = Surface Transportation Block Grant
USDOT = U.S. Department of Transportation

Table D-3: TTD —Planning, Policy, Program, and Public Outreach Resources for Hazard Mitigation

Type	
Climate Adaptation Plan	The Tahoe Climate Adaptation Action Portfolio is a scientific assessment of the vulnerability of the Lake Tahoe, forests, and communities to climate change impacts (tahoe.ca.gov/climate-change) and identifies adaptation actions that are already being undertaken. The portfolio "purposefully focuses on adaptation" rather than mitigation.
Master Plan	Linking Tahoe: Lake Tahoe Basin TMP is an implementation plan developed to achieve the transportation policies of the Lake Tahoe Region.
Corridor Plan	The 2017 Linking Tahoe: Corridor Connection Plan was created to enhance the manageability of planning by dividing the Basin into six corridors. These corridors are based upon the land use patterns and commonality of issues and opportunities with north and south entry corridors. Projects, services, and policies were identified to address the unique needs of each corridor and then integrated across all corridors to create a unified, transportation system plan.
Regional Transportation Plan	The 2020 Regional Transportation Plan identifies a broad range of projects, programs, and strategies needed to comprehensively improve Tahoe's transportation system over the next 25 years and lays out funding priorities in the region. The plan outlines transportation projects that address climate change and growing risks to the safety, reliability, effectiveness, and sustainability of the Tahoe Basin and its transportation network.
Short Range Transportation Plan (SRTP)	The TTD SRTP guides TTD's goals, objectives, and policies of transit service within the Lake Tahoe Region over a 5-year period. The SRTP is developed within the context of the long-range transit plan, Linking Tahoe: Lake Tahoe TMP. The TMP is aimed at implementing a new vision for transit as "the vehicle for change in the Tahoe Region."
Public Outreach	Transit surveys provide valuable feedback and suggestions for existing and future transit in the Lake Tahoe Region. TTD aims to release web-based surveys biannually.

Table D-4: TTD—Ability to Improve On / Expand Resources

Capability	Type/Description	Expansion
Human and Technical	Mitigation Specialist	Appoint or assign someone within TTD to oversee hazard mitigation grant opportunities, such as notifying TTD of upcoming grant cycles, and spearheading Notice of Intents applications, grant applications, and grant management requirements.
Financial	HMA Funding	Apply for HMA BRIC and/or HMGP grants as they become available for projects pre-identified in TTD plans and programs, including the 2023 HMP.
Planning, Policy and Public Outreach	Emergency Operations Plan	Develop an Emergency Operations Plan to assist TTD personnel who have key roles and responsibilities during an emergency response. The document would provide an overview of TTD's organization, policies, and approach to emergency management of an incident, including hazards discussed in the 2023 HMP. It would also provide targeted information, forms, and checklists to direct and support the activities of TTD staff participating in emergency response efforts.
Planning, Policy, Program, and Public Outreach	Continuity of Operations Plan	Develop a Continuity of Operations Plan to ensure that TTD can continue to perform its essential functions, provide essential services, and deliver core capabilities during a disruption to normal operations.
Planning, Policy, Program, and Public Outreach	Regional Evacuation Plan	Develop a Regional Evacuation Plan that contains strategies to coordinate regional transportation policies, infrastructure planning and response plans throughout the region in the event of an emergency evacuation.
Planning, Policy, Program, and Public Outreach	Tabletop Exercises	Develop and conduct a tabletop exercise (or series of tabletop exercises) with relevant stakeholders focused on the regional transportation response to a winter storm and/or wildfire. Include the use of ferries for evacuation.

Notes:
HMA = Hazard Mitigation Assistance
RCC = Regional Coordinating Council
TTD = Tahoe Transportation District

Table D-5: TTD—Draft Mitigation Action List

Mitigation Action 1	**Broadband and Communications Network Expansion**
Description	Bolster and expand the Lake Tahoe Basin's Intelligent Transportation Systems, broadband, and cellular communications network. It is important to have a resilient communications system (a community lifeline) before a disaster to broadcast warning and evacuation information, during a disaster and during extreme weather events to allow essential communication services to keep critical government, medical and emergency services, and communicating with the traveling public during and after these events as a way for people to connect to important resources, reach safe locations, declare their safety and telework, telemedicine, and participate in online education, if necessary. Consider upgrading the system to have an autonomous power supply, safer and more accessible equipment location, critical system backup, co-location with other utilities, and system monitoring too.
Hazard(s)	All
Building / Infrastructure	Existing and proposed
Benefits / Costs	Project will require funding to develop, install and operate. Project will also require regular maintenance and inspections.
Source	Vulnerability of California Roadways to Post-Wildfire Debris Flows (UCLA Institute of Transportation Studies, 2020), One Tahoe: A Transportation Funding Initiative (TTD, 2021), Guide to Expanding Mitigation (FEMA, 2021)
Mitigation Action 2	**Bus Exportable Power Systems (BEPS)**
Description	Purchase electric buses and during emergencies or disasters use them as mobile backup generators (i.e., BEPS) for critical facilities and other critical needs.
Hazard(s)	All
Building / Infrastructure	Proposed
Benefits / Costs	There are not enough generators when disasters hit. According to the BEPS program manager at University of Texas – Austin, "Transit agencies have a vast collection of raw horsepower in the form of their buses, along with a large supply of energy with their onsite diesel fuel stations. Tapping into this resource and outfitting transit buses with exportable power could provide a game-changing capability for emergency response power needs." Energy is considered a community lifeline.
Source	FTA, University of Texas – Austin
Mitigation Action 3	**Maintenance Building and Yard Mitigation**
Description	It is essential for critical facilities, including TTD's Maintenance building and yard, to remain functional during and after a disaster. As such, retrofit TTD's existing Maintenance building and yard and/or build TTD's proposed Maintenance building and yard to withstand various hazards identified for each building location. As noted in **Section 4**, the existing and proposed Maintenance building and yard are in earthquake, flood, wildfire, and winter storm hazard areas. They are also susceptible to climate change impacts. Mitigation measures may include seismic retrofits, rooftop strengthening, elevated electrical equipment, backup power, and defensible space.
Hazard(s)	Climate change, earthquake, flood, wildfire, and winter storm

Building / Infrastructure	Existing and proposed
Benefits / Costs	Project will require funding to mitigate each critical facility. Critical facilities need regular maintenance, which helps the structure and building systems that make up the facility better withstand disasters. TTD may want to consider a capital improvement plan with five-year projections to plan for major repairs, and then establish a schedule for upgrades to help plan for and secure the necessary funding. Mass transit is considered a community lifeline.
Source	FEMA Recovery Advisory: CNMI RA-2
Mitigation Action 4	**Bus Stop, Mobility Hub, MB/TC, and Transit Center Mitigation**
Description	It is essential for critical assets to remain functional before, during and after a disaster. As such, retrofit and/or build bus stops, mobility hubs, MH/TC, and/or transit centers to withstand a variety of hazards. As noted in **Section 4**, the existing and proposed bus stops, mobility hubs, MB/TC, and transit centers are in earthquake, flood, landslides, wildfire, and winter storm hazard areas. They are also susceptible to climate change and drought impacts. They are not located in dam failure inundation areas. Mitigation measures may include cool pavement, greening of critical assets, seismic retrofits and rooftop strengthening, elevated electrical equipment and backup power, and defensible space.
Hazard(s)	Climate change, drought, earthquake, flood, landslide, wildfire, and winter storm
Project Type	Structure and infrastructure
Building / Infrastructure	Existing and proposed
Benefits / Costs	Project will require funding to mitigate each critical facility. In addition, critical facilities need regular maintenance, which helps the structure and building systems that make up the facility better withstand disasters. TTD may want to consider a capital improvement plan with five-year projections to plan for repairs, and then establish a schedule for ongoing maintenance and facility upgrades to help plan for and secure the necessary funding. Mass transit is considered a community lifeline.
Source	FEMA Recovery Advisory: CNMI RA-2
Mitigation Action 5	**Emergency Operations Plan**
Description	Develop an Emergency Operations Plan to assist TTD personnel who have key roles and responsibilities during an emergency response. The document would provide an overview of TTD's organization, policies, and approach to emergency management of an incident. It would also provide targeted information, forms, and checklists to direct and support the activities of TTD staff participating in emergency response efforts.
Hazard(s)	All
Building / Infrastructure	Not applicable
Benefits / Costs	Project will require initial funding to develop plan according to national/state standards. Once developed, the document should undergo periodic review and maintenance.
Source	Comprehensive Preparedness Guide 101 Version 3 (FEMA, 2021), Tahoe Regional Transportation Plan: Policy 3.4: Support emergency preparedness and response planning, including the development of regional evacuation plans (TRPA, 2020)

Mitigation Action 6	Continuity of Operations Plan
Description	Develop a Continuity of Operations Plan to ensure that TTD can continue to perform its essential functions, provide essential services, and deliver core capabilities during a disruption to normal operations.
Hazard(s)	All
Project Type	Resiliency
Building / Infrastructure	Not applicable
Benefits / Costs	Project will require initial funding to develop plan according to national/state standards. Once developed, the document should undergo periodic review and maintenance.
Source	Continuity Guidance Circular (FEMA, 2018)
Mitigation Action 7	**Coordinated Transportation Management Center**
Description	Create a transportation management center (TMC) to receive and disseminate real-time information to and from passengers, transit vehicles, field staff including transit staff and traffic enforcement staff, and partner transportation agencies within and beyond the Lake Tahoe Basin. The TMC will also serve other functions including maintenance support, a training facility for transportation management personnel, resource center for transportation data, and a department operations center in the event of an emergency.
Hazard(s)	Dam failure, earthquake, flood, landslide, wildfire, and winter storm
Building / Infrastructure	Proposed
Benefits / Costs	Traditionally, a TMC is located in a physical building. It may be part of a single agency or a multi-agency facility and managed by operators and emergency responders. However, newer communication, computing, and software technology advances may make a virtual TMC possible. There are a number of considerations to determine if a physical, virtual or hybrid TMC is suitable, including facilities, operations and maintenance costs, and hardware and software systems and web-based applications.
Source	Tahoe Regional Transportation Plan: Page 68 (TRPA, 2020)
Mitigation Action 8	**Regional Evacuation Plan**
Description	Develop a Regional Evacuation Plan that contains strategies to coordinate regional transportation policies, infrastructure planning and response plans throughout the region in the event of an emergency evacuation.
Hazard(s)	Dam failure, earthquake, flood, landslide, wildfire, and winter storm
Building / Infrastructure	Not applicable
Benefits / Costs	Project will require initial funding to develop plan according to national/state standards. Once developed, the document should undergo periodic review and maintenance.
Source	Tahoe Regional Transportation Plan: Policy 3.4: Support emergency preparedness and response planning, including the development of regional evacuation plans (TRPA, 2020), Boulder Transportation Master Plan (2019), Regional Mass Transportation & Evacuation Plan (Bay Area UASI, 2011)

Mitigation Action 9	**Tabletop Exercises**
Description	Develop and conduct a tabletop exercise (or series of tabletop exercises) with relevant stakeholders focused on the regional transportation response to a dam failure, earthquake, flood, landslide, wildfire, and/or winter storm event.
Hazard(s)	Dam failure, earthquake, flood, landslide, wildfire, and winter storm
Building / Infrastructure	Not applicable
Benefits / Costs	Exercises help build preparedness for threats and hazards by providing a low-risk, cost-effective environment to test and validate plans, policies, procedures and capabilities, and identify resource requirements, capability gaps, strengths, areas for improvement, and potential best practices. Project will require funding to develop, put on, and hotwash the tabletop exercises.
Source	Homeland Security Exercise and Evaluation Program, U.S. Department of Homeland Security (2020)
Mitigation Action 10	**Critical Facilities Mitigation in Additional Flood Hazard Areas**
Description	TTD may have critical facilities that are in potential / additional flood hazard areas, such as pluvial flooding areas (due to extreme precipitation) and lakeshore flooding areas (due to tsunami/seiche waves). Use existing reports/studies and/or LiDAR data to identify areas that are prone to extreme precipitation and/or expected tsunami/seiche wave inundation. Determine TTD critical assets at risk and mitigate through measures such as vertical elevation and protective structures.
Hazard(s)	Climate change, flood, and earthquake
Building / Infrastructure	Existing and proposed
Benefits / Costs	Project will require funding to identify hazards and critical facilities at risk. This can be done in-house and/or by a consultant. The cost of mitigating an existing and/or proposed critical facility will depend on the mitigation effort. In addition, critical facilities need regular maintenance, which helps the structure and building systems that make up the facility better withstand disasters. TTD may want to consider a capital improvement plan with five-year projections to plan for repairs, and then establish a schedule for ongoing maintenance and facility upgrades to help plan for and secure the necessary funding. Mass transit is considered a community lifeline.
Source	TTD
Mitigation Action 11	**Additional Hazard Mapping and Vulnerability Analysis**
Description	Acquire missing hazard mapping datasets (dam failure, earthquake, flood, landslide, and wildfire) for the Nevada side of the Lake Tahoe Basin. Using the newly acquired hazard data, along with the existing Nevada data for watersheds, snowfall and avalanche, conduct a vulnerability analysis for TTD critical facilities. Consider implementing Mitigation Action #4 measures for TTD critical facilities that are identified as being located in a hazard area.
Hazard(s)	Dam failure, earthquake, flood, landslide, wildfire for missing hazard mapping All hazards for vulnerability analysis
Building / Infrastructure	Existing and proposed

Benefits / Costs	Project will require time and effort to acquire pre-existing hazard mapping datasets and conduct a vulnerability analysis to determine which TTD critical facilities are in hazard areas. GIS datasets can be acquired from the Nevada Department of Emergency Management, MyHAZARDS – Nevada, USGS, and FEMA. A work can be done in-house and/or by a consultant. Mass transit is considered a community lifeline.
Source	AECOM

Notes:
BEPS = Bus Exportable Power Systems
FEMA = Federal Emergency Management Agency
FTA = Federal Transit Administration
TMC = transportation management center
TTD = Tahoe Transportation District

Table D-6: TTD—Finalized Mitigation Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
1	Broadband and Communications Network Expansion	High	BRIC	Management / Capital Programs	1–5 years
2	Bus Exportable Power Systems (BEPS)	High	STBG, 5339 Bus and Bus Facilities Formula Program, PROTECT Discretionary Grant Program	Management / Capital Programs	1–5 years
3	Maintenance Building and Yard Mitigation	Highest	BRIC / HMGP	Management / Capital Programs	1–3 years
4	Bus Stop, Mobility Hub, MB/TC, and Transit Center Mitigation	Highest	BRIC / HMGP	Management / Capital Programs	1–5 years
5	Emergency Operations Plan	Highest	BRIC / HMGP	Transit Systems	1–3 years
6	Continuity of Operations Plan	Highest	National Continuity Programs	Transit Systems	1–3 years
7	Coordinated Transportation Management Center	High	EOC Grant Program	Transit Systems	5+ years
8	Regional Evacuation Plan	Highest	PROTECT Discretionary Grant Program	Transit Systems	1–3 years
9	Tabletop Exercises	Highest	NEP	Transit Systems	1–3 years
10	Critical Facilities Mitigation in Additional Flood Hazard Areas	High	BRIC / HMGP, PROTECT Discretionary Grant Program	Management / Capital Programs	1–5 years
11	Additional Hazard Mapping and Vulnerability Analysis	High	PROTECT Discretionary Grant Program	Management / Capital Programs	1–5 years

Notes:
BRIC = Building Resilient Infrastructure and Communities
EOC = Emergency Operations Center
FEMA = Federal Emergency Management Agency
HMGP = Hazard Mitigation Grant Program
NEP = National Exercise Program
PROTECT = Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program
STBG = Surface Transportation Block Grant

Table D-7: TTD—Integration of 2023 HMP

HMP Section	Existing Plan/Policy/Program	Process / Timeframe
Section 4 – Risk Assessment	Coordinated Human Services Transportation Plan (CHSTP) (TTD, 2019)	The CHSTP is designed to gather input and cooperation of local transit agencies, social service agencies, community agencies, and the public. The plan offers strategies for meeting local needs as determined collectively through participation in the Regional Coordinating Council (RCC). The RCC provides an opportunity for groups that may not typically meet to discuss transportation needs and ways to improve access throughout the region. The RCC includes representatives from health and human service agencies, transportation providers, non-profit agencies, and other community groups. TTD should present the 2023 HMP's risk assessment to the RCC to consider for inclusion in the CHSTP next update, which should occur in 2024. Additionally, TTD should also use the 2023 HMP's risk assessment to help the RCC determine/refine the role of public transit in evacuation planning.
Section 5 and Appendix D – Mitigation Strategy	Tahoe Transportation District Short Range Transit Plan (TTD, 2017)	The SRTP's 5-year vision focuses on establishing a solid foundation upon which an improved transit system can grow. The 2023 HMP's mitigation strategy supports this growth through mitigation and resilience-focused strategies. As such, TTD should incorporate the 2023 HMP mitigation strategy into the Future Mitigation Strategies section of the SRTP during the next SRTP update (which is currently ongoing).

Notes:
CHSTP = Coordinated Human Services Transportation Plan
RCC = Regional Coordinating Council
TTD = Tahoe Transportation District

APPENDIX E—TAHOE RESOURCE CONSERVATION DISTRICT

Table E-1: Tahoe RCD—Human and Technical Resources for Hazard Mitigation

Program	Principal Activities Related to Hazard Mitigation
Administration and Operations	Administration and Operations consists of an Executive Director, Director of Finance and Administration, Director of Programs, Human Resources and Grants Manager, and Bookkeeper and Office Coordinator. Administration and Operations is in charge of daily operations of the Tahoe RCD, including financial management, strategic planning, budgeting, legal affairs, and human resource needs.
Aquatic Invasive Species Program	The AIS Program consists of an AIS Program Manager, AIS Prevention Coordinator, three AIS Watercraft Inspection Site Supervisors, AIS Outreach Coordinator, and AIS Control Coordinator. The AIS Program works to prevent the introduction of new invasive species, educate the public on AIS, control existing populations of AIS, and monitor for new populations around Lake Tahoe.
Fire Adaptive Communities Program	The Fire Adaptive Communities Program consists of a Fire Adaptive Communities Program Manager, Fire Adaptive Communities Program Coordinator and a CWPP Coordinator. Tahoe RCD works with local fire districts, public land management agencies and neighborhoods to manage the Tahoe Network of Fire Adapted Communities.
Restoration and Land Management Program	The Restoration and Land Management Program consists of a Restoration and Land Management Program Manager, TCP Program Manager, TCP Program Assistant, TCP Environmental Technician and Land Steward, and TCP Land Steward. Tahoe RCD Tahoe RCD works with communities, land managers, private landowners, and other local and regional partners to plan, consult on, and implement innovative restoration projects around the Lake Tahoe Basin.
Stormwater Program	The Stormwater Program consists of a Stormwater and Environmental Services Program Manager and a Stormwater Program GIS Specialist. Tahoe RCD manages the Regional Stormwater Monitoring Program.

Notes:
AIS = Aquatic Invasive Species
CWPP = Community Wildfire Protection Plan
GIS = Geographic Information System
Tahoe RCD = Tahoe Resource Conservation District
TCP = Tahoe Conservation Partnership

Table E-2: Tahoe RCD—Financial Resources for Hazard Mitigation

Name	Purpose
California Department of Conservation Regional Forest and Fire Capacity Program (RFFC)	The RFFC makes available block grants to support regional leadership to "build local and regional capacity and develop, prioritize, and implement strategies and projects that create fire adapted communities and landscapes by improving ecosystem health, community wildfire preparedness, and fire resilience." RFFC block grants support partner capacity, project readiness, implementation of demonstration projects, and regional priority planning to achieve landscape-level and community wildfire resilience. In August 2022, the California Tahoe Conservancy awarded a $406,500 RFFC block grant to the Tahoe RCD to update critical plans, including pre-attack wildfire plans and the Lake Tahoe Basin Community Wildfire Protection Plan (CWPP) to reduce wildfire dangers in the Greater Lake Tahoe Area.
California Department of Fish and Wildlife (CDFW) Watershed Restoration Grant Program	Starting in FY 22–23, CDFW will have over $200 million dedicated to restoration, including funding for grants for new initiatives under Nature Based Solutions, Drought and Climate resiliency. CDFW will accept proposals on a continual basis to fund hazard-related projects that (1) address urgent degrading water and habitat conditions due to climate change impacts and (2) restore mountain meadows and non-coastal wetlands.
CAL FIRE Forest Health Grant Program	The Forest Health Grant Program provides financial assistance for forest restoration projects that restore forest resilience from catastrophic disturbance. Eligible activities include forest fuels reduction, fire reintroduction, reforestation, and utilization of forest biomass. Funding for 2023 will be up to $120 million with an additional $50 million available for post-fire reforestation.
CAL FIRE Wildfire Prevention Grants Program	The Wildfire Prevention Grants Program offers financial assistance for local projects in and near fire-threatened communities that focus on increasing the protection of people, structures, and communities. Qualified activities include hazardous fuels reduction, wildfire prevention planning, and wildfire prevention education with an emphasis on improving public health and safety while reducing greenhouse gas emissions. Funding for 2023 will be up to $120 million.
CAL FIRE Wildfire Resilience Program	The Wildfire Resilience Program block grants provide technical and financial assistance to forestland owners to conduct forest restoration or management activities on their properties. Projects should prioritize funding forest improvement practices, including (but not limited to) tree and brush thinning, tree release, pruning, site preparation and tree planting, follow-up work to support tree growth, and/or slash disposal. This grant opportunity will not fund prescribed fire but will fund burning of piles for slash disposal. Wildfire Resilience block grant applicants are limited to counties, resource conservation districts, special districts, and non-profit organizations that have the capacity to deliver a forestry-based technical and financial assistance program to non-industrial forest landowners.

Table E-2: Tahoe RCD—Financial Resources for Hazard Mitigation

Name	Purpose
California Tahoe Conservancy (CTC)	CTC is a state agency established in 1985 that "leads California's efforts to restore and enhance the extraordinary natural and recreational resources of the Lake Tahoe Basin." CTC works collaboratively with its federal, tribal, State, local, and private partners to achieve its mission. CTC uses its funding to accomplish its mission and Strategic Plan, which includes (1) steward conservancy lands and protect basin communities from wildfire, (2) restore the resilience of basin forests and watersheds and (3) foster basinwide climate change adaptation and sustainable communities. CTC offers five grant categories, including acquisition grants, planning grants, implementation grants, monitoring grants, and technical assistance grants.
California Water Boards Stormwater Grant Program (SWGP)	The purpose of the SWGP is to "use of storm water and dry weather runoff as a resource to maximize water supply, water quality, flood management, environmental, and other community benefits within the watershed." SWGP grants in the amount of $250,000 to $10 million are awarded to multi-benefit stormwater management projects. Tahoe RCD received a $212,598.10 SWGP grant to prepare a Storm Water Resource Plan (SWRP) for the Tahoe-Sierra Region.
El Dorado and Placer County Property Tax Increment	Tahoe RCD receives a modest share of the property tax increment from parcels within the district's service area (El Dorado and Placer Counties) that amounts to approximately $135,000 to $162,000 annually. Tahoe RCD receives an average of 0.1144 percent from the parcels within El Dorado County and 0.1130 percent from the parcels within Placer County.

Table E-2: Tahoe RCD—Financial Resources for Hazard Mitigation

Name	Purpose
FEMA HMA Grants	The HMA grant program provides technical and financial assistance to help mitigate hazards through the following grants: BRIC: BRIC is an annual competitive pass-through grant program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area. BRIC was created in 2020 as part of the Disaster Recovery Reform Act of 2018 and replaces FEMA's legacy Pre-Disaster Mitigation grant program. BRIC funds a wide variety of mitigation activities, including microgrids, flood control, wetland restoration, community relocation/buyouts, seismic retrofits, and nature-based solutions. BRIC Direct Technical Assistance as a non-financial assistance grant program for: local hazard mitigation plan development initial support, identifying solutions for specific hazards, assisting with hazard mitigation project planning, requesting application development support, demonstrating cost-effectiveness of a BRIC sub-application submission, and understanding hazard mitigation grant management. HMGP: HMGP is pass-through grant program that supports pre- and post-disaster mitigation plans and projects for state and local agencies and federally recognized tribal governments. HMGP funding is authorized with a Presidential Major Disaster Declaration. A governor or tribal chief executive may request HMGP funding when submitting a disaster declaration. The amount of funding made available to the applicant is generally 15 percent of the total federal assistance amount provided for recovery from the Presidential Major Disaster Declaration. HMGP–Post-Fire: HMGP Post-Fire is a pass-through grant program that provides funding for state and local agencies and federally recognized tribal governments to reduce wildfire risks. Funded projects include (but are not limited to) defensible space initiatives, ignition-resistant construction, hazardous fuels reduction, erosion control measures, slope failure prevention measures, and flash flooding prevention. HMGP–Post-Fire grants are available to eligible states and territories that receive Fire Management Assistance declarations and to federally recognized tribal governments that have land burned within a designated area. A Post-Fire Presidential Disaster Declaration is not required to activate funding. Funding amounts are determined by FEMA and are based on a national aggregate calculation of historical Fire Management Assistance Grant declarations over the past 10 years.

Table E-2: Tahoe RCD—Financial Resources for Hazard Mitigation

Name	Purpose
Natural Resources Conservation Service Watershed Programs	The Natural Resources Conservation Service Watershed Programs provide technical and financial assistance to help implement conservation practices that address watershed resource concerns through the following grant programs: Emergency Watershed Protection Program: The Emergency Watershed Protection Program offers technical and financial assistance to help relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed. Emergency Watershed Protection Program grants are available to local agencies, conservation districts, federally recognized tribal governments, and interested public and private landowners that have a sponsor. Watershed Protection and Flood Prevention Program: The Watershed Protection and Flood Prevention Program provides technical and financial assistance to help plan and implement watershed programs, including flood prevention. It is available to state and local agencies and federally recognized tribal governments and for watersheds that are 250,000 acres and smaller.
Parasol Tahoe Community Foundation	The Parasol Tahoe Community Foundation was founded in 1996 as a non-profit that is dedicated to supporting the Tahoe region. Its initiatives include fire safety and fire prevention, affordable housing, economic resiliency, and sustainable tourism. In 2019, the Parasol Tahoe Community Foundation awarded Tahoe RCD a grant of $18,057 to enhance wildfire suppression capabilities on the Nevada side of Lake Tahoe. This donation has resulted in expansion of strategic and tactical wildfire pre-attack plans covering the entire Lake Tahoe Basin.
Sierra Nevada Conservancy Watershed Improvement Program	The Sierra Nevada Conservancy is a state agency established through bi-partisan legislation to “initiate, encourage, and support efforts that improve the environmental, economic, and social well-being of California’s Sierra Nevada-Cascade region, its communities, and the people of California.” The Sierra Nevada Conservancy’s Watershed Improvement Program funds projects that restore, protect, and enhance watersheds and communities in California’s Sierra Nevada-Cascade region. These grants are awarded through grant programs under four regional goals: Forest & Watershed Health, Strategic Land Conservation, Vibrant Recreation & Tourism, and Resilient Communities.
Tahoe Fund	The Tahoe Fund was founded in 2010 as a non-profit in both California and Nevada. The goal of the fund is to become a major source of private funding for environmental projects around the Lake Tahoe Basin. In 2019, the Tahoe Fund launched the Smartest Forest Fund (with a goal of $5 million) to seek funding for and invest in promising new ideas and pilot projects around forest health. The the Smart Forest Fund awarded Tahoe RCD with a grant for Community Hardening & Resident Preparedness to “revamp” its community hardening and preparedness programs.

Table E-2: Tahoe RCD—Financial Resources for Hazard Mitigation

Name	Purpose
Tahoe Truckee Community Foundation (TTCF)	TTCF is a philanthropic organization dedicated to improving the lives and environment in the North Tahoe area. Since 1998, the TTCF has "played key role in identifying and addressing the needs of their region and responding with resources and solutions." TTCF has four impact areas: family strengthening, forest health, housing, and impact investing. TTCF works with donors, nonprofits, community partners, local governments, and funders from outside the region to steward donor gifts into the community through annual grant cycles, community initiatives, and the strengthening of nonprofit organizations. Tahoe RCD received funding from TTCF to develop the Fire Adapted Community Neighborhood Leader Training Video in both Spanish and English.
Truckee River Fund	Truckee Meadows Water Authority (TMWA) established the Truckee River Fund in 2004. The purpose of the fund as stated in the fund agreement is that it "shall be used exclusively for projects that protect and enhance water quality or water resources of the Truckee River, or its watershed." In addition, the fund provides TMWA with a vehicle for responding to the numerous requests from outside groups and organizations that are involved in promoting and improving the health of the Truckee River System and watershed, thus benefiting the primary water source for the community and, in the long run, benefiting TMWA customers. In 2015, Tahoe RCD was awarded a $112,000 grant from the Truckee River Fund for aquatic invasive species prevention and control. In 2014, Tahoe RCD was also awarded a grant from the Truckee River Fund in the amount of $49,000 to prepare baseline maps delineating aquatic invasive species and trash along the Truckee River corridor.
U.S. Forest Service: Community Wildfire Defense Grant	The Community Wildfire Defense Grant, funded through the Bipartisan Infrastructure Law, is intended to help at-risk local communities and tribes reduce the risk against wildfire. The grant provides funding for two types of projects: the development and revision of community wildfire protection plan (CWPP) and the implementation of projects described in CWPP that were written less than 10 years ago. Priority is given to at-risk communities in an area identified as having high or very high wildfire hazard potential, are low-income, and/or have been impacted by a severe disaster.

Notes:
BRIC =
CAL FIRE = California Department of Forestry and Fire Protection
CDFW = California Department of Fish and Wildlife
CTC = California Tahoe Conservancy
CWPP = community wildfire protection plan
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
HMGP = Hazard Mitigation Grant Program
RFFC = Regional Forest and Fire Capacity Program
SWGP = Stormwater Grant Program
SWRP = Storm Water Resource Plan
Tahoe RCD = Tahoe Resource Conservation District
TMWA = Truckee Meadows Water Authority
TTCF = Tahoe Truckee Community Foundation

Table E-3: Tahoe RCD—Planning, Policy, Program, and Public Outreach Resources for Hazard Mitigation

Type	Description
Strategic Plans	The Strategic Plan 2021–2023 (Tahoe RCD, 2020) highlights new strategies and opportunities that address the impacts of urban runoff, invasive species, climate change, wildfire awareness, restoration, and other critical environmental concerns of the basin.
Stormwater Plans	Senate Bill 985 (SB 985), the Storm Water Management Planning Act of 2014, requires a SWRP as a condition of receiving grant funds for storm water and dry weather runoff capture projects from any bond approved by California voters after January 2014. The intent of SB 985 is to encourage the use of storm water and dry weather runoff as a resource to maximize water supply, water quality, flood management, environmental, and other community benefits within the watershed. In 2018, Tahoe RCD completed a SWRP for the Tahoe-Sierra Region. The plan was developed to address the SWRP Guidelines which focuses on watershed-based approaches to stormwater management. Tahoe RCD is the lead agency in the adaptive management (tracking and reporting performance, synthesize findings, recommending adjustments, and adopting and implementing adjustments) of the SWRP.
Aquatic Invasive Species Programs	Tahoe RCD's Prevention Program conducts watercraft inspections and outreach "Take Care" campaigns. Control activities remove existing invasive species while monitoring activities look for new invasive species populations.
Fire Adapted Communities Programs	As a member of the Tahoe Fire and Fuels Team, Tahoe RCD collaborates with local fire districts, public land management agencies, and neighborhoods to manage the Tahoe Network of Fire Adapted Communities (Tahoe Network). The Tahoe Network strives to prepare people and property for wildfire by coordinating efforts on a neighborhood scale. The Tahoe Network connects residents to fire protection districts and public land management agencies to create defensible space and ember awareness; educates residents through the Tahoe Living With Fire website, publications and workshops; and empowers neighborhoods to work together with neighborhood leaders to prepare for wildfire.
Stormwater Programs	Tahoe RCD manages the Regional Stormwater Monitoring Program for the Lake Tahoe Basin. The program is designed to monitor urban stormwater at select locations in the Tahoe Basin for nutrients and sediments. There are seven jurisdictions around the lake that must comply with stormwater management regulations to reduce pollutant loading to the lake. Data collected by Regional Stormwater Monitoring Program is also used to assesses the cumulative effect of environmental improvement projects and better management practices on stormwater quality.
Restoration and Land Management Programs	Through a Joint Powers Agreement, Tahoe RCD has been providing the California Tahoe Conservancy with field crews and specialists to assist with the management of their lands for over 25 years. Through this agreement, both agencies collaboratively manage approximately 4,700 parcels totaling nearly 6,500 acres on the California-side of the Lake Tahoe Basin. Tahoe RCD crew work includes forest habitat enhancement and hazardous fuel reduction, resource protection and restoration, streambank stabilization and monitoring, property inspection and maintenance, and aquatic invasive species management.

Table E-3: Tahoe RCD—Planning, Policy, Program, and Public Outreach Resources for Hazard Mitigation

Type	Description
Environmental Services Programs	Tahoe RCD conducts wildlife, vegetation, and habitat surveys on lands associated with fuel reduction projects, and forestry, wetland, and riparian restoration projects. Additionally, Tahoe RCD conducts geomorphic surveys before and after implementation of restoration projects.

Notes:
SWRP = Storm Water Resource Plan
Tahoe RCD = Tahoe Resource Conservation District

Table E-4: Tahoe RCD—Ability to Improve On / Expand Resources

Capability	Type/Description	Expansion
Human and Technical	Executive Director / Board	Continue to build relationships and work on long term, ongoing agreements/partnerships with Tahoe Fire and Fuels Teams, Watershed Improvement Program, TCP, and the Regional Stormwater Board Monitoring Program.
Human and Technical	Mitigation Grant Specialist	Appoint or assign someone within Tahoe RCD to oversee HMA mitigation grant opportunities, including notifying Tahoe RCD of upcoming grant cycles, and spearheading Notice of Intents applications, grant applications, and grant management requirements.
Financial	HMA Funding	Apply for HMA funding as it becomes available for projects pre-identified in Tahoe RCD plans and programs, including the 2023 HMP.
Planning, Policy, Program, and Public Outreach	Fire Adapted Communities	Reach new demographics – engage with school-age children, non-English speaking communities, long-term renters, and visitors in outreach efforts.

Notes:
HMA = Hazard Mitigation Assistance
Tahoe RCD = Tahoe Resource Conservation District
TCP = Tahoe Conservation Partnership

Table E-5: Tahoe RCD—Draft Mitigation Action List

Mitigation Action 1	**Johnson Meadow Wetland and Stream Restoration Project**
Description	Restore Johnson Meadow along the Upper Truckee River, which includes over 200 acres of meadow and riparian habitat. The project will remove conifers that are encroaching on meadows and aspen stands. The restoration will increase soil moisture retention, sequester carbon, and protect habitat that provides refuge for diverse species under climate change, and include a long-term monitoring plan.
Hazard(s)	Climate change, dam failure, drought, and flood
Building / Infrastructure	Existing and future
Benefits / Costs	Project has been pre-identified in a detailed list of adaptation actions in the Tahoe Climate Adaption Action Portfolio (2C. Adaptation Actions, page 19). Project will accommodate increased flooding, withstand prolonged drought, and serve as climate refuges for native species. FEMA RVIII has previously determined the apparent efficacy of a similar type of project. Project will require funds/personnel to actively restore and monitor restoration work.
Source	Tahoe Climate Adaptation Action Portfolio (CTC and TTD, 2021), 2020 Ninemile Creek Mitigation Pre-Disaster Mitigation Project
Mitigation Action 2	**Polaris Creek Restoration Project**
Description	Plan, fund, and implement wetland and stream restoration projects on along Polaris Creek that can accommodate increased flooding, withstand prolonged drought, and serve as climate refuges for native species.
Hazard(s)	Climate change, drought, and flood
Building / Infrastructure	Existing and future
Benefits / Costs	Project has been pre-identified as a “high-priority” project in a detailed list of adaptation actions in the Tahoe Climate Adaption Action Portfolio (2C. Adaptation Actions, page 19). Project will accommodate increased flooding, withstand prolonged drought, and serve as climate refuges for native species. FEMA RVIII has previously determined the apparent efficacy of a similar type of project. Project will require funds/personnel to actively restore and monitor restoration work.
Source	Tahoe Climate Adaptation Action Portfolio (CTC and TTD, 2021), 2020 Ninemile Creek Mitigation Pre-Disaster Mitigation Project
Mitigation Action 3	**Stormwater Monitoring Station Back-up Power Source**
Description	Tahoe RCD manages the Regional Stormwater Monitoring Program which monitors urban stormwater runoff entering the lake for nutrients and sediments. There are a multitude of technical difficulties that can be encountered with stormwater monitoring, including power failure due to hazardous conditions which can result in data gaps. Although al Tahoe RCD stormwater monitoring stations are equipped with solar panels to recharge batteries, some stations do not have enough sun exposure to keep batteries

	continuously charged (especially during winter), and during periods of extended cloud cover or snow blockage and subsequent decrease in solar recharge, all stations are subject to power failure.
Hazard(s)	Climate change, earthquake, landslide, flood, wildfire, and winter storm
Building / Infrastructure	Existing
Benefits / Costs	Project will require funds/personnel to purchase, install and maintain the back-up power source.
Source	Annual Stormwater Monitoring Report WY21 (Tahoe RCD, 2022)
Mitigation Action 4	**Regional Landscape Conservation Measures for Lake Tahoe 1**
Description	Regional Landscape Conservation program for the Tahoe RCD includes technical assistance for implementing erosion control, native and fire-wise landscaping, fertilizer management, invasive weed management, and water conservation measures including water harvesting technologies. Educational materials and stewardship opportunities will be used to provide assistance to the California side of the Lake Tahoe Basin. Additionally, this project will work cooperatively and complementary to the South Tahoe Public Utility District's Regional Water Conservation Project and is intended to increase water conservation efforts in the region.
Hazard(s)	Climate change, flood, and winter storm
Building / Infrastructure	Existing
Benefits / Costs	Project has been pre-identified as a ranked project in the 2018 Stormwater Resource Plan: Tahoe-Sierra Region (Appendix E and Appendix F). Project has been pre-identified as a ranked project in the 2014 Tahoe Sierra Integrated Regional Water Management Plan.
Source	2018 Stormwater Resource Plan: Tahoe-Sierra Region (Tahoe RCD, 2018), Tahoe Sierra Integrated Regional Water Management Plan (STPUD, 2014)
Mitigation Action 5	**Diverse Aquatic Plant Control Techniques**
Description	Enhance the integrated aquatic invasive species management program that uses a combination of control methods, such as mechanical and physical control. Remove aquatic invasive species from aquatic habitats in the Lake Tahoe Basin, subsequently improving water quality conditions in wetlands, tributaries, marinas, and embayments.
Hazard(s)	Climate change
Building / Infrastructure	Existing
Benefits / Costs	Project will require continual ecosystem evaluation in order to weigh the pros and cons of each management method and combination, and measure effectiveness of habitat restoration in lake, river, creek, and pond aquatic ecosystems.
Source	2021–2023 Strategic Plan (Tahoe RCD, 2020)
Mitigation Action 6	**Defensible Space Assistance Program**
Description	Develop a program that is designed to assist homeowners that need to create a defensible space of 100 feet around their homes, and are not able to do so because of physical, economic, or other barriers. Each homeowner would need to apply for the

	program Services would include brush and tree trimming/thinning, dead tree removal, if funding permits and is applicable, raking of dead leaves and pine needles, chipping of removed vegetation, on-site education about effective defensible space, initial one-day defensible space clean up.
Hazard(s)	Climate change and wildfire
Building / Infrastructure	Existing
Benefits / Costs	Project will require funds/personnel to develop program, conduct public outreach, manage the program, and to carry-out defensible space work.
Source	Fire Safe Council of San Diego County
Mitigation Action 7	**Fire Adapted Communities Expansion / Wildfire Education**
Description	Through the Tahoe Network, continue to host Wildfire Home Retrofit Workshops where regional and national experts present home hardening techniques. Expand program to reach new demographics – engage with school-age children, non-English speaking communities, long-term renters, and visitors in outreach efforts. Develop guides and materials to distribute at workshops.
Hazard(s)	Climate change and wildfire
Building / Infrastructure	Existing
Benefits / Costs	Project has been pre-identified in a detailed list of adaptation actions in the Tahoe Climate Adaption Action Portfolio (5C. Wildfire Education Adaptation Actions, page 49). Project will require funds/personnel to develop and host workshops and develop and print guides and materials. Once the workshop program is developed it can be used repeatedly.
Source	2021–2023 Strategic Plan (Tahoe RCD, 2020), Tahoe Climate Adaptation Action Portfolio (CTC and TTD, 2021)
Mitigation Action 8	**Structural Hardening Assessments**
Description	Through the Tahoe Network, (1) identify project areas in which structural hardening assessments will occur, (2) conduct community outreach and engagement to identify approximately eligible property owners and conduct property pre-inspections, (3) complete assessments for eligible and interested property owners, (4) provide cost-share incentives (i.e.: 75 percent cash-match incentives up to $20,000) to residents for structural hardening or, as an alternative option, have the Tahoe Network directly implement the structural hardening strategy.
Hazard(s)	Climate change and wildfire
Building / Infrastructure	Existing
Benefits / Costs	Project has been pre-identified in the 2021–2023 Strategic Plan. Retrofitting existing homes can have substantial costs, but components (roof, exterior wall and deck), project scope/costs can be prioritized based on neighborhood context or fire severity zone (Headwater Economics, 2018). FEMA RIX has previously determined the apparent efficacy of this type of project.

	Project will require funds/personnel to identify project areas, conduct community outreach, develop assessments, assess properties and, in some instances, harden properties.
Source	2021–2023 Strategic Plan (Tahoe RCD, 2020), 2021 Wildfire Resilience Sonoma County BRIC Project, 2021 Nevada County and Fire Safe Council of Nevada County BRIC Project
Mitigation Action 9	**Defensible Space Assessments**
Description	Through the Tahoe Network, (1) identify project areas in which defensible space assessments will occur, (2) conduct community outreach and engagement to identify approximately eligible property owners and conduct property pre-inspections, (3) complete assessments for eligible and interested property owners, (4) provide cost-share incentives (i.e.: 75 percent cash-match incentives up to $6,000) to residents for vegetation management or, as an alternative option, have the Tahoe Network implement selected vegetation management strategy.
Hazard(s)	Climate change and wildfire
Building / Infrastructure	Existing
Benefits / Costs	Homeowners benefit from defensible space on their properties and the benefits extend to others as well. When a homeowner maintains defensible space, their home is less likely to ignite other nearby structures, overwhelm firefighters, and threaten surrounding communities from wildfires (California Local Analyst's Office Report, 2021). California Public Resource Code 4291 and local fire codes already require property owners in high to extreme fire severity zones to maintain defensible space around all structures. However, there can be several barriers to achieving high compliance, including lack of resources in the form of time and money. FEMA RIX has previously determined the apparent efficacy of this type of project. Project will require funds/personnel to identify project areas, conduct community outreach, develop assessments, assess properties and, in some instances, remove vegetation.
Source	2021 Wildfire Resilience Sonoma County BRIC Project, 2021 Nevada County and Fire Safe Council of Nevada County BRIC Project
Mitigation Action 10	**Dead or Dying Tree Removal Program**
Description	Remove standing dead or dying trees on private properties within the Lake Tahoe Basin to mitigate wildfire risk. Properties and trees to be identified through surveys. Hand and mechanical methods may be used.
Hazard(s)	Climate change, drought, and wildfire
Building / Infrastructure	Existing
Benefits / Costs	Project will expand safe zones by reducing occurrence of crown fire. Project will need to include avoidance and minimization measures to limit the potential for adverse impacts to resources and community members, such as noise and air quality. FEMA RIX has previously determined the apparent efficacy of this type of project. Project will require funds/personnel to survey properties and trees and also to hand/mechanical remove trees. Mechanical thinning is generally more cost effective than hand thinning for removal of large trees (trees greater than 16 inches diameter).

	Hand thinning is generally limited to the removal of trees less than 16 inches diameter on steeper slopes, and in sensitive areas.
Source	Town of Paradise Wildfire Mitigation Fact Sheet (FEMA, 2022)
Mitigation Action 11	**Micro Stormwater Infiltration Systems for the Lake Tahoe Basin**
Description	Recent analysis of LiDAR data and other remotely sensed data in Incline Village, South Lake Tahoe, and Tahoma has identified a potential to develop stormwater detention and infiltration areas based on small-scale patterns of land topography. This information makes it possible to identify the volume of Micro Stormwater Infiltration Systems achievable by small and simple modifications to existing depressions in the landscape. Micro Stormwater Infiltration Systems have the potential to infiltrate urban stormwater and reduce flooding. This project aims to build on results from previously analyzed LiDAR data and stormwater infrastructure to determine hydrologic connectivity and identify areas that could be used to increase stormwater infiltration.
Hazard(s)	Climate change and flood
Building / Infrastructure	Existing and future
Benefits / Costs	Project has been pre-identified as a ranked project in the 2014 Tahoe Sierra Integrated Regional Water Management Plan.
Source	Tahoe Sierra Integrated Regional Water Management Plan (STPUD, 2014)
Mitigation Action 12	**Innovative Best Management Practices and Retrofits to Improve Climate Change Resilience**
Description	Modify and/or replace existing stormwater system infrastructure in the Lake Tahoe Basin to increase stormwater retention, conveyance, and groundwater infiltration capacity by employing nature-based solutions.
Hazard(s)	Climate change and flood
Building / Infrastructure	Existing
Benefits / Costs	Objective has been identified as a top priority in the 2023 Total Maximum Daily Load Annual Strategy. Project aims to implement stormwater projects to enhance infiltration and treatment of stormwater to improve climate change resiliency. The project will require coordination with state and local jurisdictions in the Lake Tahoe Basin. Project builds on results of an assessment of existing urban stormwater infrastructure performance under projected future climate conditions and research on emerging technologies for better stormwater management.
Source	2023 Total Maximum Daily Load Annual Strategy (Nevada Division of Environmental Protection and Lahontan Regional Water Quality Control Board, December 2022)
Mitigation Action 13	**Long-Range Fire Detection Camera Installation Project**
Description	Installation of long-range fire detection cameras. Cameras will alert emergency officials of potential wildfires by constantly surveying the Lake Tahoe Basin for smoke and fire in order to prevent the loss of life, property, and economic damage. Project will coordinate to install high-definition cameras, mounted on strategically-selected, high elevation towers capable of detecting smoke and fire from as far away as 60 miles during the day and 150 miles at night using infrared technology. Once a wildfire is detected, the system will email or text data and images to CAL FIRE dispatch centers.

Hazard(s)	Climate change, drought, and wildfire
Building / Infrastructure	Existing and future
Benefits / Costs	Project will enable emergency personnel to send life-saving evacuation warnings to residents and mobilize firefighting resources to critical locations to fight, contain, and stop the fire's spread. Project will require funds/personnel to develop program, coordinate resources, conduct public outreach and manage the program. FEMA RIX has previously determined the apparent efficacy of this type of project.
Source	FEMA Grants California Governor's Office of Emergency Services and Sonoma County $2 million for Wildfire Detection System (Feb 2020)
Mitigation Action 14	**Additional Hazard Mapping and Vulnerability Analysis**
Description	Acquire missing hazard mapping datasets (dam failure, earthquake, flood, landslide, and wildfire) for the Nevada side of the Lake Tahoe Basin. Using the newly acquired hazard data, along with the existing Nevada data for watersheds, snowfall and avalanche, conduct a vulnerability analysis for Tahoe RCD critical facilities. Consider implementing Mitigation Action #4 measures for facilities identified in the vulnerability analysis as being in hazard areas.
Hazard(s)	Dam failure, earthquake, flood, landslide, wildfire for missing hazard mapping All hazards for vulnerability analysis
Building / Infrastructure	Existing
Benefits / Costs	Project will require time and effort to acquire pre-existing hazard mapping datasets and conduct a vulnerability analysis to determine which TTD critical facilities are in hazard areas. GIS datasets can be acquired from the Nevada Department of Emergency Management, MyHAZARDS – Nevada, USGS, and FEMA. This work can be done in-house and/or by a consultant.
Source	AECOM
Mitigation Action 15	**Upper Truckee River Project Partnership**
Description	Explore potential future partnership with the City of South Lake Tahoe to restore the Airport Reach of the Upper Truckee River. The Upper Truckee River watershed is the largest watershed in the Lake Tahoe Basin and has the highest annual sediment loads of all the tributaries to Lake Tahoe. According to the Bureau of Land Management (BLM), benefits for similar projects have included: increased groundwater elevation and increased plant available water which provides desired habitat for several wildlife species; improved aquatic habitat conditions from increased pool depth and increased pool frequency; increased streambank vegetation and stream shade; and increased streambank stability/less bank erosion due to increased vegetation.
Hazard(s)	Climate change, drought, and flood
Building / Infrastructure	Existing and future
Benefits / Costs	Project will accommodate increased flooding, withstand prolonged drought, and serve as climate refuges for native species.

	FEMA RVIII has previously determined the apparent efficacy of a similar type of project. Project will require funds/personnel to actively restore and monitor restoration work.
Source	Tahoe RCD, BLM Upper Truckee River Reach 5 Restoration and Utility Relocation Project

Notes:
BLM = Bureau of Land Management
BRIC = Building Resilient Infrastructure and Communities
FEMA = Federal Emergency Management Agency
Tahoe RCD = Tahoe Resource Conservation District

Table E-6: Tahoe RCD—Finalized Mitigation Action Plan

No.	Project Name	Priority Ranking	Potential Funding Source	Program Lead	Project Implementation
1	Johnson Meadow Wetland and Stream Restoration Project	Highest Priority	BRIC / HMGP, Sierra Nevada Conservancy Watershed Improvement Program	Restoration and Land Management Program	2–3 years
2	Polaris Creek Restoration Project	High Priority	BRIC / HMGP, Sierra Nevada Conservancy Watershed Improvement Program	Restoration and Land Management Program	2–3 years
3	Stormwater Monitoring Station Back-up Power Source	Highest Priority	BRIC / HMGP	Stormwater Program	1–2 years
4	Regional Landscape Conservation Measures for Lake Tahoe 1	High Priority	BRIC / HMGP	Restoration and Land Management Program	2–3 years
5	Diverse Aquatic Plant Control Techniques	High Priority	BRIC / HMGP	Aquatic Invasive Species Program	2–3 years
6	Defensible Space Assistance Program	Highest Priority	BRIC / HMGP, Community Wildfire Defense Grant, CAL FIRE Wildfire Prevention Grants Program	Fire Adaptive Communities Program	2–3 years
7	Fire Adapted Communities Expansion / Wildfire Education	Highest Priority	BRIC / HMGP, Community Wildfire Defense Grant, CAL FIRE Wildfire Prevention Grants Program	Fire Adaptive Communities Program	2–3 years
8	Structural Hardening Assessments	Highest Priority	BRIC / HMGP, Community Wildfire Defense Grant, CAL FIRE Wildfire Prevention Grants Program	Fire Adaptive Communities Program	2–3 years
9	Defensible Space Assessments	Highest Priority	BRIC / HMGP, Community Wildfire Defense Grant, CAL FIRE Wildfire Prevention Grants Program	Fire Adaptive Communities Program	2–3 years

10	Dead or Dying Tree Removal Program	Highest Priority	BRIC / HMGP, Community Wildfire Defense Grant, CAL FIRE Wildfire Resilience Program	Fire Adaptive Communities Program	2–3 years
11	Micro Stormwater Infiltration Systems for the Lake Tahoe Basin	Highest Priority	BRIC / HMGP, California Water Boards Stormwater Grant Program	Stormwater Program	1–2 years
12	Innovative Best Management Practices and Retrofits to Improve Climate Change Resilience	Highest Priority	BRIC / HMGP, California Water Boards Stormwater Grant Program	Stormwater Program	1–2 years
13	Long-Range Fire Detection Camera Installation Project	Highest Priority	BRIC / HMGP	Fire Adaptive Communities Program	1–2 years
14	Additional Hazard Mapping and Vulnerability Analysis	High	Tahoe Fund	Administration and Operations	1–3 years

Notes:
BRIC = Building Resilient Infrastructure and Communities
CAL FIRE = California Department of Forestry and Fire Protection
HMGP = Hazard Mitigation Grant Program

Table E-7: Tahoe RCD—Integration of 2023 HMP

HMP Section	Existing Plan/Policy/Program	Process / Timeframe
Section 5 and Appendix E – Mitigation Strategy	Tahoe RCD Strategic Plan	During the next Strategic Plan update (2024–2026), highlight new strategies identified in the 2023 HMP's Draft Mitigation Action List and Finalized Mitigation Action Plan.
Section 5 and Appendix E – Mitigation Strategy	Living with Fire website	Update the Living with Fire website with any new mitigation programs as programs are announced and/or implemented (and identified in the 2023 HMP).

Notes:
HMP = Hazard Mitigation Plan
Tahoe RCD = Tahoe Resource Conservation District