CALTRANS Adaptation Priorities REPORT






DISTRICT 3

December

2020

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Term and Definitions

- **Adaptation:** The steps taken to prepare a community or modify a targeted asset prior to a weather or climate-related disruption to minimize or avoid the impacts of that event. An example would be elevating assets in areas likely to experience increased flooding in the future.

- **Exposure:** The presence of infrastructure in places and settings where it could be adversely affected by hazards and threats, for example, a road in a floodplain.[1]

- **Hazards and Stressors:** Stresses on transportation system performance and condition. Whether such impacts occur today (e.g., riverine flooding that closes major highways) or whether they are part of a long- term trend (e.g., sea level rise), mainstreaming resilience efforts into an agency's functions requires an understanding of their nature, scope, and magnitude. The terms are used interchangeably to refer to transportation impacts originating primarily from natural causes (e.g., flooding or wildfire hazards).

- **Resilience:** The characteristic of a system that allows it to absorb, recover from, or more successfully adapt to adverse events.

- **Risk***:* "A combination of the likelihood that an asset will experience a particular climate impact and the severity or consequence of that impact."[2]

- **Sensitivity:** Per the Federal Highway Administration, "refers to how an asset or system responds to, or is affected by, exposure to a climate change stressor. A highly sensitive asset will experience a large degree of impact if the climate varies even a small amount, where as a less sensitive asset could withstand high levels of climate variation before exhibiting any response."[3]

- **Uncertainty:** The degree to which a future condition or system performance cannot be forecast. Both human-caused and natural disruptions, especially for longer-term climate changes, are by their very nature uncertain events (as no one knows for sure exactly when and where and with what intensity they will occur). Sensitivity tests using multiple plausible scenarios of future conditions can help one understand the range of uncertainty and its implications. This approach is used routinely when working with climate projections to help understand the range of possible conditions given different future greenhouse gas emission scenarios.

- **Vulnerability:** Per the Federal Highway Administration, "the degree to which a system is susceptible to or unable to cope with adverse effects of climate change or extreme weather events."[4]

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[1] This definition is adopted from the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report. 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
[2] FHWA. 2017. "Vulnerability Assessment and Adaptation Framework: Third Edition." Retrieved September 25, 2020 from https://www.fhwa.dot.gov/environment/sustainability/resilience/adaptation_framework/climate_adaptation.pdf
[3] Ibid.
[4] FHWA. 2014. "FHWA Order 5520. "Transportation System Preparedness and Resilience to Climate Change and Extreme Weather Events." Dec. 15. Retrieved June 30, 2020 from https://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm

1. INTRODUCTION

California's climate is changing. Temperatures are warming, sea levels are rising, wet years are becoming wetter, dry years are becoming drier, and wildfires are becoming more intense. Most scientists attribute these changes to the unprecedented amounts of greenhouse gases in the atmosphere. Given that global emissions of these gases continue at record rates, further changes in California's climate are, unfortunately, very likely.

The hazards brought on by climate change pose a serious threat to California's transportation infrastructure. Higher than anticipated sea levels can regularly inundate roadways, extreme floods can severely damage bridges and culverts, rapidly moving wildfires present profound challenges to timely evacuations, and higher than anticipated temperatures can cause expensive pavement damage over a broad area. As Caltrans' assets such as bridges and culverts age, they will be forced to weather increasingly severe conditions that they were not designed to handle, adding to agency expenses and putting the safety and economic vitality of California communities at risk.

Recognizing this, Caltrans has initiated a major agency-wide effort to adapt their infrastructure so that it can withstand future conditions. The effort began by determining which assets are most likely to be adversely impacted by climate change in each Caltrans district. That assessment, described in the Caltrans Climate Change Vulnerability Assessment Report for District 3, identified stretches of the State Highway System within the district that are potentially at risk. This Adaptation Priorities Report picks up where the vulnerability assessment left off and considers the implications of those impacts on Caltrans and the traveling public, so that facilities with the greatest potential risk receive the highest priority for adaptation. District 3 anticipates that planning for, and adapting to, climate change will continue to evolve subsequent to this report's release as more data and experience is gained.

1.1. Purpose of Report

The purpose of this report is to prioritize the order in which assets found to be exposed to climate hazards will undergo detailed asset-level climate assessments. Since there are many potentially exposed assets in the district, detailed assessments will need to be done sequentially according to their priority level. The prioritization considers, amongst other things, the timing of the climate impacts, their severity and extensiveness, the condition of each asset (a measure of the sensitivity of the asset to damage), the number of system users affected, and the level of network redundancy in the area. Prioritization scores are generated for each potentially exposed asset based on these factors and used to rank them.

1.2. Report Organization

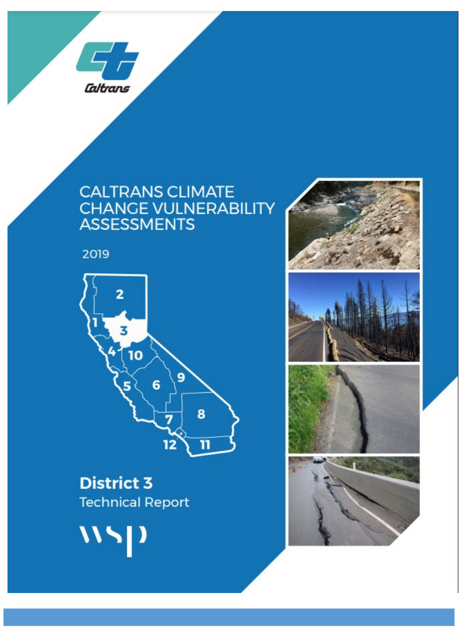
The main feature of this report is the prioritized list of potentially exposed assets within District 3. Per above, this information will inform the timing of the detailed adaptation assessments of each asset, which is the next phase of Caltrans' adaptation work. The final prioritized list of assets for District 3 can be found in Chapter 4 of this document. The interim chapters provide important background information on the prioritization process. For example, those interested in learning more about Caltrans' overall adaptation efforts, and how the prioritization fits into that, should refer to Chapter 2. Likewise, those who are interested in learning more about how the prioritization was determined should refer to Chapter 3.

2. CALTRANS' CLIMATE ADAPTATION FRAMEWORK

Enhancing Caltrans' capability to consider adaptation in all its activities requires an agency-wide perspective and a multi-step process to make Caltrans more resilient to future climate changes. The process for doing so will take place over many years and will, undoubtedly, evolve over time as everyone learns more about climate hazards, better data is collected, and experience shows which techniques are most effective. Researchers have just started examining what steps an overarching adaptation framework for a department of transportation should entail. Figure 1 provides a graphical illustration of one such path called the Framework for Enhancing Agency Resiliency to Natural and Anthropogenic Hazards and Threats (FEAR-NAHT).[5] This framework, developed through the National Cooperative Highway Research program (NCHRP), has been adopted by Caltrans as part of its long-term plan for incorporating adaptation into its activities (hereafter referred to as the Caltrans Climate Adaptation Framework or "Framework").

Steps 1 through 4 of the Framework represent activities that are currently underway at Caltrans Headquarters to effectively manage its new climate adaptation program and develop policies that will help jumpstart adaptation actions throughout the organization. Step 1, *Assess Current Practice*, and Step 4, *Implement Early Wins*, are both addressed within a document called the Caltrans Climate Adaptation Strategy Report. The Adaptation Strategy Report undertook a comprehensive review of all climate adaptation policies and activities currently in place or underway at Caltrans. The report also includes numerous no-regrets adaptation actions ("early wins") that can be taken in the near-term to enhance agency resiliency. Several of these strategies also touch on elements of Step 2, *Organize for Success*, and Step 3, *Develop an External Communications Strategy and Plan*. In addition to this, a comprehensive adaptation communications strategy and plan for climate change is being developed as part of a Caltrans pilot project with the Federal Highway Administration.

Step 5, *Understand the Hazards and Threats*, is the first step where detailed technical analyses are performed, and in this case, identify assets potentially exposed to various climate stressors. This step has been completed for a subset of the assets and hazards in District 3 and the results are presented in the Caltrans Climate Change Vulnerability Assessment Report for District 3. The exposure information generated in the Vulnerability Assessment Report is used as an input to this study.



COVER OF THE CALTRANS CLIMATE CHANGE VULNERABILITY ASSESSMENT TECHNICAL REPORT FOR DISTRICT 3

[5] This framework and related guidance for state DOTs is being developed as part of NCHRP 20-117, Deploying Transportation Resilience Practices in State DOTs (expected completion in 2020).

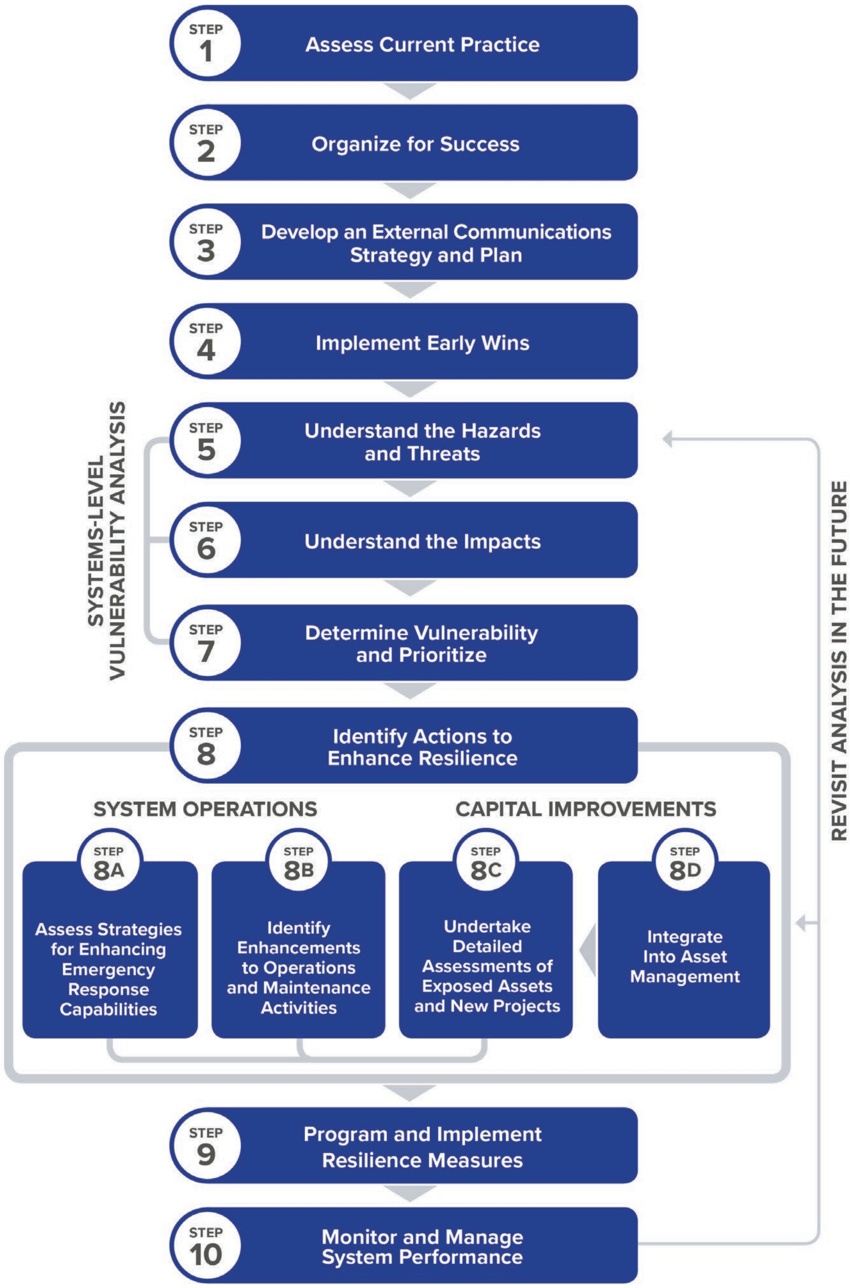


FIGURE 1: CALTRANS' CLIMATE ADAPTATION FRAMEWORK (FEAR-NAHT FRAMEWORK)

The work undertaken for this study, the District 3 Adaptation Priorities Report covers both Steps 6 and 7 in the Framework. Step 6, *Understand the Impacts*, is focused on the implications of the exposure identified in Step 5. This includes understanding the sensitivity of the asset to damage from the climate stressor(s) it is potentially exposed to and understanding the criticality of the asset to the functioning of the transportation network and the communities it serves. Developing an understanding of these considerations is part of the prioritization methodology described in the next chapter.

Step 7, *Determine Vulnerability and Prioritize*, focuses on creating and implementing a prioritization approach that considers both the nature of the exposure identified in Step 5 (its severity, extensiveness, and timing) and the consequence information developed in Step 6. The goal of the prioritization is to identify which assets should undergo detailed adaptation assessments first, because resource constraints will prevent all assets from undergoing detailed study simultaneously.

After Step 7, the Framework divides into two parallel tracks, one focused on operational measures to enhance resiliency and the consideration of adaptation (Steps 8A and 8B) and the other on identifying adaptation-enhancing capital improvement projects (Steps 8C and 8D). Collectively, these represent the next steps that should be undertaken using the information from this report. On the operations track, the results of this assessment should be reviewed for opportunities to enhance emergency response (Step 8A) and operations and maintenance (Step 8C). Caltrans' next step on the capital improvement track should be to undertake detailed assessments of the exposed facilities (Step 8C). The prioritization information generated as part of this assessment should also be integrated into the state's asset management system (Step 8D). All projects recommended through the asset management process should also undergo detailed adaptation assessments (hence the arrow from Step 8D to 8C).

Thus, there will be two parallel pathways for existing assets to get to detailed facility level adaptation assessments. The first is through this prioritization analysis, which is driven primarily by the exposure to climate hazards with asset condition as a secondary consideration. The second is through the existing asset management process, which is driven primarily by asset condition and will have vulnerability to climate hazards as a secondary consideration.

The detailed adaptation assessments in Step 8C will involve engineering-based analyses to verify asset exposure to pertinent climate hazards (some exposed assets featured in this report will not be exposed after closer inspection). Then, if exposure is verified, Step 8C includes the development and evaluation of adaptive measures to mitigate the risk. The highest priority assets from this study will be evaluated first and lower priority assets will be evaluated later. Once specific adaptation measures have been identified, be they operational measures or capital improvements, these projects can then be programmed (Step 9). Step 10 then focuses on continuous monitoring of system performance to track progress towards enhancing resiliency. Note the feedback loops from Step 10 to Steps 5 and 8. The arrow back to Step 5 indicates that the exposure analysis should be revisited in the future as new climate projections are developed. The arrow back to Step 8 indicates how one can learn from the performance indicators and use this data to modify the actions being undertaken to enhance resilience.

3. PRIORITIZATION METHODOLOGY

3.1. General Description of the Methodology

The methodology used to prioritize assets exposed to climate hazards draws upon both technical analyses and the on-the-ground knowledge of all district staff. The technical analysis component was undertaken first to provide an initial indication of adaptation priorities. These initial priorities were then reviewed with district staff at a workshop and adjusted to reflect local knowledge and recommendations. These adjustments are embedded in the final priorities shown in Chapter 4.

With respect to the technical analysis, there are a few different approaches for prioritizing assets based on their vulnerability to climate hazards. The approach selected for this study is known as the indicators approach. The indicators approach involves collecting data on a variety of variables that are determined to be important factors for prioritization. These are then put on a common scale, weighted, and used to create a score for each asset. The scores collectively account for all the variables of interest and can be ranked to determine priorities.

It is important to note that, since the prioritization process is focused on determining the order in which detailed adaptation assessments are conducted, only assets determined to be potentially exposed to a climate hazard are included in this analysis. Assets that were determined to have no exposure to the hazards studied are not included in this study.

The remainder of this chapter describes the prioritization methodology in detail. Section 3.2 begins by describing the asset types and hazards studied. Next, Section 3.3 discusses the individual prioritization metrics (factors) that were used in the technical analysis. Following this, Section 3.4 describes how those individual factors were brought together into an initial prioritization score for each asset. Lastly, Section 3.5 describes how the initial prioritization was adjusted with input from district staff.

3.2. Asset Types and Hazards Studied

Caltrans is responsible for maintaining dozens of different asset types (bridges, culverts, roadway pavement, buildings, etc.). Each of these asset types is uniquely vulnerable to a different set of climate stressors. Resource constraints only allowed this study to investigate a subset of the asset types owned by Caltrans in District 3 and, for those, only a subset of the climate stressors that could impact them. Additional exposure and prioritization analyses are needed in the future to gain a fuller understanding of Caltrans' adaptation needs.

I-80 RAMP REPAIR NEAR NYACK

The subset of asset types and hazards included in this study generally mirror those that were included in the District 3 Climate Change Vulnerability Assessment Report. That said, exposure to two additional hazards was included as part of this study: (1) riverine flooding impacts to bridges and culverts and (2) temperature impacts to pavement binder grade. Table 1 shows all the asset types included in this study for District 3 and marks with an "X" the hazards that were evaluated for each in the exposure analysis.

TABLE 1: ASSET-HAZARD COMBINATIONS STUDIED

	Temperature	Riverine Flooding	Wildfire	Sea Level Rise	Storm Surge
Pavement Binder Grade	X				
At-Grade Roadways				X	X
Bridges		X		X	X
Large Culverts[6]		X		X	X
Small Culverts[7]		X	X	X	X

The various asset-hazard combinations include:

- **Pavement binder grade exposure to temperature changes:** Binder can be thought of as the glue that holds the various aggregate materials in asphalt together. Binder is sensitive to temperature. If temperatures become too hot, the binder can become pliable and deform under the weight of traffic. On the other hand, if temperatures are too cold, the binder can shrink causing cracking of the pavement. There are various types (grades) of binder, each suited to a different temperature regime. This study and the Caltrans District 3 Climate Change Vulnerability Assessment considered how climate change will influence high and low temperatures and how this, in turn, could affect pavement binder grade performance.[8]

  Assumptions were made that (1) all roadways are currently (or could be in the future) asphalt and (2) the binder grade currently in place on each segment of roadway matches the specifications in the Caltrans Highway Design Manual. From here, the allowable temperature ranges of each binder grade were compared to projected temperatures in 2040, 2070, and 2100. If the temperature parameters exceeded the design tolerance of the assumed binder grade, that segment of roadway was deemed to be potentially exposed.

DAMAGED PAVEMENT SLABS SOUTH OF SUTTERVILLE

- **Bridge exposure to riverine flooding:** Bridges are sensitive to higher flood levels and river flows. With climate change, precipitation is generally expected to become more intense in District 3 leading to increased flooding on rivers and streams. These higher flows could exceed the design tolerances of bridges. In addition, wildfires are also expected to become more prevalent in District 3 with climate change. After a wildfire burns, the ground can become hard and less

6 Culverts 20 feet or greater in width.
7 Culverts less than 20 feet in width.
8 See the District 3 Climate Change Vulnerability Assessment Summary and/or Technical Reports for more information about the temperature data used to assess pavement performance: https://dot.ca.gov/programs/transportation-planning/2019-climate-change-vulnerability-assessments

capable of absorbing water. As a result, flood flows can increase substantially in the aftermath of a fire which could further exacerbate the risks to bridges. To better understand the threat posed to bridges in District 3, a flood exposure index was developed and calculated for each bridge that crosses a river or stream. The index considered both the changes in precipitation and wildfire likelihood in the area draining to the bridge in the early, mid, and late century timeframes. The index also considers the capacity of the bridge to handle higher flows using waterway adequacy information from the National Bridge Inventory (NBI). A higher score on the index indicates bridges at relatively greater risk due to a combination of higher projected flows and lower capacity.

- **Large culvert exposure to riverine flooding:** A distinction is made in the analysis between large and small culverts due to different data being available for each. Large culverts are included in the NBI and are generally 20 feet or greater in width. Small culverts are generally shorter than 20 feet in width and covered through a different inventory/inspection program. Large culverts, like bridges, are sensitive to increased flood flows. Thus, a flood exposure index was calculated for each large culvert in the same manner as was done for bridges.

- **Small culvert exposure to riverine flooding:** Small culverts (those less than 20 feet in width) are, like bridges and large culverts, also sensitive to higher flood flows. Hence, a flood exposure index like the one for bridges and large culverts was calculated for this asset type. The one difference is that the capacity component of the index for small culverts used the actual dimensions of the culvert, information that was not available for bridges and large culverts. Although the actual dimensions of small culverts were available, due to resource and data constraints, no hydraulic analyses were performed to determine overtopping potential. Instead, the size was simply used as a factor in the riverine flood exposure index.

- **Small culvert exposure to wildfire:** In addition to the higher post-fire flood flows captured in the flood exposure analysis, culverts can also be sensitive to the direct impacts of fire on the structure. Certain culvert materials (e.g. wood and plastic) can easily burn or be deformed during a fire. Thus, an assessment was made to determine the likelihood of a wildfire directly impacting each small culvert in the early, mid, and late century timeframes. This analysis was only conducted for small culverts because information on culvert construction materials was not available for large culverts.

SMALL CULVERT

- **At-grade roadway exposure to sea level rise:** Sea level rise, caused by the warming of ocean waters and the melting of land-based glaciers, is a prominent hazard brought on by climate change. In low-lying areas like the Sacramento-San Joaquin Delta (the Delta), at-grade roads may become subject to regular inundation as sea levels rise. This can lead to frequent road closures that disrupt travel and accessibility. In some locations with regular inundation, premature degradation roadway infrastructure may also occur.

- **Bridge exposure to sea level rise:** There are several ways in which sea level rise may adversely affect bridges. For very low bridges, a rise in sea levels may result in water overtopping the deck and impeded travel. It is important to recognize, however, that serious impacts can still occur to bridges from sea level rise even if water does not overtop the deck. For example, the navigability of Delta channels may become impeded as sea level rise diminishes clearance levels for boats.

- **Large and small culvert exposure to sea level rise:** Culverts are primarily used to convey streams and stormwater underneath roadways, and some are also used in tidally influenced areas like the Delta. Sea level rise is culverts on the Delta can change the hydraulic performance of the culvert leading to more frequent overtopping of the nearby roadway. For culverts that were not designed for a tidal setting, the frequent unanticipated presence of saltwater can also lead to corrosion and other maintenance issues that may decrease the anticipated lifespan of the asset.

- **At-grade roadway exposure to storm surge:** Storm surge refers to the elevating of coastal waters during major storm events. When strong winds blow onshore during such events, this can cause the water to pile up and reach levels much greater than during the normal tidal cycle. Sea level rise can cause the water to reach even higher during major storm events and increase the frequency and severity of inundation. Inundation of at-grade roadways from storm surge may require the road to be closed, disrupting travel. Also, the surge and wave action often associated with storm events can cause erosion of the roadway embankment.

- **Bridge exposure to storm surge:** Storm surge presents many threats to bridges that may not have been fully anticipated if sea level rise was not considered during design. Some low bridges may be overtopped by the surge and others may be affected by uplifting forces from wave action hitting the bottom of the deck. Either situation is likely to lead to the closure of the bridge and introduce the potential for serious structural damage. Even if the water is not high enough to reach the bridge deck, the elevated water levels and associated wave action can cause erosion or flooding around bridge approaches. Furthermore, if the surge approaches or recedes at a high enough velocity, scouring of soils can occur around bridge piers and abutments weakening the structure and potentially compromising the bridge's integrity. This is a particularly acute threat for surge-impacted bridges built over roadways or railroads (as opposed to over water) because scour may not have been considered during their initial designs.

- **Large and small culvert exposure to storm surge:** Storm surge can overwhelm culverts and flood roadways, impeding travel. If the velocity of the surge is great enough, the hydraulic forcing of excessive water through too small an opening can also damage the culvert. Water overtopping the roadway embankment or levee on top of the culvert may also cause erosion resulting in damages to the roadway and the culvert itself.

3.3. Prioritization Metrics

Metrics are the individual variables used to calculate a prioritization score for each asset. These can be thought of as the individual factors that, collectively, help determine the asset's priority for adaptation. Each of the asset-hazard combinations described in the previous section has its own unique set of factors that are used in the prioritization. The metrics were selected based on their relevancy to each asset-hazard combination and data availability. For example, the condition rating of a culvert is a very relevant metric for prioritizing culverts exposed to riverine flooding, however, it is not at all relevant to prioritizing bridges exposed to the same hazard. Table 2 provides an overview of all the metrics included in this study and denotes with an "X" their application to the various asset-hazard combinations studied.

The metrics included in this study fall into two categories: exposure metrics and consequence metrics. Exposure metrics capture the extensiveness, severity, and timing of a hazard's projected impact on an asset. Assets that have more extensive, more severe, and sooner exposure are given a higher priority. Consequence metrics provide an indication of how sensitive an exposed asset is to damage using information on the asset's condition. Consequence metrics also indicate how sensitive the overall transportation network may be to the loss of that asset should it be taken out of service by a hazard. The poorer the initial condition of the potentially exposed asset and the more critical it is to the functioning of the transportation network, the higher the priority given. The specific metrics that are included within each of these categories are described in the sections that follow.

TABLE 2: METRICS INCLUDED FOR EACH ASSET-HAZARD COMBINATION STUDIED

Metrics	Sea Level Rise				Storm Surge				Wildfire	Tempera-ture	Riverine Flooding		
	At-Grade Roadways	Bridges	Large Culverts	Small Culverts	At-Grade Roadways	Bridges	Large Culverts	Small Culverts	Small Culverts	Pavement Binder Grade	Bridges	Large Culverts	Small Culverts
Exposure													
Past natural hazard impacts	X	X	X	X	X	X	X	X	X		X	X	X
Lowest impactful sea level rise (SLR) increment	X	X	X	X									
Percent of road segment exposed to 6.6 ft. of SLR	X												
Lowest impactful SLR increment with 100-year storm surge					X	X	X	X					
Percent of road segment exposed to a 100-year storm with 4.6 ft. of SLR					X								
Initial timeframe for elevated level of concern for wildfire									X				
Highest projected wildfire level of concern									X				
Initial timeframe when asphalt binder grade needs to change										X			
Maximum riverine flooding exposure score for the 2010-2039 timeframe											X	X	X
Maximum riverine flooding exposure score											X	X	X
Consequences													
Bridge substructure condition rating						X					X		
Channel and channel protection condition rating											X	X	
Culvert condition rating							X	X				X	X
Culvert material				X					X				
Scour rating						X					X		
Average annual daily traffic (AADT)	X	X	X	X	X	X	X	X	X	X	X	X	X
Average annual daily truck traffic (AADTT)	X	X	X	X	X	X	X	X	X	X	X	X	X
Incremental travel distance to detour around the asset									X		X	X	X
Incremental travel distance to detour around the asset for the lowest impactful SLR increment	X	X	X	X	X	X	X	X					
Incremental travel distance to detour around the asset under the maximum increment of SLR (6.6 feet of SLR alone and 4.6 feet of SLR with a 100-year storm.[9]	X	X	X	X	X	X	X	X					

[9] Both sea level rise and storm surge datasets were applied when calculating detour routes. Data applied came from two different models which use different methodologies and assumptions. As such, the model results did not match up across the same flood extents. In the detour analysis, if a road was exposed to sea level rise but not surge due to differing model extents, then the detour would assume the roadway was exposed to sea level rise AND surge.

3.3.1. Exposure Metrics

The following metrics were used to assess asset exposure in District 3:

- **Past natural hazard impacts:** Assets that have experienced weather or fire-related impacts in the past are likely to experience more issues in the future as climate changes and should be prioritized. To obtain information on past impacts, District 3 maintenance staff were surveyed and asked to identify any bridges, large culverts, or small culverts that had experienced riverine flooding-related impacts over the last 20 years. Care was taken to ensure that these impacts occurred on assets that had not been replaced with a more resilient design after the event occurred. In addition, staff were also asked if any small culverts were damaged directly by fire and replaced with culverts of the same material. Any asset that was identified as previously impacted by either flooding or fire was flagged and that asset was given a higher priority for adaptation.

FLOODING AT WILLOW REST AREA

- **Lowest impactful sea level rise increment:** Assets that are likely to be impacted by sea level rise sooner should receive higher priority for detailed facility level assessments. To consider this in the asset scoring, a metric was developed that captured the lowest (first) increment of sea level rise[10] to potentially impact each at-grade roadway, bridge[11], large culvert, and small culvert.

[10] Sea level rise areas hydrologically connected to the sea and hydrologically disconnected low-lying areas potentially vulnerable to sea level rise inundation were both used for this assessment.

[11] The lowest impactful sea level rise scenario for bridges was determined by whichever increment of sea level rise first causes inundation under the bridge. For bridges already over Delta channels, potential impacts were assumed to occur at the lowest available increment of sea level rise. No analyses were performed to compare the elevations of the bottoms of the bridge decks to the underlying water elevations. The

This metric made use of the Climate Central sea level rise data used in the District 3 Climate Change Vulnerability Assessment.[12] This data is available across the Delta for the following sea level rise heights: 0.0, 0.8, 1.6, 2.5, 3.3, 4.1, 4.9, 5.7, and 6.6 feet. The lower the sea level rise increment that first impacts the asset, the higher priority it received for this metric.

- **Percent of road segment exposed to 6.6 ft. of sea level rise:** For at-grade roadway segments[13], not only is the timing of sea level rise impacts an important factor, but also the extensiveness of the impacts. All else being equal, a segment of road that is impacted over a large proportion of its length should receive higher priority than one impacted over only a small area. The 6.6 feet sea level rise increment from Climate Central was used for this metric in order to provide an indicator of more severe, potential impacts at the end of the century under a pessimistic greenhouse gas emissions scenario.

SLOPE EROSION

- **Lowest impactful sea level rise increment with 100-year storm surge:** As with sea level rise, assets that are likely to be impacted by storm surge sooner should receive higher priority for detailed facility level assessments. To factor this into the analysis, this metric captures the lowest (first) sea level rise increment at which the 100-year storm surge could potentially impact each at-grade roadway, bridge[14], large culvert, and small culvert. The CalFloD-3D model was used for this exercise and in the District 3 Climate Change Vulnerability Assessment storm surge assessment.[15] CalFloD-3D modeled a more limited set of future sea level rise increments than the Climate Central model (0.0, 1.6, 3.3, and 4.6 feet) with a 100-year storm event.

- **Percent of road segment exposed to a 100-year storm surge with 4.6 feet of sea level rise:** This metric measures the proportion of each at-grade roadway segment exposed to a 100-year storm surge. The highest CalFloD-3D model sea level rise and storm surge increment of 4.6 feet was applied. The highest model sea level rise increment is representative of 2080 projections under

analysis was set up this way in recognition of the impacts possible at bridges from sea level rise before water touches the deck (e.g., corrosion, structural instability, erosion, scour, and navigability concerns).

[12] See the District 3 Climate Change Vulnerability Assessment Summary and/or Technical Reports for more information: https://dot.ca.gov/programs/transportation-planning/2019-climate-change-vulnerability-assessments

[13] At-grade roadways are segmented at intersections with other roads thereby matching the segmentation used for the pavement binder grade analysis.

[14] As with sea level rise, the lowest impactful sea level rise scenario for bridges was determined by whichever increment of sea level rise first causes storm surge inundation under the bridge. For bridges already over Delta waters, potential impacts were assumed to occur at the lowest available increment of sea level rise. No analyses were performed to compare the elevations of the bottoms of the bridge decks to the underlying water elevations. The analysis was set up this way in recognition of the impacts possible at bridges from storm surge before water touches the deck (e.g., corrosion, structural instability, erosion, scour, and navigability concerns).

[15] See the District 3 Climate Change Vulnerability Assessment Summary and/or Technical Reports for more information: https://dot.ca.gov/programs/transportation-planning/2019-climate-change-vulnerability-assessments

a lower probability scenario and high future emissions.[16] All else being equal, the greater the proportion of roadway length exposed to storm surge, the higher the priority of that segment.

- **Initial timeframe for elevated level of concern from wildfire:** Assets that are more likely to be impacted by wildfire sooner should be prioritized first. Using the future wildfire projections developed for the District 3 Climate Change Vulnerability Assessment Report[17], the initial timeframe (2010-2039, 2040-2069, 2070-2099, or Beyond 2099) for heightened wildfire risk was determined for each small culvert. The most recent timeframe across the range of available climate scenarios was chosen. Assets that were impacted sooner were given a higher priority for adaptation.

- **Highest projected wildfire level of concern:** Assets that are exposed to a greater wildfire risk should be prioritized. The wildfire modeling conducted for the District 3 Climate Change Vulnerability Assessment classified fire risk into five levels of concern (very low, low, moderate, high, and very high) at various future time periods.[18] Using this data, the highest level of concern was determined for each small culvert between now and 2100 and across all climate scenarios. Assets with higher levels of concern were given a higher priority for adaptation.

- **Initial timeframe when asphalt binder grade needs to change:** Roadway segments that are more likely to need binder grade changes sooner should be prioritized. Using the assumptions and data from the pavement binder grade exposure analysis described above, the initial timeframe (prior to 2010, 2010-2039, 2040-2069, or 2070-2099) for binder grade change was determined. Roadway segments that were found to need binder grade changes sooner were given a higher priority for detailed adaptation assessments.

- **Maximum riverine flooding exposure score for the 2010-2039 timeframe**: Assets that have relatively higher exposure to riverine flooding in the near-term should be prioritized. Using the riverine flood exposure index values calculated using the process described above, the highest score for the near-term (2010-2039) period was determined for each bridge, large culvert, and small culvert considering all climate scenarios and the range of outputs from all climate and wildfire models. Assets with the highest overall riverine flooding scores in this initial period received a higher priority for adaptation.

- **Maximum riverine flooding exposure score:** In addition to understanding the most pressing near-term needs for dealing with riverine flooding, assets that have relatively higher exposure to riverine flooding at any point over their lifespans should also be prioritized. To calculate this metric, the highest riverine flooding exposure score was determined for each asset considering all time periods (from now through 2100), all climate scenarios, and all climate and wildfire models. Assets with the highest overall riverine flooding scores received a higher priority for adaptation.

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[16] See the Ocean Protection Council California Sea Level Rise Guidance (2018 Update) for more information on sea level rise projections in San Francisco Bay (these are the closest projections to the Delta): https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf

[17] See the District 3 Climate Change Vulnerability Assessment Summary and/or Technical Reports for more information: https://dot.ca.gov/programs/transportation-planning/2019-climate-change-vulnerability-assessments

[18] Ibid.

3.3.2. Consequence Metrics

The following metrics were used to understand the consequences of each asset's exposure, considering both asset sensitivity to damage and network sensitivity to loss of the asset:

- **Bridge substructure condition rating:** Poor bridge substructure condition can contribute to failure during riverine flooding events. The NBI assigns a substructure condition rating to each bridge. Values range from nine to two with lower values indicating poorer condition. Bridges with poor substructure condition ratings were given higher priority for adaptation assessments.

- **Channel and channel protection condition rating:** Poor channel conditions or inadequate channel protection measures can contribute to failure during riverine flooding events. The NBI assigns a channel and channel protection condition rating to each bridge and large culvert. Values range from nine to two with lower values indicating poorer condition. Bridges and large culverts with poor channel or channel protection ratings were given higher priority for adaptation assessments.

- **Culvert condition rating:** Poor culvert condition can contribute to failure during riverine flooding events. The NBI assigns a culvert condition rating to each large culvert. Values range from nine to two with lower values indicating poorer condition. Caltrans has developed their own culvert condition rating system for small culverts. Possible ratings in the Caltrans system include good, fair, critical, and poor. Large and small culverts with poorer condition ratings in either system were prioritized.

- **Culvert material:** Culvert material determines the sensitivity of culverts to direct damage from wildfires. Caltrans includes material data in its databases on small culverts (no equivalent information exists for large culverts). Possible culvert materials include HDPE (high density polyethylene [plastic]), PVC (polyvinyl chloride [plastic]), corrugated steel pipe, composite, wood, masonry, and concrete. HDPE, PVC, corrugated steel pipe, composite, and wood culverts are all more sensitive to wildfire and any small culverts made from these materials that are exposed to an elevated risk from wildfire were prioritized for adaptation.

- **Scour rating:** Scour is a condition where water has eroded the soil around bridge piers and abutments. Excessive scour of bridge foundations makes bridges more prone to failure, especially during riverine flooding events. The NBI assigns a scour condition rating to each bridge. Values range from eight to two with lower values indicating greater scour concern. Bridges with lower scour values (higher scour concern) were given higher priority for adaptation assessments.

- **Average annual daily traffic (AADT):** AADT is a measure of the average traffic volume on a roadway. The consequences of weather-related failures/disruptions/maintenance are greater for assets that convey a higher volume of traffic. Disruptions on higher volume roads affect a greater proportion of the traveling public and there is a greater chance of congestion ripple effects throughout the network because alternate routes are less likely to be able to absorb the diverted traffic. AADT data was obtained from Caltrans databases and assigned to all the asset types included in this study. Exposed assets with higher AADT values were given greater priority for adaptation.

- **Average annual daily truck traffic (AADTT):** AADTT is a measure of the average truck volumes on a roadway. Efficient goods movement is important for maintaining economic resiliency and for providing relief supplies after a disaster. The consequences of weather-related failures/disruptions/maintenance are greater for assets that are a critical link in supply chains. AADTT data was obtained from Caltrans databases and assigned to all the asset types included in this study. Potentially exposed assets with higher AADTT values were given greater priority for adaptation.

- **Incremental travel distance to detour around the asset due to wildfire or riverine flooding closures:** This metric measures the degree of network redundancy around each asset which may be out of service due to a wildfire or riverine flood impacts. A detour routing tool was developed for this project that can find the shortest path detour around a bridge, large culvert, or small culvert and calculate the additional travel distance that would be required to take that detour. The tool was run for each of the assets studied. Assets that had very long detour routes were given greater priority for adaptation.

MUDSLIDE NEAR LATROBE ROAD, EL DORADO HILLS

- **Incremental travel distance to detour around the asset for the lowest impactful SLR increment:** A more complex version of the detour routing tool was used to determine the shortest detour for the lowest impactful sea level rise increment that would result in sea level rise and storm surge affecting each asset. This provides an indication of the initial network redundancy issues that may be created by impacts in the Delta. For these hazards, the detour tool considered the inundation/erosion throughout the roadway network for each increment of sea level rise evaluated. This ensured that detours were not routed onto roads that would also be inundated or eroded under the same amount of sea level rise. In other words, when run for assets exposed to sea level rise, the detour routing algorithm ensured that no flooded roadways under that sea level rise increment could be considered a detour route. When run for assets exposed to storm surge, the detour routing algorithm ensured that no road affected by either sea level rise or storm surge at the same increment of sea level rise could be considered a detour route. As with the riverine flooding detours, assets that had very long detour routes were given greater priority for adaptation.

- **Incremental travel distance to detour around the asset under the maximum extent of SLR (6.6 feet of SLR and 4.6 feet of SLR with a 100-year storm):** This metric captures the level of network redundancy around exposed at-grade roadways, bridges, large culverts, and small culverts under 6.6 feet of SLR and 4.6 feet of SLR and a 100-year storm surge. As in the sea level rise and surge metrics, the Climate Central model was used for sea level rise on its own and the CalFloD-3D model was used to identify potential roadway closures under sea level rise and surge. The detour values for this metric were calculated the same way as was done for the lowest impactful sea level rise increment detour metrics described above. Likewise, assets that had very long detour routes under these sea level rise and surge increment were given greater priority for adaptation.

3.4. Calculation of Initial Prioritization Scores

Once all the metrics were gathered/developed, the next step was to combine them and calculate an initial prioritization score for each asset. Calculating prioritization scores is a multi-step process that was conducted using Microsoft Excel. The primary steps are as follows:

1. **Scale the raw metrics:** Several of the metrics described in the previous section have different units of measurement. For example, the AADT metric is measured in vehicles per day whereas the incremental travel time to detour around the asset is measured in minutes. There is a need to put each metric on a common scale to be able to integrate them into one scoring system. For this study, it was decided to use a scale ranging from zero to 100 with zero indicating a value for a metric that would result in the lowest possible priority level and 100 indicating a value for a metric that would result in the highest possible priority level. The district wide minimum and maximum values for each metric were used to set that metric’s zero and 100 values. The past weather/fire impacts metric (which had binary values) was assigned a zero if the condition was false (i.e., there were no previous weather/fire impacts reported) and 100 if the condition was true. Categorized values, like the various condition rating metrics, were generally parsed out evenly between zero and 100 (i.e., if there were seven condition rating values, the minimum and maximum values were coded as zero and 100, respectively, with the five remaining categories assigned values at intervals of 20). The remaining metrics with

continuous values were allowed to fall at their proportional location within the re-scaled zero to 100 range.

2. **Apply weights:** Some metrics have been determined by Caltrans to be more important than others for determining priorities. Therefore, the relative importance of each metric was adjusted by multiplying the scaled score by a weighting factor. Metrics deemed more important to prioritization were multiplied by a larger weight. For consistency, Caltrans Headquarters staff harmonized the weights to be used in all districts based on national best practices and input from the districts. Table 3 shows the weighting schema applied to the asset-hazard combinations in District 3. The weights are percentage based and add to 100% for all the metrics within a given asset-hazard combination (column).

TABLE 3: WEIGHTS BY METRIC FOR EACH ASSET-HAZARD COMBINATION STUDIED

Metric	Percentage Weights by Asset Class												
	Sea Level Rise				Storm Surge				Wildfire	Tempera-ture	Riverine Flooding		
	At-Grade Roadways	Bridges	Large Culverts	Small Culverts	At-Grade Roadways	Bridges	Large Culverts	Small Culverts	Small Culverts	Pavement Binder Grade	Bridges	Large Culverts	Small Culverts
Exposure													
Past natural hazard impacts	20%	20%	20%	20%	20%	20%	20%	20%	20%	-	20%	20%	20%
Lowest impactful sea level rise (SLR) increment	22.5%	45%	45%	40%	-	-	-	-	-	-	-	-	-
Percent of road segment exposed to 6.6 ft. of SLR	22.5%	-	-	-	-	-	-	-	-	-	-	-	-
Lowest impactful SLR increment with 100-year storm surge	-	-	-	-	22.5%	45%	45%	45%	-	-	-	-	-
Percent of road segment exposed to a 100-year storm with 4.6 ft. of SLR	-	-	-	-	22.5%	-	-	-	-	-	-	-	-
Initial timeframe for elevated level of concern for wildfire	-	-	-	-	-	-	-	-	17.5%	-	-	-	-
Highest projected wildfire level of concern	-	-	-	-	-	-	-	-	17.5%	-	-	-	-
Initial timeframe when asphalt binder grade needs to change	-	-	-	-	-	-	-	-	-	60%	-	-	-
Maximum riverine flooding exposure score for the 2010-2039 timeframe	-	-	-	-	-	-	-	-	-	-	22.5%	22.5%	22.5%
Maximum riverine flooding exposure score	-	-	-	-	-	-	-	-	-	-	22.5%	22.5%	22.5%
Consequences													
Bridge substructure condition rating	-	-	-	-	-	1.5%	-	-	-	-	1%	-	-
Channel and channel protection condition rating	-	-	-	-	-	-	-	-	-	-	2.5%	2.5%	-
Culvert condition rating	-	-	-	-	-	-	5%	5%	-	-	-	2.5%	5%
Culvert material	-	-	-	15%	-	-	-	-	20%	-	-	-	-
Scour rating	-	-	-	-	-	8.5%	-	-	-	-	6.5%	-	-
Average annual daily traffic (AADT)	10%	10%	10%	7%	10%	7%	7%	7%	7%	13%	7%	10%	10%
Average annual daily truck traffic	5%	5%	5%	3%	5%	3%	3%	3%	3%	27%	3%	5%	5%
Incremental travel distance to detour around the asset	-	-	-	-	-	-	-	-	15%	-	15%	15%	15%
Incremental travel distance to detour around the asset for the lowest impactful SLR increment	10%	10%	10%	7.5%	10%	7.5%	10%	10%	-	-	-	-	-
Incremental travel distance to detour around the asset under the maximum increment of SLR (6.6 feet of SLR alone and 4.6 feet of SLR with a 100-year storm.[19]	10%	10%	10%	7.5%	10%	7.5%	10%	10%	-	-	-	-	-
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

[19] Both sea level rise and storm surge datasets were applied when calculating detour routes. Data applied came from two different models which use different methodologies and assumptions (Climate Central and CalFloD-3D). As such, the model results did not match up across the same flood extents. In the detour analysis, if a road was exposed to sea level rise but not surge due to differing model extents, then the detour would assume the roadway was exposed to sea level rise AND surge. See the District 3 Climate Change Vulnerability Assessment Summary and/or Technical Reports for more information about the sea level rise and surge models applied: https://dot.ca.gov/programs/transportation-planning/2019-climate-change-vulnerability-assessments

In general, higher weights were assigned to the future exposure metrics (including those considering both the hazard timing and severity) as they are the primary drivers of adaptation need. This helps ensure adaptations are considered proactively before the hazards affect the assets. It also focuses the first detailed assessments on those assets that are projected to be most severely affected by climate change.

Amongst the consequence metrics, more weight is given to the AADT and detour route variables relative to the condition rating related variables (bridge substructure condition rating, channel and channel protection condition rating, culvert condition rating, and scour rating). The logic for this is as follows. First, except for the scour rating, the connection between asset condition and asset failure during a hazard event is not always straightforward. Where there is less confidence in a metric, it is weighted less.[20] Second, other prioritization systems used by Caltrans, namely the asset management system, focus on condition to prioritize assets. Thus, poor condition assets will already be prioritized through that program and, per Caltrans' Climate Adaptation Framework shown in Figure 1 will also undergo detailed adaptation assessments before upgrades are made. There is little value in duplicating that prioritization system for this report; instead this effort puts more priority on assets based on their exposure to climate change-related hazards. Lastly, the traffic volume and detour length variables are the primary measures by which impacts to users of the system are captured and, given the importance of mobility to the functioning of the state, were weighted higher.[21]

An exception to some of the logic noted above can be found with small culvert exposure to wildfire. For these assets, nearly as much weight is given to the culvert material variable as to the AADT and detour route variables collectively. This is because the very nature of the threat to small culverts from wildfire is highly related to the material of the culvert. If the culvert is plastic or wood, it is much more susceptible to fire damage than, say, a concrete culvert. Since they are less likely to be adversely affected by fire in the first place, one would not want to give high priority to concrete culverts for wildfire just because they convey a high AADT or have long detour routes. That is why more weight is placed on the material metric for this particular asset-hazard combination.

3. **Calculate prioritization scores for each hazard**: After the weights were applied, the next step was to calculate prioritization scores for each individual hazard. This was done by first summing the products of the weights and scaled values for all the metrics relevant to the particular asset-hazard combination being studied (i.e., summing up the products for each column in Table 3). Since there are different numbers of metrics used to calculate the score for each asset-hazard combination, these values were then re-scaled to range from zero to 100 with zero representing the lowest priority asset and 100 the highest priority asset. These interim scores provide useful information for understanding asset vulnerability to each specific hazard.
4. **Calculate cross-hazard prioritization scores:** While the prioritization scores for each hazard provide useful information, they do not provide the full picture on the threats posed to each asset. It was decided that the final scores used as the basis for prioritization need to look

[20] Note that the scour rating metric is weighted somewhat higher than the other condition related assets because of its more direct connection to asset failure.

[21] Within the traffic volume related metrics, note that slightly more weight is given to AADT as opposed to truck AADT given that the majority of traffic on a roadway is non-truck. Thus, it was reasoned that the total volume should factor in somewhat more heavily than the truck volume. One exception to this was for temperature impacts to pavement. This asset-hazard combination is unique in that the traffic volume information is not just an indicator of how many users may be affected by necessary pavement repairs but also an indicator of how much damage may occur to the pavement should temperatures exceed binder grade design thresholds. Given that, for this asset-hazard combination, more weight is given to truck volumes since trucks do disproportionately more damage to temperature-weakened pavement.

holistically across all the hazards analyzed. This cross-hazard perspective provides a better view of the collective threats faced by each asset and a better basis for prioritization. To calculate the cross-hazard scores, the scores for each hazard analyzed for the asset were summed. These were then re-scaled yet again to a zero to 100 scale since different asset types have different numbers of hazards. As before, the higher the score, the higher the adaptation priority of that asset. These cross-hazard scores represent the final scores calculated for each asset during the technical assessment portion of the methodology.

5. **Assign priority levels**: The final step in the technical assessment was to group together assets into different priority levels based on their cross-hazard scores. This was done to make the outputs more oriented to future actions, decrease the tendency to read too much into minor differences in the cross-hazard scores, and better facilitate dialogue at the workshop with District 3 staff. Five priority levels were developed (Priority 1, 2, 3, 4, and 5) and assets were assigned to those groups on a district-wide basis. An equal number of assets were assigned to each priority level to help facilitate administration of the facility-level adaptation assessments that will follow this study.

3.5. Adjustments to Prioritization

A workshop was held with the district to explain the scoring methodology and go over the preliminary results. District 3 staff then made recommendations on adjusting asset priorities based upon their on-the-ground knowledge of existing conditions and changed the priorities for nine culverts. Small culverts with the following culvert ID numbers were changed to Priority 1: 38563, 35636, 35656, 35661, 35908. And the following small culverts were changed to Priority 2: 38386, 35615, 35896, 35907. These adjustments are reflected in Table 6 and Table 10 below.

4. DISTRICT ADAPTATION PRIORITIES

This chapter presents Caltrans' priorities for undertaking detailed adaptation assessments of assets exposed to climate change in District 3. The material presented in this chapter reflects the results of the technical analysis and the coordination with District 3 staff described in the previous chapter. The information is broken out by asset type with priorities for bridges discussed in the first section, followed by those for large culverts, small culverts, and roadways.

4.1. Bridges

A total of 240 bridges were assessed for vulnerability to sea level rise, storm surge, and riverine flooding associated with climate change. All these bridges should eventually undergo detailed adaptation assessments. However, due to resource limitations, this will not be possible to do all at once. Instead, the bridges will be analyzed over time according to the priorities presented here.

Figure 2 provides a map of all the bridges assessed in the district using the prioritization analysis methodology explained above. The color of the bridge points corresponds to the priority assigned to each bridge; darker red colors indicate higher priority assets. The map shows that high priority bridges are scattered throughout the district. That said, some spatial patterns may be drawn. The top 8 bridges with the highest cross-hazard asset prioritization scores are in the Delta and are exposed to varying increments of sea level rise and storm surge. The top 5 bridges are also exposed to riverine flooding from the Sacramento and San Joaquin Rivers running into the Delta. The combined effects of sea level rise, storm surge, and increased river flows make these bridges particularly vulnerable and high priority.

Table 4 presents a summary of all the Priority 1 bridges in District 3 sorted by their cross-hazard prioritization scores. A complete listing of all bridges ranked by their prioritization scores appears in Table 8 in the appendix.

BUTTE CITY BRIDGE, HIGHWAY 162

TABLE 4: PRIORITY 1 BRIDGES

Priority	Bridge Number	County[22]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
1	24 0051	SAC	STATE ROUTE 160	SACRAMENTO RIVER	5.86	100.00
1	24 0053	SAC	STATE ROUTE 160	SACRAMENTO RIVER	20.87	69.68
1	24 0261L	SAC	INTERSTATE 5 SB	LOST SLOUGH	1.04	63.42
1	24 0261R	SAC	INTERSTATE 5 NB	LOST SLOUGH	1.04	61.77
1	24 0121	SAC	STATE ROUTE 160	THREE MILE SLOUGH	L6.98	57.42
1	24 0052	SAC	STATE ROUTE 160	STEAMBOAT SLOUGH	19.76	54.93
1	24 0260L	SAC	INTERSTATE 5 SB	MIDDLE SLOUGH	0.71	53.51
1	24 0260R	SAC	INTERSTATE 5 NB	MIDDLE SLOUGH	0.71	53.51
1	22 0045	YOL	INTERSTATE 80	YOLO CAUSEWAY EAST	7.25	50.34
1	12 0026	BUT	STATE ROUTE 99	KEEFERS SLOUGH	39.69	42.69
1	22 0021	YOL	WEST CAPITOL AVE	SACRAMENTO RIVER (TOWER)	13.07	36.77
1	19 0124L	PLA	INTERSTATE 80 WB	SOUTH YUBA RIVER	R62.77L	34.99
1	24 0003	SAC	STATE ROUTE 51	AMERICAN RIVER	2.61	34.13
1	17 0063L	NEV	IS 80	TRUCKEE RIVER	28	34.08
1	17 0063R	NEV	I-80	TRUCKEE RIVER	28	34.08
1	25 0017	ED	STATE ROUTE 89	CASCADE CREEK	14.81	32.54
1	25 0022	ED	STATE ROUTE 49	GREENWOOD CREEK	26.82	32.32
1	11 0011	GLE	STATE ROUTE 162	WALKER CREEK	68.16	29.32
1	24 0001L	SAC	ST RTE 160 SB, LRT	AMERICAN RIVER	R44.47	29.07
1	15 0022	COL	STATE ROUTE 20	SALT CREEK	20.21	29.05
1	19 0027	PLA	INTERSTATE 80	LINDA CREEK	0.82	28.91
1	24 0149	SAC	STATE ROUTE 99	ELDER CREEK	18.05	28.66
1	24 0126	SAC	STATE ROUTE 51	ARCADE CREEK	8.06	28.65
1	12 0055	BUT	STATE ROUTE 162	DRY CREEK	1.32	27.41
1	24 0045L	SAC	STATE ROUTE 99 SB	LAGOON CREEK	4.98	27.02
1	22 0109	YOL	STATE ROUTE 16	RUMSEY CANYON	6.36	26.89
1	12 0120	BUT	STATE ROUTE 99	COTTONWOOD CREEK	15.41	26.69
1	25 0012	ED	U.S. HIGHWAY 50	UPPER TRUCKEE RIVER	70.31	26.34
1	19 0121R	PLA	INTERSTATE 80 EB	HAMPSHIRE ROCKS,S YUBA R	R64.54R	26.18
1	12 0075L	BUT	STATE ROUTE 99 SB	LITTLE DRY CREEK	22.95	25.97
1	12 0075R	BUT	STATE ROUTE 99 NB	LITTLE DRY CREEK	22.95	25.66
1	15 0019	COL	SR 20	POWELL SLOUGH	28.54	25.57
1	17 0012	NEV	INTERSTATE 80	TRUCKEE RIVER	21.13	25.33
1	24 0218	SAC	INTERSTATE 80 EB	UP RR, BNSF RY,STEELHEAD	M5.21	25.30
1	24 0030R	SAC	STATE ROUTE 99 NB	NORTH CHANNEL DRY CREEK	0.13	25.02

[22] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba

Priority	Bridge Number	County[22]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
1	22 0136L	YOL	INTERSTATE 5	AZEVEDO DRAW	R24.53	24.90
1	24 0030L	SAC	STATE ROUTE 99 SB	NORTH CHANNEL DRY CREEK	0.13	24.88
1	22 0136R	YOL	INTERSTATE 5	AZEVEDO DRAW	R24.53	24.80
1	22 0090	YOL	STATE ROUTE 16	MOSSY CREEK	18.13	24.76
1	22 0116L	YOL	INTERSTATE 505	SOUTH FORK WILLOW SLOUGH	10.33	24.68
1	22 0028	YOL	STATE ROUTE 16	SOUTH FORK WILLOW SLOUGH	31.82	24.55
1	12 0049	BUT	STATE ROUTE 32	ROCK CREEK	2.08	24.53
1	17 0078	NEV	STATE ROUTE 89	PROSSER CREEK	4.87	24.53
1	22 0116R	YOL	INTERSTATE 505	SOUTH FORK WILLOW SLOUGH	10.33	24.50
1	22 0114R	YOL	INTERSTATE 505	UNION SCHOOL SLOUGH	5.71	24.32
1	22 0114L	YOL	INTERSTATE 505	UNION SCHOOL SLOUGH	5.71	24.25
1	15 0036	COL	STATE ROUTE 16	BEAR CREEK	R4.34	23.99
1	22 0007R	YOL	INTERSTATE 5	CACHE CREEK	R11.45	23.96

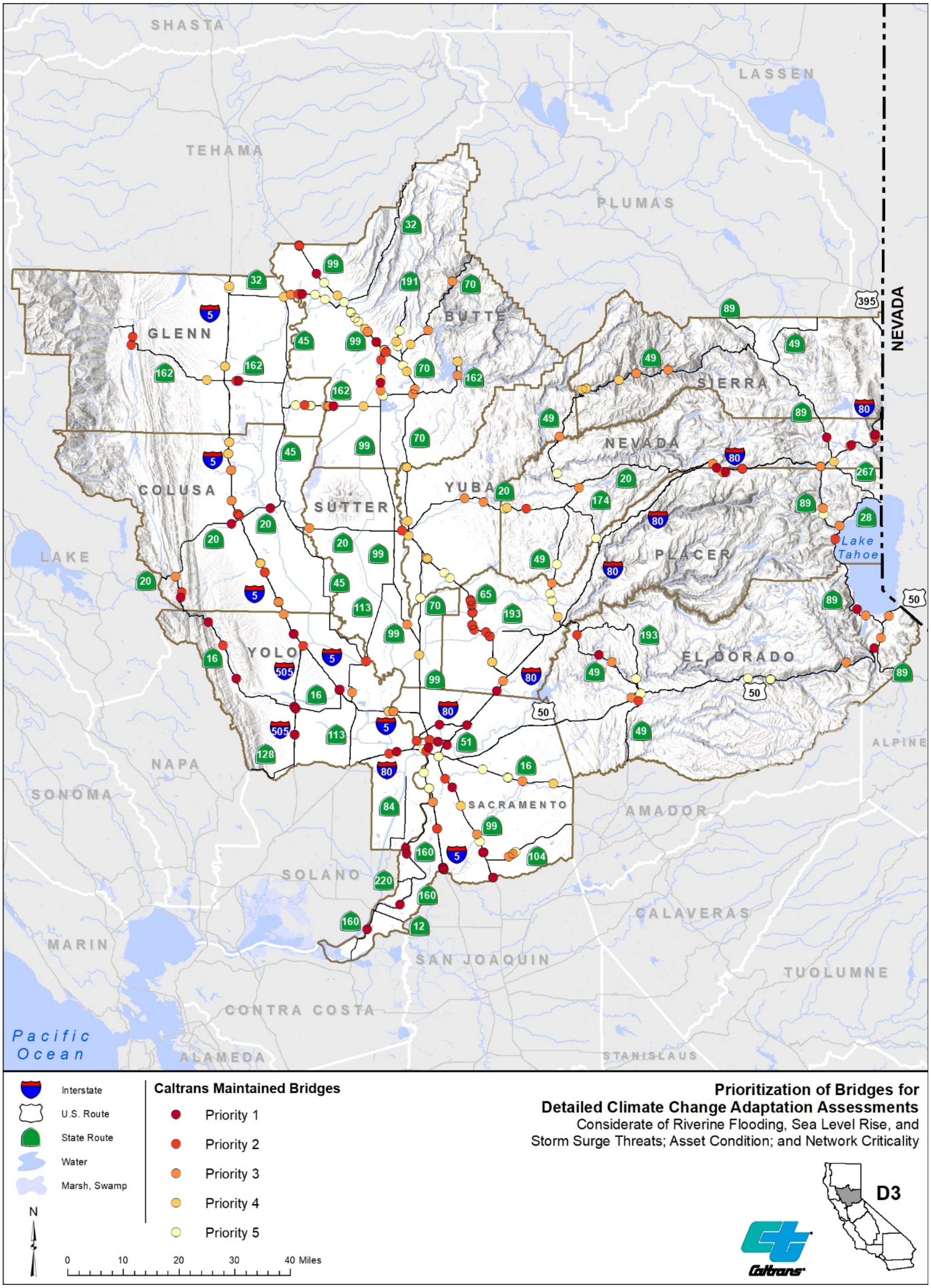

FIGURE 2: PRIORITIZATION OF BRIDGES FOR DETAILED ADAPTATION ASSESSMENTS

4.2. Large Culverts

A total of 28 large culverts were assessed for vulnerability to more severe riverine flooding associated with climate change, sea level rise, and storm surge. Figure 3 provides a map of all the large culverts potentially exposed to flood impacts in the district and colored by their priority level. Given the limited number of large culverts in District 3, it is hard to draw spatial patterns to the vulnerabilities. The Priority 1 large culvert with the highest cross-hazard prioritization score is located along Interstate 5 in Sacramento County, where it crosses over Morrison Creek. This culvert is the highest priority due to exposure to sea level rise and riverine flooding. The remaining four Priority 1 large culverts are distributed throughout District 3 and are high priority due to a mix of high riverine flooding scores and long detours around the assets and/or high AADT.

Table 5 presents a summary of all the Priority 1 large culverts in District 3 sorted by their cross-hazard prioritization scores. A complete listing of all large culverts ranked by their prioritization scores appears in Table 9 in the appendix.

TABLE 5: PRIORITY 1 LARGE CULVERTS

Priority	Culvert System Number	County[23]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
1	24 0347	SAC	INTERSTATE 5	SOUTH REACH BEACH LAKE	12.4	100.00
1	25 0019	ED	STATE ROUTE 89	MEEKS CREEK	24.9	72.55
1	13 0021	SIE	STATE ROUTE 89	TURNER CANYON	18.8	69.43
1	13 0010	SIE	STATE ROUTE 49	HOWARD CREEK	R34.26	64.75
1	22 0172	YOL	INTERSTATE 5	DUNNIGAN CREEK	R25.97	55.25

[23] ED = El Dorado; SAC = Sacramento; SIE = Sierra; YOL = Yolo;

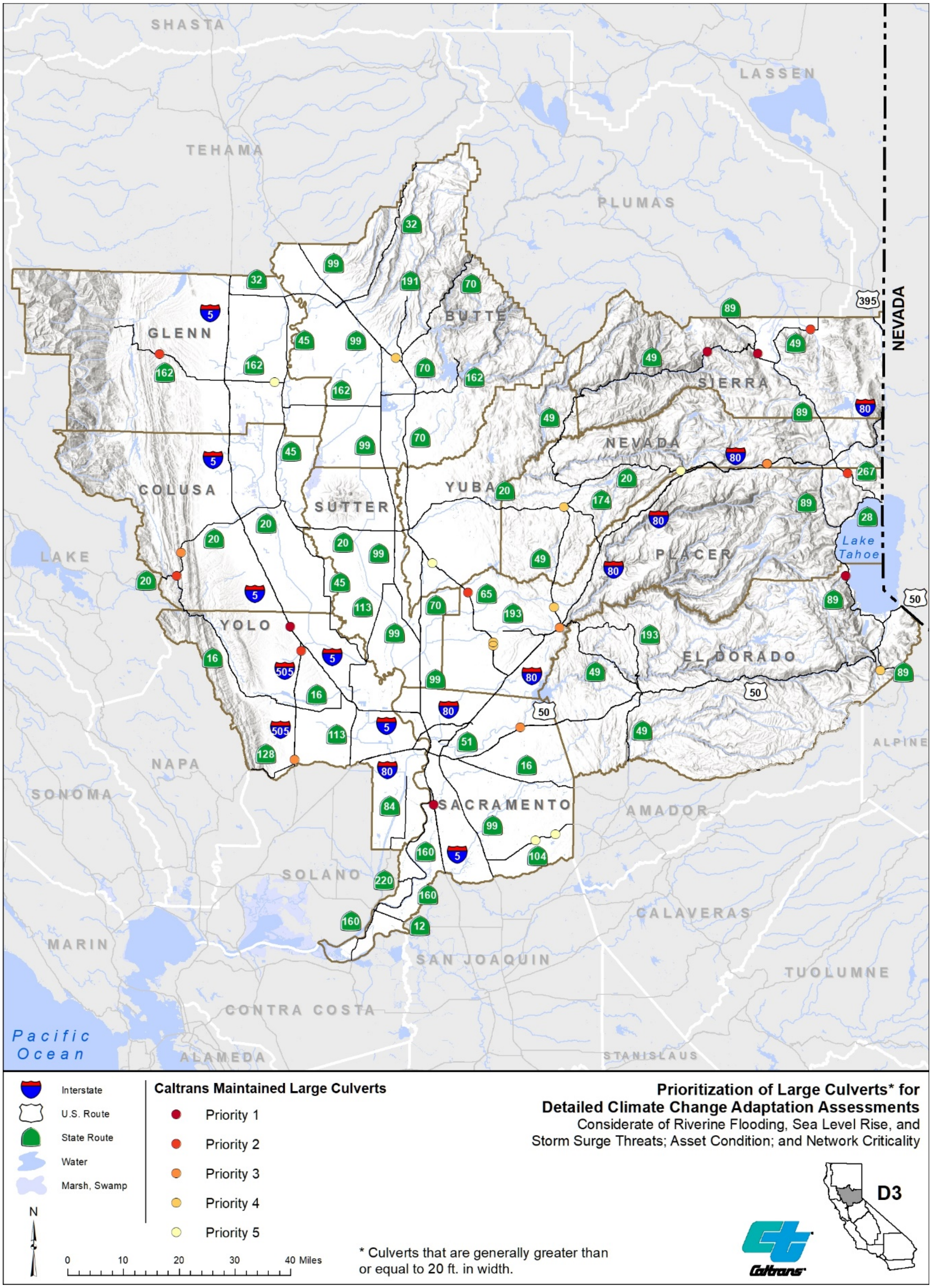

FIGURE 3: PRIORITIZATION OF LARGE CULVERTS FOR DETAILED ADAPTATION ASSESSMENTS

4.3. Small Culverts

A total of 363 small culverts were assessed for vulnerability to more severe riverine flooding, sea level rise, storm surge, and high wildfire risk associated with climate change. Figure 4 provides a map of all the small culverts potentially exposed to more severe riverine flooding and wildfire in the district. The small culverts are colored by their priority level.

The map indicates several clusters of high priority small culverts. Most of the small culverts, 75 of the 77, with the highest prioritization scores are located within four counties: Nevada, Sierra, Placer, and El Dorado. The mountainous terrain of these counties makes them subject to riverine flood exposure and high wildfire risk. The rural routes these culverts are on also have lengthy detour routes. Notable clusters of Priority 1 small culverts can be found along US-50 in El Dorado County, Interstate 80 along the border of Nevada and Placer Counties, and State Route 89 in Sierra County. After initial review of the data, District 3 staff upgraded five small culverts along State Route 49 and 89 to Priority 1, which can be seen in the "Priority Adjusted" column of Table 6.

Table 6 presents a summary of all the Priority 1 small culverts in District 3 sorted by their cross-hazard prioritization scores. District 3 staff also changed four small culverts along State Route 20, 49, and 89 to Priority 2. A complete listing of all small culverts ranked by their prioritization scores appears in Table 10 in the appendix.

TABLE 6: PRIORITY 1 SMALL CULVERTS

Priority	Culvert System Number	County[24]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
1	170804002918	NEV	80	29.18	100.00	
1	130804000115	SIE	80	1.15	85.23	
1	190800106282	PLA	80	62.82	81.45	
1	170800002765	NEV	80	27.65	80.81	
1	170802106241	NEV	80	62.41	80.53	
1	190804003494	PLA	80	34.94	79.28	
1	170804003055	NEV	80	30.55	78.62	
1	170804002573	NEV	80	25.73	78.30	
1	170802106170	NEV	80	61.7	77.82	
1	190800106341	PLA	80	63.41	77.49	
1	170804002399	NEV	80	23.99	76.64	
1	190802106264	PLA	80	62.64	76.46	
1	170802006215	NEV	80	62.15	76.13	
1	190802106254	PLA	80	62.54	75.73	
1	170802106122	NEV	80	61.22	75.58	
1	170802106033	NEV	80	60.33	75.47	
1	170802106090	NEV	80	60.9	75.42	
1	190899100850	PLA	89	8.5	75.11	
1	250504005660	ED	50	56.6	74.91	
1	170802106205	NEV	80	62.05	74.84	

[24] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba

Priority	Culvert System Number	County[24]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
1	170804002961	NEV	80	29.61	74.16	
1	170804002300	NEV	80	23	73.93	
1	170800106132	NEV	80	61.32	73.12	
1	170804003023	NEV	80	30.23	72.98	
1	170800106095	NEV	80	60.95	72.98	
1	130804000123	SIE	80	1.23	71.82	
1	250504005883	ED	50	58.83	71.81	
1	250504005428	ED	50	54.28	71.32	
1	250504005631	ED	50	56.31	71.18	
1	250504006288	ED	50	62.88	70.79	
1	250504006435	ED	50	64.35	70.75	
1	250504005871	ED	50	58.71	70.73	
1	250504006349	ED	50	63.49	70.70	
1	170800106033	NEV	80	60.33	70.65	
1	170804002300	NEV	80	23	70.07	
1	250504005549	ED	50	55.49	69.44	
1	170804002389	NEV	80	23.89	68.71	
1	250504006399	ED	50	63.99	68.22	
1	170804003124	NEV	80	31.24	66.92	
1	130890002748	SIE	89	27.48	66.61	
1	250504005449	ED	50	54.49	66.31	
1	250504005417	ED	50	54.17	66.16	
1	250504005501	ED	50	55.01	66.14	
1	250504005388	ED	50	53.88	66.12	
1	250504000031	ED	50	0.31	66.00	
1	190894001536	PLA	89	15.36	65.93	
1	250504006291	ED	50	62.91	65.80	
1	250050000354	ED	5	3.54	65.79	
1	130890002660	SIE	89	26.6	65.45	
1	130894002124	SIE	89	21.24	65.37	
1	250504005653	ED	50	56.53	64.84	
1	170804002349	NEV	80	23.49	64.46	
1	160204001698	YUB	20	16.98	62.84	
1	130490005856	SIE	49	58.56	62.45	
1	130894002140	SIE	89	21.4	62.37	
1	130890002788	SIE	89	27.88	62.35	
1	250504006580	ED	50	65.8	62.09	
1	250504006158	ED	50	61.58	61.70	
1	250504005497	ED	50	54.97	61.52	
1	130894002309	SIE	89	23.09	61.44	
1	130890002777	SIE	89	27.77	61.32	
1	130894002188	SIE	89	21.88	61.16	

Priority	Culvert System Number	County[24]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
1	250504006411	ED	50	64.11	60.75	
1	250504006430	ED	50	64.3	60.75	
1	130895202156	SIE	89	21.56	59.97	
1	170204004090	NEV	20	40.9	59.81	
1	170204004092	NEV	20	40.92	59.81	
1	250504005638	ED	50	56.38	59.02	
1	130894002392	SIE	89	23.92	58.94	
1	130490004942	SIE	49	49.42	58.67	
1	130490004936	SIE	49	49.36	58.65	
1	130490005920	SIE	49	59.2	58.27	
1	160490000699	YUB	49	6.99	42.06	Yes
1	130490005358	SIE	49	53.58	32.65	Yes
1	130490005661	SIE	49	56.61	30.35	Yes
1	130490005687	SIE	49	56.87	30.04	Yes
1	130894001751	SIE	89	17.51	26.48	Yes

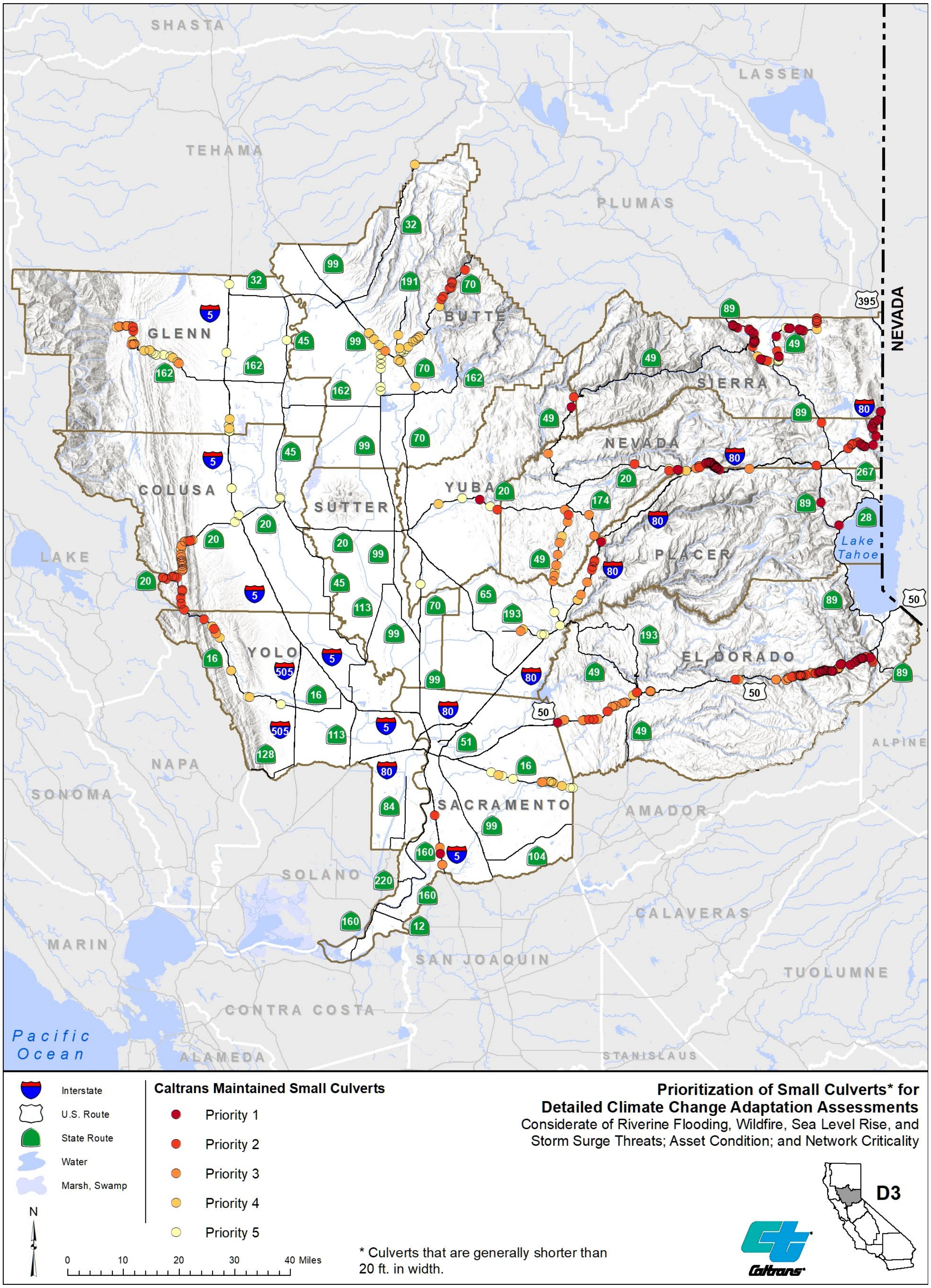

FIGURE 4: PRIORITIZATION OF SMALL CULVERTS FOR DETAILED ADAPTATION ASSESSMENTS

4.4. Roadways

A total of 3,608 roadway segments were assessed for vulnerability to sea level rise, storm surge, and temperature changes that affect pavement performance. To make the analysis as detailed as possible, the original segments were short with beginning and end points at intersections with other streets (including smaller local streets) in the roadway network. Once the processing of vulnerability scores was complete, smaller segments sharing the same priority score as their neighbors on the same route were consolidated into longer segments to simplify the presentation of the results. This reduced the number of segments scored from 3,608 to the 441 presented in this report.

Figure 5 provides a map of all the consolidated roadway segments potentially exposed to flooding associated with sea level rise, surge, and/or pavement degrading temperature changes in the district. Each segment is colored by its priority level. The map shows that several of the Priority 1 roadways with the highest cross-prioritization hazard scores are in Sacramento County on State Routes 12, 220, 99, and 160. Additionally, State Route 84 in Yolo County has a high cross-prioritization hazard score. The vulnerability of these highways is primarily driven by sea level rise and storm surge as they cross the Delta region. Interstate 5 and US 50 are other high priority routes that are vulnerable to high sea level rise and surge increments and near-term pavement impacts from temperature rise. These routes are also highly trafficked and would present greater consequences to users if they were temporarily closed.

Table 7 presents a summary of all the Priority 1 roadways in District 3 sorted by their cross-hazard prioritization scores. A complete listing of all roadways ranked by their prioritization scores appears in Table 11 in the appendix.

TABLE 7: PRIORITY 1 ROADWAYS

Priority	Route	Carriageway[25]	From County & Postmile / To County & Postmile[26]	Average Cross-Hazard Prioritization Score[27]
1	12	P	SAC 12 0.395 / SAC 12 6.074	81.24
1	220	P	SOL 220 3.196 / SAC 220 3.114	61.20
1	99	P	SAC 99 19.609 / SAC 99 R24.282	50.03
1	99	P	SAC 99 19.9 / SAC 99 R24.28	49.79
1	99	P	SAC 99 R24.334 / SAC 99 R24.334	49.79
1	16	P	SAC 16 T1.658 / SAC 16 T1.691	48.19
1	12	P	SAC 12 0.395 / SAC 12 0.759	45.98
1	84	P	YOL 84 0.004 / YOL 84 2.211	45.01
1	84	P	YOL 84 2.647 / YOL 84 15.687	45.01
1	160	P	SAC 160 19.833 / SAC 160 20.86	44.30
1	160	P	SAC 160 21.1 / SAC 160 34.072	44.30
1	160	P	SAC 160 L0.783 / SAC 160 L7.233	44.30
1	160	P	SAC 160 L10.029 / SAC 160 19.73	44.30
1	160	P	SAC 160 L8.338 / SAC 160 L9.909	44.30

[25] Caltrans' alignment codes designate the carriageway on divided roadways: "P" always represents northbound or eastbound carriageways whereas "S" always represents southbound or westbound carriageways. Undivided roadways are always indicated with a "P".

[26] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba

[27] These values represent the average of the cross-hazard prioritization scores amongst all the abutting small segments on the same route sharing a common priority level that were aggregated to form the longer segments listed in this table.

Priority	Route	Carriageway[25]	From County & Postmile / To County & Postmile[26]	Average Cross-Hazard Prioritization Score[27]
1	160	P	SAC 160 R44.543 / SAC 160 R44.742	44.30
1	5	P	SAC 5 0.042 / SAC 5 4.66	41.90
1	5	P	SAC 5 16.145 / SAC 5 17.505	41.90
1	5	P	SAC 5 17.578 / SAC 5 18.191	41.90
1	5	P	SAC 5 20.877 / SAC 5 22.436	41.90
1	5	P	SAC 5 22.473 / SAC 5 24.838	41.90
1	5	P	SAC 5 25.333 / SAC 5 32.732	41.90
1	5	P	YOL 5 5.533 / YOL 5 R6.52	41.90
1	5	P	SAC 5 0.044 / SAC 5 8.44	41.60
1	5	P	SAC 5 16.155 / SAC 5 17.187	41.60
1	5	P	SAC 5 21.937 / SAC 5 22.428	41.60
1	5	P	SAC 5 22.473 / SAC 5 24.841	41.60
1	5	P	SAC 5 25.334 / SAC 5 32.733	41.60
1	5	P	YOL 5 5.532 / YOL 5 R6.537	41.60
1	160	P	SAC 160 L0.386 / SAC 160 L1.386	40.35
1	160	P	SAC 160 R44.456 / SAC 160 R44.739	40.35
1	50	P	ED 50 15.339 / ED 50 17.519	39.86
1	50	P	ED 50 R13.694 / ED 50 R15.051	39.86
1	50	P	ED 50 R8.908 / ED 50 R12.197	39.86
1	50	P	SAC 50 L0.351 / SAC 50 L0.354	39.86
1	50	P	SAC 50 L0.599 / ED 50 R1.664	39.86
1	50	P	YOL 50 0.15 / YOL 50 2.495	39.86
1	50	P	ED 50 15.31 / ED 50 17.522	39.70
1	50	P	ED 50 R13.737 / ED 50 R15.054	39.70
1	50	P	ED 50 R8.741 / ED 50 R12.201	39.70
1	50	P	SAC 50 L0.597 / ED 50 R1.667	39.70
1	50	P	YOL 50 0 / YOL 50 2.5	39.70
1	51	P	SAC 51 0.084 / SAC 51 8.86	37.84
1	51	P	SAC 51 0.083 / SAC 51 2.792	37.67
1	51	P	SAC 51 2.834 / SAC 51 8.86	37.67
1	80	P	SAC 80 M0.115 / PLA 80 10.334	36.93
1	80	P	SOL 80 R44.72 / YOL 80 2.872	36.93
1	80	P	YOL 80 5.818 / YOL 80 R9.999	36.93
1	80	P	YOL 80 R11.261 / YOL 80 R11.632	36.93
1	80	P	SAC 80 M0.106 / PLA 80 10.359	36.79
1	80	P	SOL 80 R43.876 / SOL 80 R44.666	36.79
1	80	P	SOL 80 R44.715 / YOL 80 2.937	36.79
1	80	P	YOL 80 5.818 / YOL 80 R10.028	36.79
1	80	P	YOL 80 R11.219 / YOL 80 R11.627	36.79
1	65	P	PLA 65 R7.635 / PLA 65 R9.266	34.95

Priority	Route	Carriageway[25]	From County & Postmile / To County & Postmile[26]	Average Cross-Hazard Prioritization Score[27]
1	65	P	TUL 65 39.576 / TUL 65 R5.93	34.95
1	65	P	PLA 65 M8.073 / PLA 65 R9.252	34.84
1	65	P	TUL 65 R4.873 / PLA 65 R5.925	34.84
1	275	P	YOL 275 11.747 / YOL 275 11.792	34.25

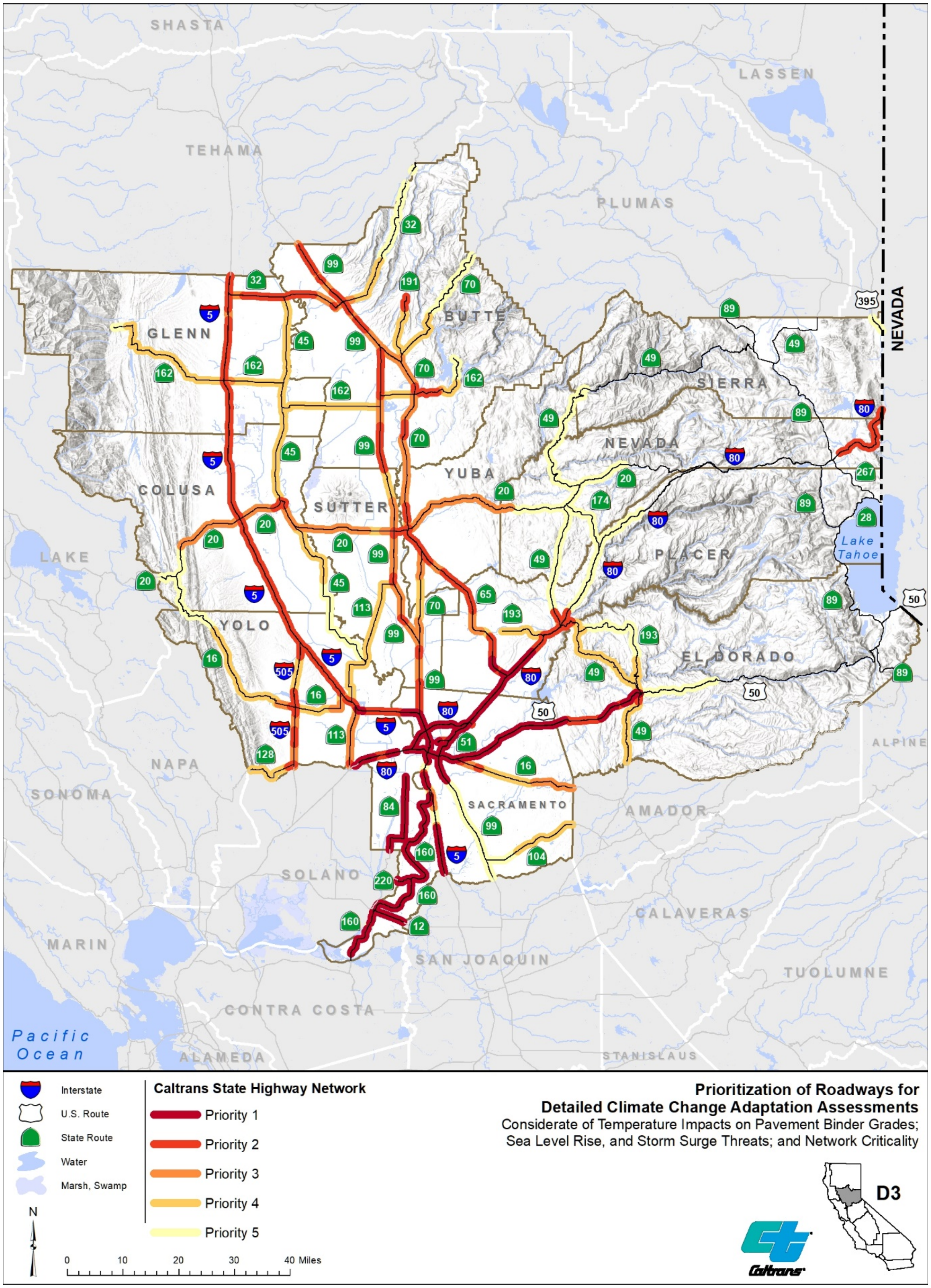

FIGURE 5: PRIORITIZATION OF ROADWAYS FOR DETAILED ADAPTATION ASSESSMENTS

5. NEXT STEPS

This report has identified the bridge, large culvert, small culvert, and roadway assets exposed to a variety of climate hazards in District 3 and assigned them priority levels for detailed assessments based on their vulnerability rating. Caltrans' next step will be to begin undertaking these detailed adaptation assessments for the identified assets starting with the highest priority (Priority 1) assets first and then proceeding to lower priority assets thereafter. These detailed adaptation assessments will take a closer look at the exposure to each asset using more localized climate projections and more detailed engineering analyses. If impacts are verified, Caltrans will develop and evaluate adaptation options for the asset to ensure that it is able to withstand future climate changes. Importantly, the detailed adaptation assessments will include coordination with key stakeholder groups whose actions affect or are affected by the asset and its adaptation.

GABION WALL SLIDE

Another next step will be to integrate the prioritization measures into the asset management system used in the district. This will ensure that climate change is a consideration in the identification of future projects alongside traditional asset condition metrics. As noted previously, assets identified for capital investments, especially those flagged as being a high priority for climate change, should then undergo detailed climate change assessments prior to project programming.

In addition, district staff can use the results of this study as a tool to facilitate discussions with various important stakeholders in the district about addressing climate change and its impacts. This may include state and federal environmental agencies regional transportation authorities, universities or academic partners, and others. Multi-agency stakeholder coordination and involvement of the private sector is also essential because the impacts from climate change, and ability to effectively address those impacts, cross both jurisdictional and ownership boundaries. For example, Caltrans could increase the size of a culvert to accommodate higher stormwater and debris flows while the more cost-effective solution may be better land management in the adjacent drainage area. The approach to climate change cannot just be Caltrans-centric. A common framework across all state agencies and key stakeholders must be established for truly effective long-term solutions to be achieved.

6. APPENDIX

TABLE 8: PRIORITIZATION OF BRIDGES FOR DETAILED CLIMATE CHANGE ADAPTATION ASSESSMENTS

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
1	24 0051	SAC	STATE ROUTE 160	SACRAMENTO RIVER	5.86	100.00
1	24 0053	SAC	STATE ROUTE 160	SACRAMENTO RIVER	20.87	69.68
1	24 0261L	SAC	INTERSTATE 5 SB	LOST SLOUGH	1.04	63.42
1	24 0261R	SAC	INTERSTATE 5 NB	LOST SLOUGH	1.04	61.77
1	24 0121	SAC	STATE ROUTE 160	THREE MILE SLOUGH	L6.98	57.42
1	24 0052	SAC	STATE ROUTE 160	STEAMBOAT SLOUGH	19.76	54.93
1	24 0260L	SAC	INTERSTATE 5 SB	MIDDLE SLOUGH	0.71	53.51
1	24 0260R	SAC	INTERSTATE 5 NB	MIDDLE SLOUGH	0.71	53.51
1	22 0045	YOL	INTERSTATE 80	YOLO CAUSEWAY EAST	7.25	50.34
1	12 0026	BUT	STATE ROUTE 99	KEEFERS SLOUGH	39.69	42.69
1	22 0021	YOL	WEST CAPITOL AVE	SACRAMENTO RIVER (TOWER)	13.07	36.77
1	19 0124L	PLA	INTERSTATE 80 WB	SOUTH YUBA RIVER	R62.77L	34.99
1	24 0003	SAC	STATE ROUTE 51	AMERICAN RIVER	2.61	34.13
1	17 0063L	NEV	IS 80	TRUCKEE RIVER	28	34.08
1	17 0063R	NEV	I-80	TRUCKEE RIVER	28	34.08
1	25 0017	ED	STATE ROUTE 89	CASCADE CREEK	14.81	32.54
1	25 0022	ED	STATE ROUTE 49	GREENWOOD CREEK	26.82	32.32
1	11 0011	GLE	STATE ROUTE 162	WALKER CREEK	68.16	29.32
1	24 0001L	SAC	ST RTE 160 SB, LRT	AMERICAN RIVER	R44.47	29.07
1	15 0022	COL	STATE ROUTE 20	SALT CREEK	20.21	29.05
1	19 0027	PLA	INTERSTATE 80	LINDA CREEK	0.82	28.91
1	24 0149	SAC	STATE ROUTE 99	ELDER CREEK	18.05	28.66
1	24 0126	SAC	STATE ROUTE 51	ARCADE CREEK	8.06	28.65
1	12 0055	BUT	STATE ROUTE 162	DRY CREEK	1.32	27.41
1	24 0045L	SAC	STATE ROUTE 99 SB	LAGOON CREEK	4.98	27.02
1	22 0109	YOL	STATE ROUTE 16	RUMSEY CANYON	6.36	26.89
1	12 0120	BUT	STATE ROUTE 99	COTTONWOOD CREEK	15.41	26.69
1	25 0012	ED	U.S. HIGHWAY 50	UPPER TRUCKEE RIVER	70.31	26.34
1	19 0121R	PLA	INTERSTATE 80 EB	HAMPSHIRE ROCKS,S YUBA R	R64.54R	26.18
1	12 0075L	BUT	STATE ROUTE 99 SB	LITTLE DRY CREEK	22.95	25.97
1	12 0075R	BUT	STATE ROUTE 99 NB	LITTLE DRY CREEK	22.95	25.66
1	15 0019	COL	SR 20	POWELL SLOUGH	28.54	25.57
1	17 0012	NEV	INTERSTATE 80	TRUCKEE RIVER	21.13	25.33

[28] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
1	24 0218	SAC	INTERSTATE 80 EB	UP RR, BNSF RY,STEELHEAD	M5.21	25.30
1	24 0030R	SAC	STATE ROUTE 99 NB	NORTH CHANNEL DRY CREEK	0.13	25.02
1	22 0136L	YOL	INTERSTATE 5	AZEVEDO DRAW	R24.53	24.90
1	24 0030L	SAC	STATE ROUTE 99 SB	NORTH CHANNEL DRY CREEK	0.13	24.88
1	22 0136R	YOL	INTERSTATE 5	AZEVEDO DRAW	R24.53	24.80
1	22 0090	YOL	STATE ROUTE 16	MOSSY CREEK	18.13	24.76
1	22 0116L	YOL	INTERSTATE 505	SOUTH FORK WILLOW SLOUGH	10.33	24.68
1	22 0028	YOL	STATE ROUTE 16	SOUTH FORK WILLOW SLOUGH	31.82	24.55
1	12 0049	BUT	STATE ROUTE 32	ROCK CREEK	2.08	24.53
1	17 0078	NEV	STATE ROUTE 89	PROSSER CREEK	4.87	24.53
1	22 0116R	YOL	INTERSTATE 505	SOUTH FORK WILLOW SLOUGH	10.33	24.50
1	22 0114R	YOL	INTERSTATE 505	UNION SCHOOL SLOUGH	5.71	24.32
1	22 0114L	YOL	INTERSTATE 505	UNION SCHOOL SLOUGH	5.71	24.25
1	15 0036	COL	STATE ROUTE 16	BEAR CREEK	R4.34	23.99
1	22 0007R	YOL	INTERSTATE 5	CACHE CREEK	R11.45	23.96
2	17 0003	NEV	STATE ROUTE 20	SQUIRREL CREEK	R5.32	23.88
2	12 0029	BUT	STATE ROUTE 99	CAMPBELL CREEK	45.7	23.86
2	22 0007L	YOL	INTERSTATE 5	CACHE CREEK	R11.44	23.76
2	12 0053	BUT	STATE ROUTE 32	PINE CREEK LAGOON	1.39	23.72
2	12 0070L	BUT	STATE ROUTE 149 SB	DRY CREEK	R3.5	23.63
2	12 0028	BUT	STATE ROUTE 99	PINE CREEK	45.52	22.70
2	11 0022	GLE	STATE ROUTE 162	ANGELS SLOUGH	80.72	22.61
2	17 0062	NEV	INTERSTATE 80	TRUCKEE RIVER	27.29	22.59
2	24 0068R	SAC	INTERSTATE 5 NB	AMERICAN RIV, GARDEN HWY	24.82	22.55
2	22 0026L	YOL	INTERSTATE 80 WB	SACRAMENTO RIVER (BRYTE)	R11.31	22.32
2	25 0123	ED	HWY 49	KNICKERBOCKER CREEK	33.82	21.93
2	24 0143	SAC	STATE ROUTE 99	MORRISON CREEK	20.03	21.84
2	22 0026R	YOL	INTERSTATE 80 EB	SACRAMENTO RIVER (BRYTE)	R11.31	21.79
2	15 0071L	COL	INTERSTATE 5	FRESHWATER CREEK	R19.66	21.66
2	19 0105L	PLA	INTERSTATE 80 WB	SOUTH YUBA RI & S YUBA D	67.87	21.60
2	19 0105R	PLA	INTERSTATE 80 EB	SOUTH YUBA RI & S YUBA D	67.87	21.32
2	19 0191L	PLA	STATE ROUTE 65 SB	AUBURN RAVINE	R14.49	21.25
2	11 0087	GLE	STATE ROUTE 162	STONY CREEK	R45.13	20.84
2	19 0192L	PLA	STATE ROUTE 65	MARKHAM RAVINE	R17.69	20.72
2	19 0196R	PLA	STATE ROUTE 65	SOUTH YANKEE SLOUGH	R21.46	20.59
2	19 0195R	PLA	STATE ROUTE 65	COON CREEK	R19.92	20.56
2	19 0195L	PLA	STATE ROUTE 65	COON CREEK	R19.93	20.56
2	19 0190L	PLA	STATE ROUTE 65 SB	NORTH INGRAM SLOUGH	R13.65	20.47
2	19 0190R	PLA	STATE ROUTE 65 NB	NORTH INGRAM SLOUGH	R13.65	20.47

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
2	19 0034	PLA	STATE ROUTE 89	WARD CREEK	5.81	20.46
2	19 0194L	PLA	STATE ROUTE 65	LINCOLN AIRPORT CREEK	R18.33	20.15
2	19 0194R	PLA	STATE ROUTE 65	LINCOLN AIRPORT CREEK	R18.33	20.15
2	24 0004R	SAC	US 50 (I-305) EB	SACRAMENTO RIV,I 5,CONNS	L.01	19.92
2	15 0005R	COL	INTERSTATE 5 NB	SALT CREEK	R7.99	19.83
2	15 0071R	COL	INTERSTATE 5	FRESHWATER CREEK	R19.66	19.76
2	19 0198R	PLA	STATE ROUTE 65	BIG YANKEE SLOUGH	R22.44	19.67
2	25 0031	ED	STATE ROUTE 49	WEBER CREEK	12.81	19.49
2	22 0040	YOL	STATE ROUTE 113	SACRAMENTO RIVER	22.02	19.30
2	24 0327L	SAC	INTERSTATE 5 SB	STONE LAKE CREEK	8.11	19.23
2	22 0135R	YOL	INTERSTATE 5	OAT CREEK	R21.84	19.14
2	15 0073R	COL	INTERSTATE 5	SALT CREEK	R19.25	19.04
2	19 0197R	PLA	STATE ROUTE 65	NORTH YANKEE SLOUGH	R22.23	18.67
2	15 0073L	COL	INTERSTATE 5	SALT CREEK	R19.25	18.62
2	12 0122	BUT	STATE ROUTE 99	GOLDRUN CREEK	19.51	18.47
2	22 0023	YOL	STATE ROUTE 16	HEATHER CREEK	11.54	18.31
2	22 0044	YOL	INTERSTATE 80	YOLO CAUSEWAY WEST	5.81	18.02
2	24 0028L	SAC	STATE ROUTE 99 SB	SOUTH LAGOON CREEK	4.91	17.79
2	15 0037	COL	STATE ROUTE 16	BEAR CREEK	R3.35	17.54
2	24 0045R	SAC	STATE ROUTE 99 NB	LAGOON CREEK	4.98	17.38
2	18 0009	SUT	SR 20	FEATHER RIVER,K ST,UP RR	17	17.31
2	11 0098	GLE	STATE ROUTE 162	SALT CREEK	43.54	17.29
2	11 0010	GLE	STATE ROUTE 162	WILLOW CREEK	67.74	17.28
2	24 0028R	SAC	STATE ROUTE 99NB	SOUTH LAGOON CREEK	4.91	17.23
3	22 0038	YOL	STATE ROUTE 113	CACHE CREEK	13.1	17.20
3	17 0071L	NEV	INTERSTATE 80	SOUTH YUBA RIVER	R61.65L	17.16
3	22 0025L	YOL	ROUTE 5 SB	SACRAMENTO RIV (ELKHORN)	0.01	17.00
3	15 0064R	COL	INTERSTATE 5	PETROLEUM CREEK	R2.05	16.99
3	12 0038	BUT	STATE ROUTE 70	N FK FEATHER RIVER	40.99	16.99
3	15 0064L	COL	INTERSTATE 5	PETROLEUM CREEK	R2.05	16.83
3	25 0016	ED	STATE ROUTE 89	TAYLOR CREEK	12.03	16.83
3	12 0054	BUT	STATE ROUTE 32	SACRAMENTO RIVER	0.01	16.80
3	22 0025R	YOL	ROUTE 5 NB	SACRAMENTO RIV (ELKHORN)	0.01	16.70
3	12 0119	BUT	STATE ROUTE 99	WESTERN CANAL	14.03	16.64
3	13 0005	SIE	STATE ROUTE 49	DOWNIE RIVER	16.75	16.46
3	16 0010	YUB	STATE ROUTE 20	DRY CREEK	13.9	16.43
3	12 0056	BUT	STATE ROUTE 162	BIG BUTTE CREEK OVERFLOW	0.52	16.43
3	24 0078	SAC	STATE ROUTE 16	DEER CREEK	14.14	16.06
3	12 0131R	BUT	STATE ROUTE 99 NB	HAMLIN SLOUGH	25.35	15.89

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
3	15 0086	COL	STATE ROUTE 20	BEAR CREEK	3.28	15.54
3	13 0006	SIE	STATE ROUTE 49	LADIES CANYON CREEK	24.03	15.46
3	25 0013	ED	US HIGHWAY 50	TROUT CREEK	77.33	15.35
3	24 0020R	SAC	STATE ROUTE 99 NB	COSUMNES RIVER	8.4	15.30
3	19 0056	PLA	INTERSTATE 80	MINERS RAVINE	2.88	15.04
3	17 0015L	NEV	STATE ROUTE 89	DONNER CREEK	0.39	14.99
3	18 0008	SUT	STATE ROUTE 20	SACRAMENTO RIV(MERIDIAN)	R.01	14.99
3	12 0141R	BUT	STATE ROUTE 70	FEATHER RIVER	14.83	14.90
3	24 0327R	SAC	INTERSTATE 5 NB	STONE LAKE CREEK	8.11	14.90
3	17 0054	NEV	STATE ROUTE 20	DEER CREEK	R16.87	14.90
3	19 0119L	PLA	INTERSTATE 80 WB	SOUTH YUBA RIVER	R64.08L	14.76
3	18 0026R	SUT	STATE ROUTE 99 NB	FEATHER RIVER	12.12	14.63
3	17 0015R	NEV	STATE ROUTE 89	DONNER CREEK	0.39	14.62
3	15 0072L	COL	INTERSTATE 5	LURLINE CREEK	R22.32	14.62
3	12 0193	BUT	STATE ROUTE 162	FEATHER RIVER	15.57	14.55
3	24 0041	SAC	STATE ROUTE 104	ROLLING DRAW	5.18	14.41
3	12 0057	BUT	STATE ROUTE 162	BIG BUTTE CREEK OVERFLOW	0.22	14.27
3	19 0022	PLA	STATE ROUTE 49	BEAR RIVER	11.35	14.23
3	22 0137L	YOL	INTERSTATE 5	BUCKEYE CREEK	R28.59	14.18
3	25 0009	ED	U.S. HIGHWAY 50	PYRAMID CREEK	59.77	14.15
3	19 0031	PLA	STATE ROUTE 89	SQUAW CREEK	14.21	14.05
3	12 0134	BUT	STATE ROUTE 70	W BR FEATHER RIV(LK ORO)	28.22	13.97
3	16 0011	YUB	STATE ROUTE 20	YUBA RIVER, TIMBUCTOO PL	R17.73	13.77
3	12 0188	BUT	STATE ROUTE 162	MFK FEATHER RI BIDWELL	26.87	13.72
3	25 0005R	ED	U.S. HIGHWAY 50 EB	WEBER CREEK	15.42	13.47
3	17 0013	NEV	INTERSTATE 80	TRUCKEE RIVER	20.84	13.44
3	24 0262R	SAC	INTERSTATE 5 NB	BEACH LAKE	12.93	13.28
3	15 0069R	COL	INTERSTATE 5 NB	STONE CORRAL CREEK	R27.74	12.98
3	25 0021	ED	STATE ROUTE 49	SOUTH FORK AMERICAN RIV	23.99	12.81
3	17 0009	NEV	STATE ROUTE 49	MIDDLE YUBA RIVER	R32.62	12.65
3	25 0015	ED	US HIGHWAY 50	UPPER TRUCKEE RIVER	72.66	12.08
3	24 0042	SAC	STATE ROUTE 104	SKUNK CREEK	4.3	12.07
3	19 0033	PLA	STATE ROUTE 89	TRUCKEE RIVER	8.48	11.83
4	15 0056L	COL	INTERSTATE 5 SB	FUNKS CREEK	R30.82	11.83
4	24 0262L	SAC	INTERSTATE 5 SB	BEACH LAKE	12.92	11.80
4	15 0072R	COL	INTERSTATE 5	LURLINE CREEK	R22.31	11.75
4	11 0072L	GLE	INTERSTATE 5	STONY CREEK	R26.88	11.74
4	19 0136L	PLA	STATE ROUTE 65 SB	PLEASANT GROVE CREEK	R8.76	11.72

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
4	24 0001R	SAC	STATE ROUTE 160 NB	AMERICAN RIVER	R44.46	11.71
4	15 0056R	COL	INTERSTATE 5	FUNKS CREEK	R30.82	11.66
4	11 0028	GLE	STATE ROUTE 32	GLENN-COLUSA CANAL	9.58	11.53
4	12 0059	BUT	STATE ROUTE 70	MIDDLE HONCUT CREEK	0.09	11.38
4	12 0060	BUT	STATE ROUTE 70	NORTH HONCUT CREEK	0.15	11.38
4	15 0005L	COL	INTERSTATE 5 SB	SALT CREEK	R7.99	11.16
4	15 0069L	COL	INTERSTATE 5 SB	STONE CORRAL CREEK	R27.74	11.12
4	15 0007L	COL	INTERSTATE 5	NORTH BRANCH SAND CREEK	R9.79	10.96
4	19 0017	PLA	STATE ROUTE 49	WISE CANAL	5.02	10.95
4	15 0015R	COL	INTERSTATE 5	HUNTERS CREEK	R32.94	10.83
4	13 0015	SIE	STATE ROUTE 49	GOODYEARS CREEK	R12.24	10.68
4	12 0073R	BUT	STATE ROUTE 149 NB	CLEAR CREEK	R3.96	10.65
4	15 0015L	COL	INTERSTATE 5	HUNTERS CREEK	R32.94	10.60
4	24 0080	SAC	STATE ROUTE 16	COSUMNES RIVER	19.72	10.57
4	16 0019	YUB	STATE ROUTE 70	SIMMERLY SLOUGH	16.01	10.38
4	11 0090	GLE	STATE ROUTE 162	SOUTH FORK WILLOW CREEK	62.5	10.36
4	22 0041	YOL	STATE ROUTE 45	SYCAMORE SLOUGH	0.13	10.32
4	16 0034	YUB	STATE ROUTE 70	YUBA RIVER, UP RR SPUR	13.6	10.32
4	11 0058R	GLE	INTERSTATE 5	SOUTH FORK WILLOW CREEK	R12.39	10.30
4	17 0098	NEV	STATE ROUTE 267	GLENSHIRE, RR, TRK RIVER	M.39	10.19
4	17 0105	NEV	SR 20	SLACKS RAVINE	1.37	10.15
4	13 0002	SIE	STATE ROUTE 49	NORTH YUBA RIVER	R3.72	10.12
4	12 0140	BUT	STATE ROUTE 70	FLAG CANYON CRK	24.26	9.94
4	24 0018	SAC	STATE ROUTE 99	LAGUNA CREEK	14.32	9.82
4	22 0124R	YOL	INTERSTATE 5	YOLO BYPASS	0.84	9.74
4	11 0058L	GLE	INTERSTATE 5	SOUTH FORK WILLOW CREEK	R12.39	9.73
4	15 0007R	COL	INTERSTATE 5	NORTH BRANCH SAND CREEK	R9.79	9.71
4	12 0143	BUT	STATE ROUTE 70	DUDLEY CREEK	18.5	9.70
4	22 0124L	YOL	INTERSTATE 5	YOLO BYPASS	0.84	9.61
4	12 0184	BUT	STATE ROUTE 162	CANYON CREEK	29.96	9.46
4	19 0136R	PLA	STATE ROUTE 65 NB	PLEASANT GROVE CREEK	R8.77	9.44
4	16 0046R	YUB	STATE ROUTE 65	REEDS CREEK	R7.61	9.16
4	12 0121	BUT	STATE ROUTE 99	SHIPPEE CREEK	16.09	9.15
4	12 0129	BUT	STATE ROUTE 99	NANCE CANYON	26.14	9.13
4	16 0045R	YUB	STATE ROUTE 65 NB	HUTCHINSON CREEK	R7.42	9.13
4	13 0011	SIE	STATE ROUTE 49	FIDDLE CREEK	4.58	8.81
4	18 0017R	SUT	STATE ROUTE 99 NB	CROSS CANAL	5.92	8.69

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
4	12 0070R	BUT	STATE ROUTE 149 NB	DRY CREEK	R3.5	8.68
4	12 0042	BUT	STATE ROUTE 162	CHEROKEE CANAL	6.67	8.67
4	12 0154L	BUT	STATE ROUTE 99 SB	LINDO CHANNEL	R33.87	8.50
4	12 0194	BUT	STATE ROUTE 191	FALLAGER CREEK	2.61	8.47
4	12 0073L	BUT	STATE ROUTE 149 SB	CLEAR CREEK	R3.96	8.20
4	24 0068L	SAC	INTERSTATE 5 SB	AMERICAN RIV, GARDEN HWY	24.82	8.20
5	12 0145	BUT	STATE ROUTE 70	CAMPBELL CREEK OVERFLOW	19.81	8.19
5	12 0128L	BUT	STATE ROUTE 99 SB	EDGAR SLOUGH	30.03	8.18
5	12 0195	BUT	STATE ROUTE 191	CLEAR CREEK	4.67	8.12
5	24 0343	SAC	STATE ROUTE 16	LAGUNA CREEK	R11.53	8.10
5	18 0001L	SUT	STATE ROUTE 70 WB	BEAR RIVER (RIO OSO)	8.09	8.06
5	11 0031	GLE	STATE ROUTE 162	SACRAMENTO RIVER OVFL	81.86	8.04
5	11 0071L	GLE	INTERSTATE 5	HAMBRIGHT CREEK	R26.46	8.02
5	12 0044	BUT	STATE ROUTE 32	LINDO CHANNEL	6.36	7.95
5	16 0046L	YUB	STATE ROUTE 65	REEDS CREEK	R7.61	7.93
5	16 0003	YUB	STATE ROUTE 65	BEST SLOUGH	3.55	7.91
5	16 0045L	YUB	STATE ROUTE 65 SB	HUTCHINSON CREEK	R7.44	7.90
5	11 0027	GLE	STATE ROUTE 162	BIG BUTTE CREEK	84.58	7.73
5	18 0017L	SUT	STATE ROUTE 99 SB	CROSS CANAL	5.92	7.70
5	19 0032	PLA	STATE ROUTE 89	TRUCKEE RIVER	13.06	7.56
5	12 0045	BUT	STATE ROUTE 32	MUD CREEK	4.38	7.51
5	12 0156L	BUT	STATE ROUTE 99 SB	MUD CREEK	R37.2	7.27
5	11 0018	GLE	STATE ROUTE 162	SACRAMENTO RIVER OVFL	79.07	7.25
5	24 0231L	SAC	S51-S99 CONNECTOR	US 50 & CONNECTORS	R24.27	7.17
5	24 0231R	SAC	N99-N51 CONNECTOR	US 50 & CONNECTORS	R24.27	7.17
5	17 0104	NEV	SR 20	SLACKS RAVINE	0.96	7.10
5	12 0126L	BUT	STATE ROUTE 99 SB	BUTTE CREEK	28.72	7.03
5	24 0039	SAC	STATE ROUTE 104	GRIFFITH CREEK	5.78	6.96
5	25 0033	ED	STATE ROUTE 193	S FK AMERICAN RIVER	R24.65	6.79
5	19 0021	PLA	STATE ROUTE 49	NORTH FORK DRY CREEK	R9.45	6.74
5	18 0001R	SUT	STATE ROUTE 70 EB	BEAR RIVER (RIO OSO)	8.09	6.72
5	19 0065	PLA	STATE ROUTE 174	BEAR RIVER	2.82	6.66
5	16 0002	YUB	STATE ROUTE 65	DRY CREEK	2.21	6.29
5	17 0007	NEV	STATE ROUTE 49	SOUTH YUBA RIVER	R21.86	6.22
5	12 0128R	BUT	STATE ROUTE 99 NB	EDGAR SLOUGH	30.03	6.09
5	25 0099	ED	U.S. HIGHWAY 50	SOUTH FORK AMERICAN RIV	R44.24	5.89
5	25 0098	ED	U.S. HIGHWAY 50	SOUTH FORK AMERICAN RIV	R44.12	5.87

Priority	Bridge Number	County[28]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
5	12 0125	BUT	STATE ROUTE 99	SCRUB CREEK	27.84	5.75
5	19 0020	PLA	STATE ROUTE 49	SOUTH FORK DRY CREEK	R8.09	5.73
5	24 0296L	SAC	INTERSTATE 5 SB	FREEPORT BL,ABANDONED RR	15.58	5.55
5	25 0008	ED	U.S. HIGHWAY 50	SOUTH FORK AMERICAN RIV	39.68	5.37
5	12 0172	BUT	STATE ROUTE 191	DRY CREEK	1.68	5.27
5	11 0023	GLE	STATE ROUTE 162	SACRAMENTO RIVER OVFL	81.63	5.25
5	12 0148L	BUT	STATE ROUTE 99 SB	LITTLE CHICO CREEK	R32.2	5.21
5	24 0336	SAC	STATE ROUTE 16	FOLSOM SOUTH CANAL	T11.35	4.97
5	24 0075	SAC	STATE ROUTE 16	MORRISON CREEK	6.64	4.91
5	12 0131L	BUT	STATE ROUTE 99 SB	HAMLIN SLOUGH	25.35	4.87
5	24 0251	SAC	INTERSTATE 5	43RD AVE	18.65	4.62
5	25 0058	ED	STATE ROUTE 49	HANGTOWN CREEK	14.84	4.28
5	24 0025	SAC	STATE ROUTE 99	BADGER CREEK	6.96	2.26
5	24 0296R	SAC	INTERSTATE 5 NB	FREEPORT BL,ABANDONED RR	15.59	2.12
5	12 0031	BUT	STATE ROUTE 162	THERMALITO AFTERBAY	R10.12	0.85
5	24 0004L	SAC	US 50 (I-305) WB	SACRAMENTO RIV,I-5,CONNS	L.01	0.00
5	17 0005	NEV	STATE ROUTE 49	SOUTH WOLF CREEK	3.61	0.00

TABLE 9: PRIORITIZATION OF LARGE CULVERTS FOR DETAILED CLIMATE CHANGE ADAPTATION ASSESSMENTS

Priority	Culvert System Number	County[29]	Route	Feature Crossed	Postmile	Cross-Hazard Prioritization Score
1	24 0347	SAC	INTERSTATE 5	SOUTH REACH BEACH LAKE	12.4	100.00
1	25 0019	ED	STATE ROUTE 89	MEEKS CREEK	24.9	72.55
1	13 0021	SIE	STATE ROUTE 89	TURNER CANYON	18.8	69.43
1	13 0010	SIE	STATE ROUTE 49	HOWARD CREEK	R34.26	64.75
1	22 0172	YOL	INTERSTATE 5	DUNNIGAN CREEK	R25.97	55.25
2	11 0088	GLE	STATE ROUTE 162	NYE CREEK	51.69	54.82
2	22 0053	YOL	INTERSTATE 505	OAT CREEK	20.79	53.60
2	19 0133	PLA	STATE ROUTE 267	MARTIS CREEK	2.04	52.68
2	19 0199	PLA	STATE ROUTE 65	SOUTH SUTTER AQUEDUCT	L23.78	50.80
2	13 0013	SIE	STATE ROUTE 49	SMITHNECK CREEK	60.54	43.41
2	15 0085	COL	STATE ROUTE 20	BEAR CREEK TRIBUTARY	3.4	42.80
3	17 0073L	NEV	INTERSTATE 80 EB	SOUTH YUBA RIVER	R2.69L	40.70
3	17 0073R	NEV	INTERSTATE 80 EB	SOUTH YUBA RIVER	R2.63R	40.55
3	24 0033	SAC	US HIGHWAY 50	ALDER CREEK	16.46	38.19
3	22 0119	YOL	INTERSTATE 505	DRY SLOUGH	1.18	36.11
3	19 0064	PLA	INTERSTATE 80	AUBURN RAVINE, SPRING CR	17.18	35.29
3	15 0082	COL	STATE ROUTE 20	SALT CREEK	8.05	29.73
4	25 0061	ED	STATE ROUTE 89	BIG MEADOWS CR	4.2	28.87
4	19 0138	PLA	STATE ROUTE 65	ORCHARD CREEK	R11.66	21.97
4	19 0139	PLA	STATE ROUTE 65	N BRANCH ORCHARD CREEK	R12.27	21.95
4	19 0019	PLA	STATE ROUTE 49	ROCK CREEK	6.93	21.50
4	17 0092	NEV	STATE ROUTE 20	WOLF CREEK	R12.2	21.10
4	12 0191	BUT	STATE ROUTE 149	GOLD RUN CREEK	R1.26	19.05
5	17 0022	NEV	STATE ROUTE 20	BEAR RIVER	41.28	17.25
5	16 0048	YUB	STATE ROUTE 65	KIMBALL CREEK	R6.32	16.42
5	11 0059	GLE	STATE ROUTE 162	COLUSA DRAIN	74.56	14.46
5	24 0037	SAC	STATE ROUTE 104	HADSEVILLE CREEK	13.92	14.34
5	24 0038	SAC	STATE ROUTE 104	CLAY CREEK	9.94	0.00

[29] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba

TABLE 10: PRIORITIZATION OF SMALL CULVERTS FOR DETAILED CLIMATE CHANGE ADAPTATION ASSESSMENTS

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
1	170804002918	NEV	80	29.18	100.00	
1	130804000115	SIE	80	1.15	85.23	
1	190800106282	PLA	80	62.82	81.45	
1	170800002765	NEV	80	27.65	80.81	
1	170802106241	NEV	80	62.41	80.53	
1	190804003494	PLA	80	34.94	79.28	
1	170804003055	NEV	80	30.55	78.62	
1	170804002573	NEV	80	25.73	78.30	
1	170802106170	NEV	80	61.7	77.82	
1	190800106341	PLA	80	63.41	77.49	
1	170804002399	NEV	80	23.99	76.64	
1	190802106264	PLA	80	62.64	76.46	
1	170802006215	NEV	80	62.15	76.13	
1	190802106254	PLA	80	62.54	75.73	
1	170802106122	NEV	80	61.22	75.58	
1	170802106033	NEV	80	60.33	75.47	
1	170802106090	NEV	80	60.9	75.42	
1	190899100850	PLA	89	8.5	75.11	
1	250504005660	ED	50	56.6	74.91	
1	170802106205	NEV	80	62.05	74.84	
1	170804002961	NEV	80	29.61	74.16	
1	170804002300	NEV	80	23	73.93	
1	170800106132	NEV	80	61.32	73.12	
1	170804003023	NEV	80	30.23	72.98	
1	170800106095	NEV	80	60.95	72.98	
1	130804000123	SIE	80	1.23	71.82	
1	250504005883	ED	50	58.83	71.81	
1	250504005428	ED	50	54.28	71.32	
1	250504005631	ED	50	56.31	71.18	
1	250504006288	ED	50	62.88	70.79	
1	250504006435	ED	50	64.35	70.75	
1	250504005871	ED	50	58.71	70.73	
1	250504006349	ED	50	63.49	70.70	
1	170800106033	NEV	80	60.33	70.65	
1	170804002300	NEV	80	23	70.07	

[30] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
1	250504005549	ED	50	55.49	69.44	
1	170804002389	NEV	80	23.89	68.71	
1	250504006399	ED	50	63.99	68.22	
1	170804003124	NEV	80	31.24	66.92	
1	130890002748	SIE	89	27.48	66.61	
1	250504005449	ED	50	54.49	66.31	
1	250504005417	ED	50	54.17	66.16	
1	250504005501	ED	50	55.01	66.14	
1	250504005388	ED	50	53.88	66.12	
1	250504000031	ED	50	0.31	66.00	
1	190894001536	PLA	89	15.36	65.93	
1	250504006291	ED	50	62.91	65.80	
1	250050000354	ED	5	3.54	65.79	
1	130890002660	SIE	89	26.6	65.45	
1	130894002124	SIE	89	21.24	65.37	
1	250504005653	ED	50	56.53	64.84	
1	170804002349	NEV	80	23.49	64.46	
1	160204001698	YUB	20	16.98	62.84	
1	130490005856	SIE	49	58.56	62.45	
1	130894002140	SIE	89	21.4	62.37	
1	130890002788	SIE	89	27.88	62.35	
1	250504006580	ED	50	65.8	62.09	
1	250504006158	ED	50	61.58	61.70	
1	250504005497	ED	50	54.97	61.52	
1	130894002309	SIE	89	23.09	61.44	
1	130890002777	SIE	89	27.77	61.32	
1	130894002188	SIE	89	21.88	61.16	
1	250504006411	ED	50	64.11	60.75	
1	250504006430	ED	50	64.3	60.75	
1	130895202156	SIE	89	21.56	59.97	
1	170204004090	NEV	20	40.9	59.81	
1	170204004092	NEV	20	40.92	59.81	
1	250504005638	ED	50	56.38	59.02	
1	130894002392	SIE	89	23.92	58.94	
1	130490004942	SIE	49	49.42	58.67	
1	130490004936	SIE	49	49.36	58.65	
1	130490005920	SIE	49	59.2	58.27	
1	160490000699	YUB	49	6.99	42.06	Yes
1	130490005358	SIE	49	53.58	32.65	Yes
1	130490005661	SIE	49	56.61	30.35	Yes

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
1	130490005687	SIE	49	56.87	30.04	Yes
1	130894001751	SIE	89	17.51	26.48	Yes
2	150204000033	COL	20	0.33	57.81	
2	170800002146	NEV	80	21.46	57.69	
2	250504006507	ED	50	65.07	57.13	
2	250504006166	ED	50	61.66	57.09	
2	250504005896	ED	50	58.96	56.93	
2	170204004110	NEV	20	41.1	56.47	
2	130894002383	SIE	89	23.83	56.42	
2	130894002422	SIE	89	24.22	56.42	
2	130894002049	SIE	89	20.49	56.25	
2	170204003857	NEV	20	38.57	56.20	
2	130490005884	SIE	49	58.84	55.76	
2	130490005937	SIE	49	59.37	55.76	
2	150164100446	COL	16	4.46	55.72	
2	150164000580	COL	16	5.8	55.72	
2	150200100110	COL	20	1.1	55.58	
2	220160000799	YOL	16	7.99	55.57	
2	150204100045	COL	20	0.45	55.31	
2	150200000263	COL	20	2.63	55.21	
2	150164000288	COL	16	2.88	55.08	
2	120704103594	BUT	70	35.94	54.98	
2	250504000618	ED	50	6.18	54.61	
2	120704003911	BUT	70	39.11	53.73	
2	130894002270	SIE	89	22.7	53.48	
2	150164000028	COL	16	0.28	53.21	
2	250504004865	ED	50	48.65	53.16	
2	150164000317	COL	16	3.17	52.89	
2	120700004418	BUT	70	44.18	52.66	
2	250504006633	ED	50	66.33	52.46	
2	170804001344	NEV	80	13.44	52.33	
2	170894000781	NEV	89	7.81	52.25	
2	130490006308	SIE	49	63.08	52.09	
2	220160000346	YOL	16	3.46	52.06	
2	120704103662	BUT	70	36.62	51.89	
2	250504005040	ED	50	50.4	51.83	
2	250504005143	ED	50	51.43	51.79	
2	120704004082	BUT	70	40.82	51.71	
2	240050001056	SAC	5	10.56	51.40	
2	120704003954	BUT	70	39.54	51.39	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
2	250508001701	ED	50	17.01	51.33	
2	120704004065	BUT	70	40.65	51.30	
2	190804003019	PLA	80	30.19	51.28	
2	190804002962	PLA	80	29.62	51.28	
2	130490005941	SIE	49	59.41	50.79	
2	111620004173	GLE	162	41.73	50.71	
2	170204003046	NEV	20	30.46	50.50	
2	150200000303	COL	20	3.03	50.47	
2	190804003141	PLA	80	31.41	50.40	
2	170802002247	NEV	80	22.47	50.16	
2	170808002026	NEV	80	20.26	49.54	
2	250504005031	ED	50	50.31	49.32	
2	250504005047	ED	50	50.47	49.31	
2	250504005001	ED	50	50.01	49.29	
2	250504005077	ED	50	50.77	49.29	
2	250504005335	ED	50	53.35	49.29	
2	250504005319	ED	50	53.19	49.28	
2	130490006388	SIE	49	63.88	49.14	
2	250504005027	ED	50	50.27	49.12	
2	250504000703	ED	50	7.03	49.10	
2	130491206346	SIE	49	63.46	49.02	
2	250504000703	ED	50	7.03	48.98	
2	250500101038	ED	50	10.38	48.96	
2	170804002035	NEV	80	20.35	48.79	
2	150164000717	COL	16	7.17	48.28	
2	111620004251	GLE	162	42.51	48.09	
2	190804003115	PLA	80	31.15	47.97	
2	250500006674	ED	50	66.74	47.85	
2	170490001286	NEV	49	12.86	46.73	
2	130490006336	SIE	49	63.36	46.62	
2	160494000892	YUB	49	8.92	46.35	
2	170806105905	NEV	80	59.05	45.73	
2	250500003677	ED	50	36.77	45.71	
2	150200001141	COL	20	11.41	45.16	
2	170800002125	NEV	80	21.25	45.14	
2	160200002117	YUB	20	21.17	38.31	Yes
2	130490005041	SIE	49	50.41	29.99	Yes
2	130894001620	SIE	89	16.2	29.10	Yes
2	130894001745	SIE	89	17.45	28.89	Yes
3	150200000534	COL	20	5.34	45.05	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
3	150200000628	COL	20	6.28	45.03	
3	150200000658	COL	20	6.58	45.02	
3	150200000688	COL	20	6.88	45.01	
3	150200000503	COL	20	5.03	45.01	
3	150200000581	COL	20	5.81	45.01	
3	111624003879	GLE	162	38.79	44.97	
3	250504000787	ED	50	7.87	44.88	
3	250504101159	ED	50	11.59	44.85	
3	171744000051	NEV	174	0.51	44.85	
3	240164101780	SAC	16	17.8	44.82	
3	190800002705	PLA	80	27.05	44.62	
3	111620104505	GLE	162	45.05	44.45	
3	250504005108	ED	50	51.08	44.31	
3	250504005096	ED	50	50.96	44.29	
3	250504004871	ED	50	48.71	44.23	
3	240050000469	SAC	5	4.69	44.10	
3	170490000748	NEV	49	7.48	44.07	
3	250504004543	ED	50	45.43	44.05	
3	250504004540	ED	50	45.4	44.03	
3	150200000958	COL	20	9.58	43.86	
3	190804002460	PLA	80	24.6	43.47	
3	250504105255	ED	50	52.55	43.47	
3	111620004009	GLE	162	40.09	43.31	
3	150204001115	COL	20	11.15	43.27	
3	220160000890	YOL	16	8.9	43.25	
3	250504005768	ED	50	57.68	43.13	
3	170800002114	NEV	80	21.14	43.08	
3	170490101405	NEV	49	14.05	42.49	
3	150200000750	COL	20	7.5	42.47	
3	111620004565	GLE	162	45.65	42.19	
3	250504101159	ED	50	11.59	42.10	
3	250500101342	ED	50	13.42	42.01	
3	250504005811	ED	50	58.11	42.00	
3	170802105889	NEV	80	58.89	41.86	
3	121490800360	BUT	149	3.6	41.80	
3	170490001164	NEV	49	11.64	41.72	
3	190806006919	PLA	80	69.19	41.72	
3	171744000500	NEV	174	5	41.54	
3	111620004546	GLE	162	45.46	41.35	
3	240051200160	SAC	5	1.6	41.25	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
3	250500000159	ED	50	1.59	40.96	
3	250500101038	ED	50	10.38	40.69	
3	150200001176	COL	20	11.76	40.62	
3	250508005797	ED	50	57.97	40.60	
3	250504004793	ED	50	47.93	40.56	
3	240051200160	SAC	5	1.6	40.39	
3	170490002794	NEV	49	27.94	40.36	
3	150200000790	COL	20	7.9	40.33	
3	250500003730	ED	50	37.3	40.17	
3	250504004800	ED	50	48	40.09	
3	250506101397	ED	50	13.97	40.01	
3	190804105828	PLA	80	58.28	40.01	
3	150204001062	COL	20	10.62	39.89	
3	170490000336	NEV	49	3.36	39.49	
3	250506101217	ED	50	12.17	39.16	
3	250508001961	ED	50	19.61	39.12	
3	111624005571	GLE	162	55.71	39.12	
3	250504004748	ED	50	47.48	39.09	
3	170494000533	NEV	49	5.33	39.07	
3	250504001945	ED	50	19.45	38.82	
3	111624004220	GLE	162	42.2	38.68	
3	191930000463	PLA	193	4.63	38.55	
3	111624004019	GLE	162	40.19	38.32	
3	250504000511	ED	50	5.11	38.24	
3	250504001945	ED	50	19.45	38.20	
3	250504005773	ED	50	57.73	38.14	
3	170490000043	NEV	49	0.43	37.96	
3	170490000143	NEV	49	1.43	37.81	
3	170200004502	NEV	20	45.02	37.76	
3	170200004509	NEV	20	45.09	37.67	
4	120700002605	BUT	70	26.05	37.61	
4	111624004856	GLE	162	48.56	36.81	
4	111620004431	GLE	162	44.31	36.65	
4	111620004955	GLE	162	49.55	36.64	
4	191930000530	PLA	193	5.3	36.57	
4	120324400436	BUT	32	4.36	36.52	
4	111624005540	GLE	162	55.4	36.51	
4	111620004583	GLE	162	45.83	36.47	
4	190204004260	PLA	20	42.6	36.44	
4	190800003520	PLA	80	35.2	36.37	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
4	250500000159	ED	50	1.59	36.19	
4	170802106209	NEV	80	62.09	36.17	
4	240160101899	SAC	16	18.99	36.10	
4	240164101768	SAC	16	17.68	36.04	
4	111620004082	GLE	162	40.82	36.01	
4	111620004082	GLE	162	40.82	36.01	
4	111620003828	GLE	162	38.28	35.99	
4	250506101217	ED	50	12.17	35.68	
4	250504004782	ED	50	47.82	35.63	
4	120996002363	BUT	99	23.63	35.27	
4	110054100274	GLE	5	2.74	35.20	
4	150200000886	COL	20	8.86	35.02	
4	150200000906	COL	20	9.06	34.96	
4	240160002174	SAC	16	21.74	34.91	
4	250501201696	ED	50	16.96	34.89	
4	190800102331	PLA	80	23.31	34.85	
4	250506101401	ED	50	14.01	34.83	
4	130490001000	SIE	49	10	34.56	
4	120700002636	BUT	70	26.36	34.51	
4	170490000878	NEV	49	8.78	34.45	
4	121910000114	BUT	191	1.14	34.34	
4	120700002490	BUT	70	24.9	34.26	
4	250504004899	ED	50	48.99	34.21	
4	220160000740	YOL	16	7.4	34.14	
4	120700002552	BUT	70	25.52	34.08	
4	250504004888	ED	50	48.88	34.03	
4	220160000849	YOL	16	8.49	34.02	
4	240164001990	SAC	16	19.9	33.84	
4	190800102332	PLA	80	23.32	33.46	
4	250504000511	ED	50	5.11	33.46	
4	111624003892	GLE	162	38.92	33.43	
4	110054100100	GLE	5	1	33.38	
4	220160001633	YOL	16	16.33	33.34	
4	120990002284	BUT	99	22.84	33.21	
4	170490000212	NEV	49	2.12	33.05	
4	120700002360	BUT	70	23.6	33.02	
4	150200000560	COL	20	5.6	32.89	
4	150204000703	COL	20	7.03	32.72	
4	150204100340	COL	20	3.4	32.70	
4	150200000731	COL	20	7.31	32.64	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
4	150200000523	COL	20	5.23	32.56	
4	240164000967	SAC	16	9.67	32.38	
4	111624005419	GLE	162	54.19	32.29	
4	130894001842	SIE	89	18.42	32.19	
4	220160001626	YOL	16	16.26	32.13	
4	160200000908	YUB	20	9.08	32.01	
4	121490800031	BUT	149	0.31	31.90	
4	220160002252	YOL	16	22.52	31.66	
4	250504000531	ED	50	5.31	31.46	
4	250504000531	ED	50	5.31	31.44	
4	120700001534	BUT	70	15.34	31.25	
4	120704103445	BUT	70	34.45	31.23	
4	121496800083	BUT	149	0.83	31.18	
4	240164001942	SAC	16	19.42	31.18	
4	220160000997	YOL	16	9.97	31.02	
4	150200001122	COL	20	11.22	30.93	
4	240164001940	SAC	16	19.4	30.89	
4	150204001204	COL	20	12.04	30.74	
4	150204001043	COL	20	10.43	30.73	
4	121910000388	BUT	191	3.88	30.70	
4	250506001605	ED	50	16.05	30.67	
4	120990002506	BUT	99	25.06	30.64	
5	240164002325	SAC	16	23.25	30.61	
5	150204001032	COL	20	10.32	30.60	
5	190200004141	PLA	20	41.41	30.58	
5	120990002507	BUT	99	25.07	30.16	
5	120990002457	BUT	99	24.57	30.09	
5	110054102724	GLE	5	27.24	29.94	
5	160204001353	YUB	20	13.53	29.77	
5	121490800085	BUT	149	0.85	29.61	
5	250504000106	ED	50	1.06	29.59	
5	121496800450	BUT	149	4.5	29.49	
5	191934000941	PLA	193	9.41	29.18	
5	130894001658	SIE	89	16.58	29.07	
5	130894001647	SIE	89	16.47	29.01	
5	110050100050	GLE	5	0.5	28.86	
5	121910000072	BUT	191	0.72	28.76	
5	121910000050	BUT	191	0.5	28.59	
5	110050100050	GLE	5	0.5	28.51	
5	110054100144	GLE	5	1.44	28.50	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
5	170490000799	NEV	49	7.99	28.02	
5	110054100144	GLE	5	1.44	27.96	
5	220160002210	YOL	16	22.1	27.88	
5	130490005608	SIE	49	56.08	27.67	
5	130495204836	SIE	49	48.36	27.66	
5	130494004850	SIE	49	48.5	27.60	
5	130490004870	SIE	49	48.7	27.31	
5	240164001241	SAC	16	12.41	27.27	
5	160200001956	YUB	20	19.56	27.16	
5	240164002377	SAC	16	23.77	27.08	
5	120700002314	BUT	70	23.14	26.98	
5	240164001039	SAC	16	10.39	26.93	
5	111624005379	GLE	162	53.79	26.87	
5	170204003808	NEV	20	38.08	26.73	
5	130896001572	SIE	89	15.72	26.72	
5	130894001691	SIE	89	16.91	26.58	
5	191930000100	PLA	193	1	26.57	
5	130894001713	SIE	89	17.13	26.56	
5	130894001699	SIE	89	16.99	26.56	
5	111624005250	GLE	162	52.5	26.48	
5	240164000834	SAC	16	8.34	26.08	
5	121490800031	BUT	149	0.31	24.94	
5	150450002057	COL	45	20.57	24.91	
5	150450002031	COL	45	20.31	24.90	
5	111620005050	GLE	162	50.5	22.72	
5	120700002234	BUT	70	22.34	22.25	
5	111620005108	GLE	162	51.08	22.07	
5	130894001731	SIE	89	17.31	21.55	
5	130894001733	SIE	89	17.33	21.48	
5	111620004994	GLE	162	49.94	21.41	
5	150054101935	COL	5	19.35	17.42	
5	190494000601	PLA	49	6.01	9.13	
5	190496000322	PLA	49	3.22	6.93	
5	150055102458	COL	5	24.58	6.71	
5	150200102094	COL	20	20.94	6.62	
5	160700100244	YUB	70	2.44	6.17	
5	110054101491	GLE	5	14.91	5.74	
5	240164101831	SAC	16	18.31	4.18	
5	220160002943	YOL	16	29.43	3.49	
5	120990001389	BUT	99	13.89	2.61	

Priority	Culvert System Number	County[30]	Route	Postmile	Cross-Hazard Prioritization Score	Priority Adjusted?
5	110454001534	GLE	45	15.34	2.11	
5	120990001474	BUT	99	14.74	1.60	
5	120990001872	BUT	99	18.72	1.60	
5	120990001733	BUT	99	17.33	1.59	
5	160700100244	YUB	70	2.44	1.18	
5	120990002056	BUT	99	20.56	0.25	
5	120990001967	BUT	99	19.67	0.17	
5	150055102458	COL	5	24.58	0.00	

TABLE 11: PRIORITIZATION OF ROADWAYS FOR DETAILED CLIMATE CHANGE ADAPTATION ASSESSMENTS

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
1	12	P	SAC 12 0.395 / SAC 12 6.074	81.24
1	220	P	SOL 220 3.196 / SAC 220 3.114	61.20
1	99	P	SAC 99 19.609 / SAC 99 R24.282	50.03
1	99	P	SAC 99 19.9 / SAC 99 R24.28	49.79
1	99	P	SAC 99 R24.334 / SAC 99 R24.334	49.79
1	16	P	SAC 16 T1.658 / SAC 16 T1.691	48.19
1	12	P	SAC 12 0.395 / SAC 12 0.759	45.98
1	84	P	YOL 84 0.004 / YOL 84 2.211	45.01
1	84	P	YOL 84 2.647 / YOL 84 15.687	45.01
1	160	P	SAC 160 19.833 / SAC 160 20.86	44.30
1	160	P	SAC 160 21.1 / SAC 160 34.072	44.30
1	160	P	SAC 160 L0.783 / SAC 160 L7.233	44.30
1	160	P	SAC 160 L10.029 / SAC 160 19.73	44.30
1	160	P	SAC 160 L8.338 / SAC 160 L9.909	44.30
1	160	P	SAC 160 R44.543 / SAC 160 R44.742	44.30
1	5	P	SAC 5 0.042 / SAC 5 4.66	41.90
1	5	P	SAC 5 16.145 / SAC 5 17.505	41.90
1	5	P	SAC 5 17.578 / SAC 5 18.191	41.90
1	5	P	SAC 5 20.877 / SAC 5 22.436	41.90
1	5	P	SAC 5 22.473 / SAC 5 24.838	41.90
1	5	P	SAC 5 25.333 / SAC 5 32.732	41.90
1	5	P	YOL 5 5.533 / YOL 5 R6.52	41.90
1	5	P	SAC 5 0.044 / SAC 5 8.44	41.60
1	5	P	SAC 5 16.155 / SAC 5 17.187	41.60
1	5	P	SAC 5 21.937 / SAC 5 22.428	41.60
1	5	P	SAC 5 22.473 / SAC 5 24.841	41.60
1	5	P	SAC 5 25.334 / SAC 5 32.733	41.60
1	5	P	YOL 5 5.532 / YOL 5 R6.537	41.60
1	160	P	SAC 160 L0.386 / SAC 160 L1.386	40.35
1	160	P	SAC 160 R44.456 / SAC 160 R44.739	40.35
1	50	P	ED 50 15.339 / ED 50 17.519	39.86
1	50	P	ED 50 R13.694 / ED 50 R15.051	39.86
1	50	P	ED 50 R8.908 / ED 50 R12.197	39.86

[31] Caltrans' alignment codes designate the carriageway on divided roadways: "P" always represents northbound or eastbound carriageways whereas "S" always represents southbound or westbound carriageways. Undivided roadways are always indicated with a "P".
[32] BUT = Butte; COL = Colusa; ED = El Dorado; GLE = Glenn; NEV = Nevada; PLA = Placer; SAC = Sacramento; SIE = Sierra; SUT = Sutter; YOL = Yolo; YUB = Yuba
[33] The average of the cross-hazard prioritization scores amongst all the abutting small segments on the same route sharing a common priority level that were aggregated to form the longer segments listed in this table.

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
1	50	P	SAC 50 L0.351 / SAC 50 L0.354	39.86
1	50	P	SAC 50 L0.599 / ED 50 R1.664	39.86
1	50	P	YOL 50 0.15 / YOL 50 2.495	39.86
1	50	P	ED 50 15.31 / ED 50 17.522	39.70
1	50	P	ED 50 R13.737 / ED 50 R15.054	39.70
1	50	P	ED 50 R8.741 / ED 50 R12.201	39.70
1	50	P	SAC 50 L0.597 / ED 50 R1.667	39.70
1	50	P	YOL 50 0 / YOL 50 2.5	39.70
1	51	P	SAC 51 0.084 / SAC 51 8.86	37.84
1	51	P	SAC 51 0.083 / SAC 51 2.792	37.67
1	51	P	SAC 51 2.834 / SAC 51 8.86	37.67
1	80	P	SAC 80 M0.115 / PLA 80 10.334	36.93
1	80	P	SOL 80 R44.72 / YOL 80 2.872	36.93
1	80	P	YOL 80 5.818 / YOL 80 R9.999	36.93
1	80	P	YOL 80 R11.261 / YOL 80 R11.632	36.93
1	80	P	SAC 80 M0.106 / PLA 80 10.359	36.79
1	80	P	SOL 80 R43.876 / SOL 80 R44.666	36.79
1	80	P	SOL 80 R44.715 / YOL 80 2.937	36.79
1	80	P	YOL 80 5.818 / YOL 80 R10.028	36.79
1	80	P	YOL 80 R11.219 / YOL 80 R11.627	36.79
1	65	P	PLA 65 R7.635 / PLA 65 R9.266	34.95
1	65	P	TUL 65 39.576 / TUL 65 R5.93	34.95
1	65	P	PLA 65 M8.073 / PLA 65 R9.252	34.84
1	65	P	TUL 65 R4.873 / PLA 65 R5.925	34.84
1	275	P	YOL 275 11.747 / YOL 275 11.792	34.25
2	5	P	GLE 5 R22.811 / GLE 5 R24.817	33.24
2	5	P	GLE 5 R25.529 / GLE 5 R28.82	33.24
2	5	P	SAC 5 18.191 / SAC 5 18.664	33.24
2	5	P	SAC 5 32.732 / YOL 5 5.533	33.24
2	5	P	SAC 5 4.66 / SAC 5 8.172	33.24
2	5	P	YOL 5 R11.082 / GLE 5 R20.822	33.24
2	5	P	YOL 5 R6.52 / YOL 5 R9.213	33.24
2	5	P	GLE 5 R22.811 / GLE 5 R24.817	33.22
2	5	P	GLE 5 R25.779 / GLE 5 R28.814	33.22
2	5	P	SAC 5 17.187 / SAC 5 18.188	33.22
2	5	P	SAC 5 32.733 / YOL 5 5.532	33.22
2	5	P	YOL 5 R10.808 / GLE 5 R20.822	33.22
2	5	P	YOL 5 R6.537 / YOL 5 R9.399	33.22
2	84	P	YOL 84 2.211 / YOL 84 2.647	33.22
2	80	P	NEV 80 19.144 / SIE 80 1.593	32.82

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
2	80	P	PLA 80 10.359 / PLA 80 R20.539	32.82
2	80	P	YOL 80 2.937 / YOL 80 5.818	32.82
2	80	P	YOL 80 R10.028 / YOL 80 R11.219	32.82
2	80	P	NEV 80 18.393 / NEV 80 22.246	32.77
2	80	P	NEV 80 22.452 / SIE 80 1.593	32.77
2	80	P	PLA 80 10.334 / PLA 80 R20.547	32.77
2	80	P	YOL 80 2.872 / YOL 80 5.818	32.77
2	80	P	YOL 80 R9.999 / YOL 80 R11.261	32.77
2	49	P	PLA 49 3.09 / PLA 49 3.213	31.40
2	49	P	PLA 49 4.678 / PLA 49 5.291	31.40
2	49	P	PLA 49 5.644 / PLA 49 6.126	31.40
2	99	P	BUT 99 26.051 / BUT 99 28.37	31.17
2	99	P	BUT 99 R30.615 / BUT 99 R34.945	31.17
2	99	P	SAC 99 R32.15 / SUT 99 0.954	31.17
2	99	P	SUT 99 30.03 / SUT 99 T30.633	31.17
2	99	P	SUT 99 5.813 / SUT 99 7.08	31.17
2	16	P	SAC 16 5.691 / SAC 16 6.223	31.11
2	16	P	SAC 16 T1.691 / SAC 16 T2.53	31.11
2	16	P	YOL 16 31.039 / YOL 16 31.735	31.11
2	16	P	YOL 16 31.817 / YOL 16 32.356	31.11
2	49	P	ED 49 12.782 / ED 49 13.777	30.99
2	49	P	ED 49 37.952 / PLA 49 2.526	30.99
2	49	P	PLA 49 3.102 / PLA 49 3.21	30.99
2	49	P	PLA 49 4.805 / PLA 49 5.214	30.99
2	49	P	PLA 49 5.642 / PLA 49 6.122	30.99
2	65	P	PLA 65 L23.57 / YUB 65 3.775	30.89
2	65	P	PLA 65 R20.34 / PLA 65 R22.686	30.89
2	65	P	PLA 65 R5.93 / PLA 65 R7.635	30.89
2	65	P	PLA 65 R9.266 / PLA 65 R13.38	30.89
2	65	P	YUB 65 R6.882 / YUB 65 R9.382	30.89
2	99	P	BUT 99 13.031 / BUT 99 R21.075R	30.89
2	99	P	BUT 99 2.765 / BUT 99 R3.116	30.89
2	99	P	BUT 99 26.038 / BUT 99 28.367	30.89
2	99	P	BUT 99 4.118 / BUT 99 4.362	30.89
2	99	P	BUT 99 4.396 / BUT 99 4.577	30.89
2	99	P	BUT 99 4.717 / BUT 99 6.102	30.89
2	99	P	BUT 99 40.225 / BUT 99 45.347	30.89
2	99	P	BUT 99 6.218 / BUT 99 6.417	30.89
2	99	P	BUT 99 6.626 / BUT 99 6.824	30.89
2	99	P	BUT 99 7.013 / BUT 99 7.693	30.89

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
2	99	P	BUT 99 R30.277 / BUT 99 R34.94	30.89
2	99	P	BUT 99 T37.77 / BUT 99 38.74	30.89
2	99	P	SAC 99 R32.124 / SUT 99 0.999	30.89
2	99	P	SUT 99 12.814 / SUT 99 13.679	30.89
2	99	P	SUT 99 30.03 / SUT 99 T30.633	30.89
2	99	P	SUT 99 42.143 / BUT 99 2.508	30.89
2	99	P	SUT 99 5.822 / SUT 99 7.08	30.89
2	99	P	SUT 99 R20.551 / SUT 99 22.603	30.89
2	65	P	PLA 65 R5.925 / PLA 65 M8.073	30.81
2	65	P	PLA 65 R9.252 / PLA 65 R13.385	30.81
2	65	P	YUB 65 R6.877 / YUB 65 R9.382	30.81
2	162	P	BUT 162 16.946 / BUT 162 20.49	30.79
2	244	P	SAC 244 0.418 / SAC 244 T1.077	30.77
2	244	P	SAC 244 0.421 / SAC 244 T1.077	30.77
2	160	P	SAC 160 46.163 / SAC 160 46.604	30.69
2	160	P	SAC 160 R44.742 / SAC 160 45.606	30.69
2	50	P	ED 50 R1.664 / ED 50 R8.908	30.67
2	50	P	ED 50 R12.197 / ED 50 R13.694	30.67
2	50	P	ED 50 R15.051 / ED 50 15.339	30.67
2	50	P	ED 50 R1.667 / ED 50 R1.832R	30.63
2	50	P	ED 50 R1.959R / ED 50 R8.741	30.63
2	50	P	ED 50 R12.201 / ED 50 R13.737	30.63
2	50	P	ED 50 R15.054 / ED 50 15.31	30.63
2	16	P	SAC 16 T1.691 / SAC 16 T2.53	30.52
2	191	P	BUT 191 9.216 / BUT 191 11.387	30.50
2	32	P	BUT 32 8.309 / BUT 32 R8.558	30.44
2	32	P	GLE 32 10.313 / BUT 32 4.178	30.44
2	32	P	GLE 32 2.177 / GLE 32 9.503	30.44
2	20	P	COL 20 29.191 / COL 20 31.091	30.37
2	20	P	COL 20 31.842 / COL 20 32.308	30.37
2	20	P	COL 20 32.453 / COL 20 32.536	30.37
2	20	P	SUT 20 16.327 / YUB 20 1.571	30.37
2	160	P	SAC 160 46.163 / SAC 160 46.808	30.22
2	160	P	SAC 160 R44.739 / SAC 160 45.606	30.22
2	275	P	YOL 275 11.792 / YOL 275 12.011	30.21
2	275	P	YOL 275 11.853 / YOL 275 12.04	30.21
2	70	P	BUT 70 14.622 / BUT 70 15.425	30.16
2	70	P	BUT 70 5.934 / BUT 70 8.353	30.16
2	70	P	YUB 70 14.71 / YUB 70 14.933	30.16
2	70	P	YUB 70 16.369 / YUB 70 18.93	30.16

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
2	70	P	YUB 70 R8.289 / YUB 70 14.7	30.16
2	505	P	YOL 505 19.827 / YOL 505 R22.356	30.14
2	505	P	YOL 505 4.025 / YOL 505 6.534	30.14
2	505	P	YOL 505 9.523 / YOL 505 13.429	30.14
2	70	P	BUT 70 14.615 / BUT 70 15.423	30.13
2	70	P	YUB 70 R8.555 / BUT 70 14.7	30.13
2	128	P	YOL 128 8.766 / YOL 128 9.835	30.07
2	20	P	SUT 20 16.333 / YUB 20 0.991	29.85
2	505	S	YOL 505 19.886 / YOL 505 R22.356	29.74
2	505	S	YOL 505 4.026 / YOL 505 6.534	29.74
2	505	S	YOL 505 9.523 / YOL 505 13.434	29.74
2	113	P	YOL 113 R0.421 / YOL 113 R0.458	29.52
3	50	P	ED 50 R1.832R / ED 50 R1.959R	29.10
3	128	P	YOL 128 8.544 / YOL 128 8.766	29.08
3	113	P	YOL 113 R0.012 / YOL 113 R9.223	28.99
3	113	P	SOL 113 R22.445 / YOL 113 R0.421	28.99
3	113	P	YOL 113 R0.458 / YOL 113 R9.226	28.99
3	193	P	PLA 193 9.589 / PLA 193 10.427	28.93
3	160	P	SAC 160 45.606 / SAC 160 46.163	28.90
3	160	P	SAC 160 46.604 / SAC 160 47.05	28.90
3	5	P	GLE 5 R20.822 / GLE 5 R22.811	28.82
3	5	P	GLE 5 R24.817 / GLE 5 R25.779	28.82
3	5	P	SAC 5 12.051 / SAC 5 14.831	28.82
3	5	P	YOL 5 R9.399 / YOL 5 R10.808	28.82
3	505	P	SOL 505 R10.626 / YOL 505 4.025	28.82
3	505	P	YOL 505 6.534 / YOL 505 9.523	28.82
3	505	S	SOL 505 R10.622 / YOL 505 4.026	28.82
3	505	S	YOL 505 6.534 / YOL 505 9.523	28.82
3	160	P	SAC 160 45.606 / SAC 160 46.163	28.82
3	160	P	SAC 160 46.808 / SAC 160 47.05	28.82
3	162	P	BUT 162 15.828 / BUT 162 16.946	28.80
3	49	P	PLA 49 3.213 / PLA 49 4.678	28.76
3	49	P	PLA 49 5.291 / PLA 49 5.644	28.76
3	149	P	BUT 149 R5.082 / BUT 149 R0.08	28.76
3	149	P	BUT 149 R5.241 / BUT 149 M0.143	28.76
3	99	P	BUT 99 2.508 / BUT 99 2.765	28.69
3	99	P	BUT 99 28.37 / BUT 99 R30.615	28.69
3	99	P	BUT 99 4.362 / BUT 99 4.396	28.69
3	99	P	BUT 99 4.577 / BUT 99 4.717	28.69
3	99	P	BUT 99 6.102 / BUT 99 6.218	28.69

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
3	99	P	BUT 99 6.417 / BUT 99 6.626	28.69
3	99	P	BUT 99 6.824 / BUT 99 7.013	28.69
3	99	P	BUT 99 R21.075R / BUT 99 26.051	28.69
3	99	P	BUT 99 R3.116 / BUT 99 4.118	28.69
3	99	P	BUT 99 R34.945 / BUT 99 T37.77	28.69
3	99	P	SUT 99 0.954 / SUT 99 5.813	28.69
3	99	P	SUT 99 13.679 / SUT 99 R20.551	28.69
3	99	P	SUT 99 22.603 / SUT 99 30.03	28.69
3	99	P	SUT 99 7.08 / SUT 99 12.814	28.69
3	99	P	SUT 99 T30.633 / SUT 99 T35.086	28.69
3	5	P	GLE 5 R20.822 / GLE 5 R22.811	28.68
3	5	P	GLE 5 R24.817 / GLE 5 R25.529	28.68
3	5	P	SAC 5 8.172 / SAC 5 8.753	28.68
3	5	P	YOL 5 R9.213 / YOL 5 R11.082	28.68
3	49	P	PLA 49 3.09 / PLA 49 3.102	28.68
3	49	P	PLA 49 3.21 / PLA 49 4.805	28.68
3	49	P	PLA 49 5.214 / PLA 49 5.642	28.68
3	99	P	BUT 99 10.216 / BUT 99 11.031	28.68
3	99	P	BUT 99 11.175 / BUT 99 13.031	28.68
3	99	P	BUT 99 2.508 / BUT 99 2.765	28.68
3	99	P	BUT 99 28.367 / BUT 99 R30.277	28.68
3	99	P	BUT 99 38.74 / BUT 99 40.225	28.68
3	99	P	BUT 99 4.362 / BUT 99 4.396	28.68
3	99	P	BUT 99 4.577 / BUT 99 4.717	28.68
3	99	P	BUT 99 45.347 / BUT 99 0.001	28.68
3	99	P	BUT 99 6.102 / BUT 99 6.218	28.68
3	99	P	BUT 99 6.417 / BUT 99 6.626	28.68
3	99	P	BUT 99 6.824 / BUT 99 7.013	28.68
3	99	P	BUT 99 7.693 / BUT 99 9.985	28.68
3	99	P	BUT 99 R21.075R / BUT 99 26.038	28.68
3	99	P	BUT 99 R3.116 / BUT 99 4.118	28.68
3	99	P	BUT 99 R34.94 / BUT 99 T37.77	28.68
3	99	P	SUT 99 0.999 / SUT 99 5.822	28.68
3	99	P	SUT 99 13.679 / SUT 99 R20.551	28.68
3	99	P	SUT 99 22.603 / SUT 99 30.03	28.68
3	99	P	SUT 99 7.08 / SUT 99 12.814	28.68
3	99	P	SUT 99 T30.633 / SUT 99 36.317	28.68
3	32	P	BUT 32 10.184R / BUT 32 10.275R	28.66
3	32	P	BUT 32 10.661R / BUT 32 11.703	28.66
3	32	P	BUT 32 4.178 / BUT 32 5.553	28.66

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
3	32	P	BUT 32 6.137 / BUT 32 8.309	28.66
3	32	P	BUT 32 9.34R / BUT 32 9.539R	28.66
3	32	P	BUT 32 R8.558 / BUT 32 R8.869	28.66
3	32	P	GLE 32 9.503 / GLE 32 9.626	28.66
3	32	P	GLE 32 9.699 / GLE 32 10.313	28.66
3	32	P	GLE 32 L0 / GLE 32 2.177	28.66
3	65	P	PLA 65 R15.546 / PLA 65 R20.34	28.62
3	65	P	PLA 65 R22.686 / PLA 65 L23.57	28.62
3	65	P	YUB 65 3.775 / YUB 65 R6.877	28.62
3	70	P	BUT 70 15.425 / BUT 70 R21.321R	28.62
3	70	P	BUT 70 4.056 / BUT 70 5.934	28.62
3	70	P	BUT 70 8.353 / BUT 70 14.622	28.62
3	70	P	SUT 70 R0.051 / SUT 70 R3.621	28.62
3	70	P	YUB 70 14.933 / YUB 70 15.35	28.62
3	70	P	YUB 70 18.93 / YUB 70 22.078	28.62
3	70	P	YUB 70 22.485 / BUT 70 3.396	28.62
3	70	P	YUB 70 R3.755 / YUB 70 R8.289	28.62
3	20	P	COL 20 31.091 / COL 20 31.467	28.61
3	20	P	COL 20 31.7 / COL 20 31.842	28.61
3	20	P	COL 20 32.308 / COL 20 32.453	28.61
3	20	P	COL 20 32.536 / COL 20 36.787	28.61
3	20	P	COL 20 38.03 / SUT 20 1.9	28.61
3	20	P	COL 20 8.943 / COL 20 29.191	28.61
3	20	P	SUT 20 13.599 / SUT 20 16.327	28.61
3	20	P	SUT 20 2.063 / SUT 20 8.926	28.61
3	20	P	SUT 20 9.327 / SUT 20 10.742	28.61
3	20	P	YUB 20 R17.138 / NEV 20 2.343	28.61
3	20	P	YUB 20 R2.034 / YUB 20 R7.562	28.61
3	20	P	YUB 20 R7.957 / YUB 20 16.997	28.61
3	16	P	SAC 16 R16.295 / SAC 16 R23.95	28.58
3	16	P	SAC 16 T2.53 / SAC 16 5.007	28.58
3	16	P	YOL 16 28.638 / YOL 16 31.039	28.58
3	16	P	YOL 16 39.059 / YOL 16 R41.557	28.58
3	16	P	YOL 16 R43.311 / YOL 16 R43.42	28.58
3	65	P	PLA 65 R13.38 / PLA 65 R13.592	28.56
3	65	P	PLA 65 R15.546 / PLA 65 R20.34	28.56
3	65	P	PLA 65 R22.686 / PLA 65 L23.57	28.56
3	65	P	YUB 65 3.775 / YUB 65 R6.882	28.56
3	20	P	COL 20 31.091 / COL 20 31.468	28.52
3	20	P	COL 20 31.701 / COL 20 31.842	28.52

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
3	20	P	COL 20 32.308 / COL 20 32.453	28.52
3	20	P	COL 20 32.536 / COL 20 34.986	28.52
3	20	P	COL 20 36.601 / COL 20 36.788	28.52
3	20	P	COL 20 38.034 / COL 20 38.21	28.52
3	20	P	COL 20 R38.963 / COL 20 R39.266	28.52
3	20	P	SUT 20 1.714 / SUT 20 2.063	28.52
3	20	P	SUT 20 13.598 / SUT 20 16.333	28.52
3	20	P	SUT 20 R0.101 / SUT 20 R0.501	28.52
3	20	P	SUT 20 R0.889 / SUT 20 R1.095	28.52
3	70	P	BUT 70 11.749 / BUT 70 14.615	28.52
3	70	P	BUT 70 15.423 / BUT 70 R21.321R	28.52
3	70	P	BUT 70 4.057 / BUT 70 5.934	28.52
3	70	P	BUT 70 8.353 / BUT 70 8.986	28.52
3	70	P	SUT 70 R0.058 / SUT 70 R4.047	28.52
3	70	P	YUB 70 18.93 / YUB 70 19.791	28.52
3	70	P	YUB 70 R3.75 / YUB 70 R8.555	28.52
3	32	P	BUT 32 10.174R / BUT 32 10.285R	28.48
3	32	P	BUT 32 7.372 / BUT 32 8.309	28.48
3	32	P	BUT 32 9.324R / BUT 32 9.52R	28.48
3	32	P	BUT 32 R8.812 / BUT 32 R8.923R	28.48
3	32	P	GLE 32 9.503 / GLE 32 9.624	28.48
3	32	P	GLE 32 9.698 / GLE 32 10.313	28.48
3	32	P	GLE 32 L0.117 / GLE 32 2.177	28.48
3	162	P	BUT 162 15.827 / BUT 162 16.946	28.41
3	162	P	BUT 162 20.49 / BUT 162 21.026	28.41
3	162	P	GLE 162 65.445 / GLE 162 66.869	28.41
3	80	P	NEV 80 22.246 / NEV 80 22.452	28.35
3	244	P	SAC 244 0.041 / SAC 244 0.144	28.28
3	244	P	SAC 244 0.044 / SAC 244 0.048	28.28
3	45	P	COL 45 19.839 / COL 45 19.851	28.10
3	45	P	COL 45 19.851 / COL 45 19.92	28.10
4	275	P	YOL 275 12.011 / YOL 275 12.04	27.85
4	275	P	YOL 275 12.04 / YOL 275 12.04	27.85
4	244	P	SAC 244 0.048 / SAC 244 0.421	27.80
4	244	P	SAC 244 0.144 / SAC 244 0.418	27.80
4	16	P	SAC 16 5.007 / SAC 16 5.691	27.79
4	32	P	BUT 32 10.285R / BUT 32 10.661R	27.78
4	32	P	BUT 32 5.553 / BUT 32 6.137	27.78
4	32	P	BUT 32 9.52R / BUT 32 10.174R	27.78
4	32	P	BUT 32 R8.923R / BUT 32 9.324R	27.78

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
4	32	P	GLE 32 9.624 / GLE 32 9.698	27.78
4	20	P	COL 20 31.468 / COL 20 31.701	27.73
4	20	P	COL 20 36.788 / COL 20 38.034	27.73
4	20	P	SUT 20 10.742 / SUT 20 13.598	27.73
4	20	P	SUT 20 8.926 / SUT 20 9.327	27.73
4	20	P	YUB 20 1.571 / YUB 20 R2.034	27.73
4	20	P	YUB 20 16.997 / YUB 20 R17.138	27.73
4	20	P	YUB 20 R7.562 / YUB 20 R7.957	27.73
4	32	P	BUT 32 10.275R / BUT 32 10.661R	27.71
4	32	P	BUT 32 11.703 / BUT 32 R21.465	27.71
4	32	P	BUT 32 5.553 / BUT 32 6.137	27.71
4	32	P	BUT 32 9.539R / BUT 32 10.184R	27.71
4	32	P	BUT 32 R8.869 / BUT 32 9.34R	27.71
4	32	P	GLE 32 9.626 / GLE 32 9.699	27.71
4	20	P	COL 20 31.467 / COL 20 31.7	27.71
4	20	P	COL 20 36.787 / COL 20 38.03	27.71
4	20	P	SUT 20 1.9 / SUT 20 2.063	27.71
4	20	P	SUT 20 10.742 / SUT 20 13.599	27.71
4	20	P	SUT 20 8.926 / SUT 20 9.327	27.71
4	20	P	YUB 20 1.571 / YUB 20 R2.034	27.71
4	20	P	YUB 20 16.997 / YUB 20 R17.138	27.71
4	20	P	YUB 20 R7.562 / YUB 20 R7.957	27.71
4	65	P	PLA 65 R13.385 / PLA 65 R15.546	27.71
4	65	P	PLA 65 R13.592 / PLA 65 R15.546	27.71
4	5	P	SAC 5 15.626 / SAC 5 16.145	27.69
4	113	P	YOL 113 11.296 / YOL 113 11.339	27.65
4	113	P	YOL 113 R9.223 / YOL 113 R10.859	27.65
4	162	P	BUT 162 13.958 / BUT 162 15.828	27.63
4	162	P	GLE 162 65.244 / GLE 162 65.445	27.63
4	70	P	BUT 70 26.3 / BUT 70 26.675	27.55
4	70	P	BUT 70 28.02 / BUT 70 31.66	27.55
4	70	P	BUT 70 3.396 / BUT 70 4.057	27.55
4	70	P	SUT 70 R4.047 / YUB 70 R3.75	27.55
4	70	P	YUB 70 15.075 / YUB 70 16.369	27.55
4	70	P	YUB 70 22.078 / YUB 70 22.485	27.55
4	99	P	BUT 99 11.031 / BUT 99 11.175	27.47
4	99	P	BUT 99 9.985 / BUT 99 10.216	27.47
4	99	P	SUT 99 36.317 / SUT 99 42.143	27.47
4	70	P	BUT 70 3.396 / BUT 70 4.056	27.45
4	70	P	BUT 70 R21.321R / BUT 70 31.187	27.45

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
4	70	P	SUT 70 R3.621 / YUB 70 R3.755	27.45
4	70	P	YUB 70 15.35 / YUB 70 16.369	27.45
4	70	P	YUB 70 22.078 / YUB 70 22.485	27.45
4	99	P	BUT 99 11.031 / BUT 99 11.175	27.45
4	99	P	BUT 99 9.985 / BUT 99 10.216	27.45
4	99	P	SAC 99 19.617 / SAC 99 19.9	27.45
4	99	P	SUT 99 39.831 / SUT 99 40.971	27.45
4	505	S	YOL 505 13.434 / YOL 505 19.886	27.40
4	505	P	YOL 505 13.429 / YOL 505 19.827	27.40
4	113	P	YOL 113 11.296 / SUT 113 16.461	27.20
4	113	P	YOL 113 R9.226 / YOL 113 R11.142	27.20
4	49	P	AMA 49 22.11 / ED 49 12.153	27.19
4	49	P	ED 49 12.378 / ED 49 12.782	27.19
4	49	P	ED 49 15.688 / ED 49 37.952	27.19
4	16	P	SAC 16 5.007 / SAC 16 5.691	27.17
4	16	P	SAC 16 6.223 / SAC 16 R16.295	27.17
4	16	P	YOL 16 31.735 / YOL 16 31.817	27.17
4	16	P	YOL 16 32.356 / YOL 16 39.059	27.17
4	16	P	YOL 16 8.151 / YOL 16 28.638	27.17
4	16	P	YOL 16 R41.557 / YOL 16 R43.311	27.17
4	193	P	ED 193 0 / ED 193 1.092	27.11
4	193	P	ED 193 19.402 / ED 193 26.95	27.11
4	193	P	PLA 193 1.346 / PLA 193 9.589	27.11
4	104	P	SAC 104 6.202 / AMA 104 0	27.10
4	191	P	BUT 191 R0 / BUT 191 9.216	27.10
4	162	P	BUT 162 21.026 / BUT 162 25.485	27.05
4	162	P	BUT 162 R9.726 / BUT 162 15.827	27.05
4	162	P	GLE 162 40.267 / GLE 162 65.445	27.05
4	162	P	GLE 162 66.869 / GLE 162 76.27	27.05
4	162	P	GLE 162 76.28 / BUT 162 9.726	27.05
4	191	P	BUT 191 R0.215 / BUT 191 R0	27.01
4	128	P	YOL 128 0 / YOL 128 8.544	26.99
4	193	P	PLA 193 1.346 / PLA 193 1.623	26.96
4	49	P	ED 49 24.118 / ED 49 24.551	26.96
4	45	P	COL 45 19.92 / GLE 45 23.23	26.96
4	45	P	COL 45 7.213 / COL 45 19.839	26.96
5	45	P	YOL 45 0 / COL 45 7.213	26.88
5	153	P	ED 153 0.55 / ED 153 0	26.84
5	153	P	ED 153 0.55 / ED 153 0.55	26.84
5	99	P	SJ 99 38.783 / SAC 99 19.609	24.24

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
5	99	P	SJ 99 38.779 / SAC 99 19.617	23.79
5	162	P	BUT 162 25.485 / BUT 162 31.07	22.39
5	162	P	GLE 162 37.648 / GLE 162 40.267	22.39
5	5	P	SAC 5 17.505 / SAC 5 17.578	20.96
5	5	P	SAC 5 18.664 / SAC 5 20.877	20.96
5	5	P	SAC 5 8.753 / SAC 5 15.626	20.96
5	5	P	SAC 5 14.831 / SAC 5 16.155	20.50
5	5	P	SAC 5 18.188 / SAC 5 21.937	20.50
5	5	P	SAC 5 8.44 / SAC 5 12.051	20.50
5	160	P	SAC 160 34.072 / SAC 160 35.045	16.00
5	160	P	SAC 160 L7.233 / SAC 160 L8.338	16.00
5	160	P	SAC 160 L9.909 / SAC 160 L10.029	16.00
5	80	P	PLA 80 R20.539 / PLA 80 44.99	15.33
5	160	P	SAC 160 L7.233 / SAC 160 L7.598	15.17
5	80	P	PLA 80 R20.547 / PLA 80 44.98	14.30
5	50	P	ED 50 17.519 / ED 50 R31.764	13.97
5	50	P	ED 50 17.522 / ED 50 32.572	13.93
5	104	P	SAC 104 0.006 / SAC 104 6.202	13.93
5	104	P	SAC 104 0.055 / SAC 104 0.08	13.87
5	193	P	ED 193 1.092 / ED 193 19.402	13.58
5	16	P	COL 16 0.003 / YOL 16 8.151	13.48
5	70	P	BUT 70 31.66 / BUT 70 32.867	13.45
5	49	P	NEV 49 13.121 / NEV 49 R14.475	13.00
5	49	P	NEV 49 17.321 / NEV 49 17.571	13.00
5	49	P	NEV 49 7.802 / NEV 49 8.046	13.00
5	49	P	PLA 49 6.126 / NEV 49 3.051	13.00
5	49	P	ED 49 12.153 / ED 49 12.378	12.83
5	49	P	ED 49 13.777 / ED 49 15.688	12.83
5	49	P	NEV 49 15.062 / SIE 49 4.65	12.83
5	49	P	PLA 49 6.122 / NEV 49 R14.475	12.83
5	70	P	BUT 70 31.187 / BUT 70 48.074	10.79
5	174	P	PLA 174 0 / NEV 174 10.218	7.07
5	20	P	LAK 20 46.474 / COL 20 8.943	5.68
5	20	P	NEV 20 2.343 / NEV 20 R12.251	5.68
5	20	P	NEV 20 R12.253 / NEV 20 28.51	5.68
5	32	P	BUT 32 2.706 / BUT 32 D3.436	4.79
5	32	P	BUT 32 37.493 / TEH 32 0	4.79
5	32	P	BUT 32 R21.465 / BUT 32 R37.073	4.79
5	20	P	COL 20 3.357 / COL 20 3.563	4.39
5	20	P	NEV 20 R11.662 / NEV 20 R12.16	4.39

Priority	Route	Carriage way[31]	From County & Postmile / To County & Postmile[32]	Average Cross-Hazard Prioritization Score[33]
5	20	P	NEV 20 R12.236 / NEV 20 R12.248	4.39
5	20	P	NEV 20 R12.247 / NEV 20 R12.248	4.39
5	20	P	NEV 20 R12.248 / NEV 20 R12.251	4.39
5	20	P	NEV 20 R12.248 / NEV 20 R17.507	4.39
5	20	P	NEV 20 R6.504 / NEV 20 R6.682	4.39
5	395	P	SIE 395 R0R / LAS 395 R0	0.87
5	395	P	SIE 395 R0R / LAS 395 R0.016	0.86
5	174	P	NEV 174 6.645 / NEV 174 6.83	0.15