

Receive Results of the Caltrain Climate Vulnerability Study

**Citizens Advisory Committee
April 15, 2026
Agenda Item 9**



Study Overview

Goal: Analyze the vulnerability of Caltrain service, infrastructure, right-of-way, operations, passengers, and employees to climate impacts.



Evaluate and prioritize climate risks



Provide data to plan solutions



Support the development of **physical projects and operational changes**



Incorporate broad perspectives of passengers, community members, and others

Study Motivation

Caltrain is already experiencing climate-related impacts that will increase in frequency and intensity in the future:



High heat events requiring service reductions / slowdowns.



Storms flooding tracks and stations and causing trees to fall, damaging Caltrain infrastructure.

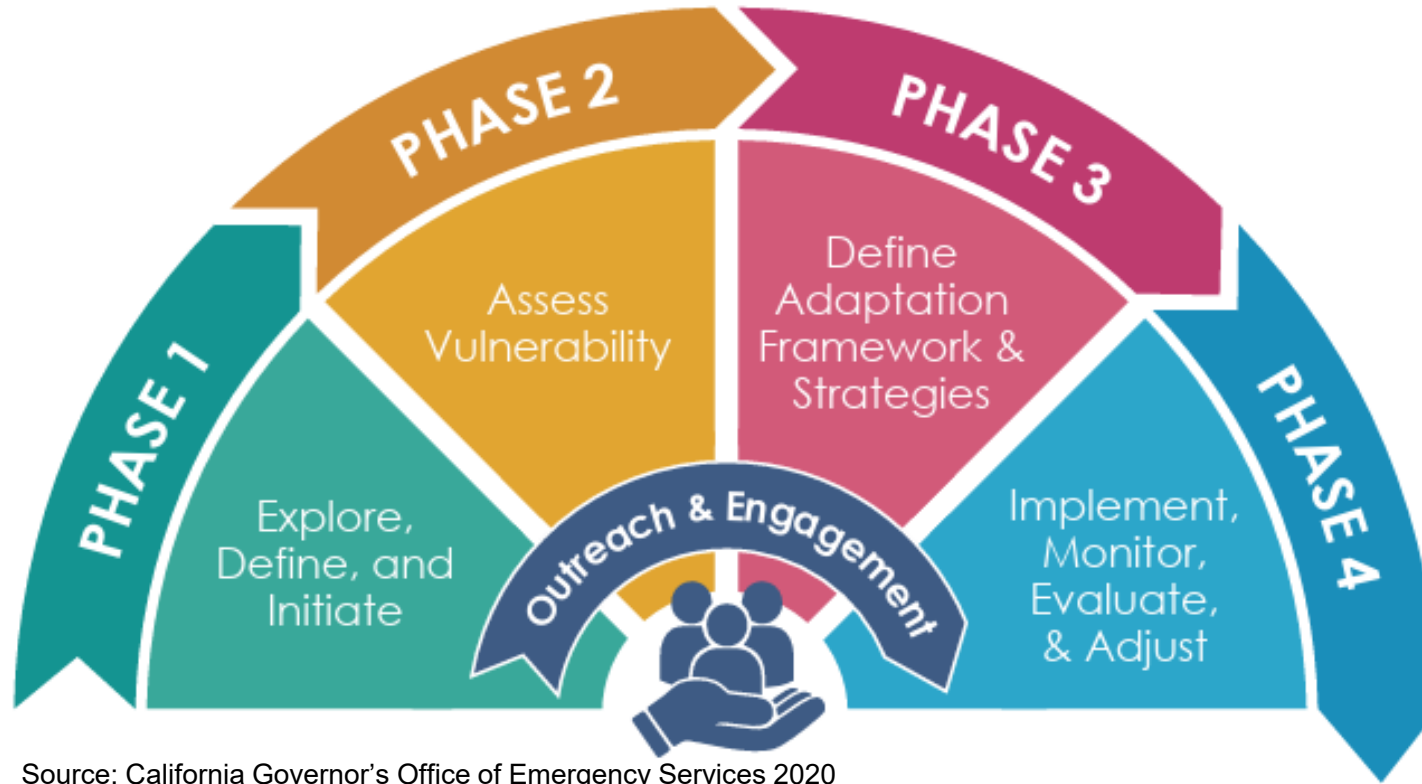


Wildfire smoke reducing air quality, affecting riders on platforms and walking/biking to and from stations.

Caltrain must understand current and future climate risk to prioritize adaptation measures and position for funding to enhance infrastructure resilience.

Study Motivation

Adaptation Planning – Phased Approach



Source: California Governor's Office of Emergency Services 2020

Hazards in Scope



Extreme Heat

- Delays due to precautionary speed restrictions
- Heat stress/discomfort on platforms or when traveling to and from stations



Flooding

- Delays due to flooding and/or precautionary speed restrictions
- Difficulty traveling to and from stations



Wildfire

- Delays
- Respiratory distress from smoke



Wind

- Delays from downed trees
- Unpleasant conditions on platforms or when traveling to and from stations

Engagement Approach

Stakeholder Outreach

- Internal Steering Committee
- Executive Steering Committee
- Committees & Joint Powers Board
- Caltrain staff as-needed
- External Advisory Committee

Public Outreach



Community Survey



Community Presentations (3)



Photo/Video Submission Tool



Public Community Meeting (1)



Community Leadership Meetings (2)



Project Summary Open House (1)

Survey Results Summary



Survey results support the technical findings.

- **Caltrain riders have been affected by all climate impacts and extreme weather hazards.**
- **Delayed/canceled trains due to hot weather and rain/windstorms** were the impacts most commonly experienced.
- Riders are concerned about all hazard types impacting their commute and transportation options. **Extreme heat and storm-related flooding are of most concern.**

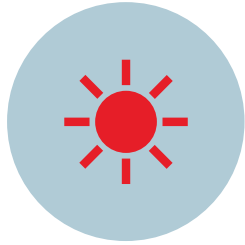
1,265
responses

Public Feedback Summary

- Caltrain riders are concerned about climate impacts to their transportation options.
- Caltrain riders have already been affected by all climate impacts and extreme weather hazards studied.
- Caltrain riders may consider other transportation options due to slow orders, closed stations, or parking closures.
- Caltrain riders support the study objectives and want information about how Caltrain plans to adapt to mitigate the risks identified in the study.



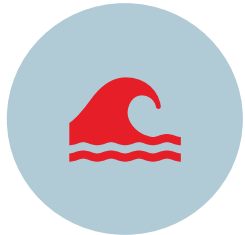
Hazards Included in the Study



Extreme Heat



Wildfire



Flooding



Wind

3 Time Horizons:

- Present-day
- Mid-century (2050)
- End-of-century (2085)

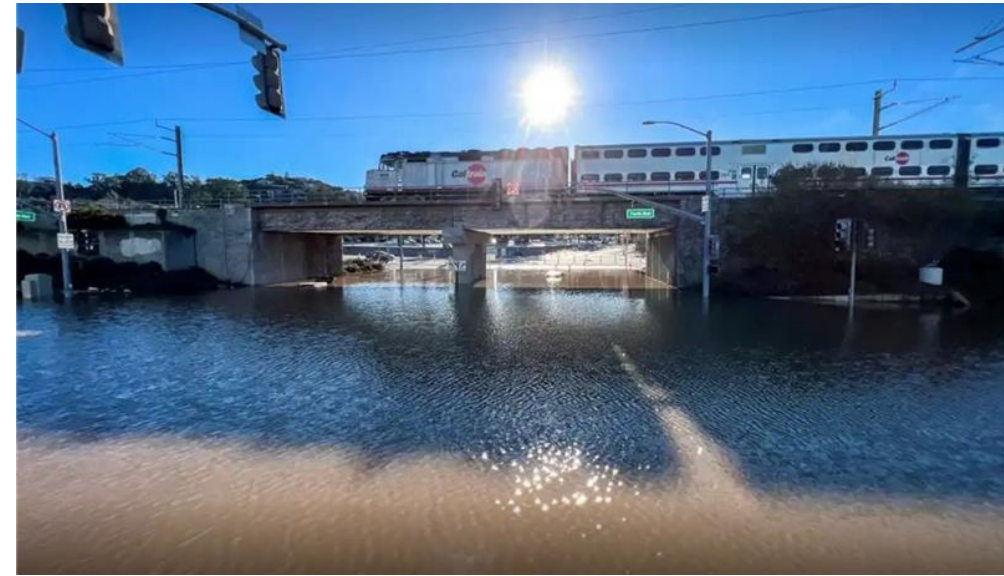
2 Future Emission Scenarios:

- Low emissions
- High emissions

Known Areas of Concern

Lived experience shared by Caltrain and others:

- San Francisco: Flooding at 4th & King
- South San Francisco station yard flooding
- Flooding of underpass grade crossings (Belmont, San Mateo, Millbrae)
- San Francisquito Bridge scour
- Fallen trees on tracks & OCS (Burlingame)
- Slow orders due to extreme heat



San Mateo, 42nd Ave and Pacific Blvd
December 2022

Riverine Flooding

- Flooding associated with overflowing creeks and rivers
- Rare storms may cause disruptions lasting days → months, damage to assets in many locations
- Service impacts: bus bridge to bypass flooded segment, hours of delay
- Bridges at risk: San Francisquito Bridge, Colma Creek Bridge, and more

Future climate:

Similar storms become more frequent



4th & King Flooded Track
January 2023



No station access / parking,
Menlo Park
January 2017



Coastal Flooding

- Flooding associated with SF Bay storm surge, tidal events, and sea level rise (SLR)
- Present day – no impacts; mid-century & beyond - impacts
- Areas at risk:
 - 4th & King
 - South San Francisco and Millbrae
 - San Mateo
 - Redwood City

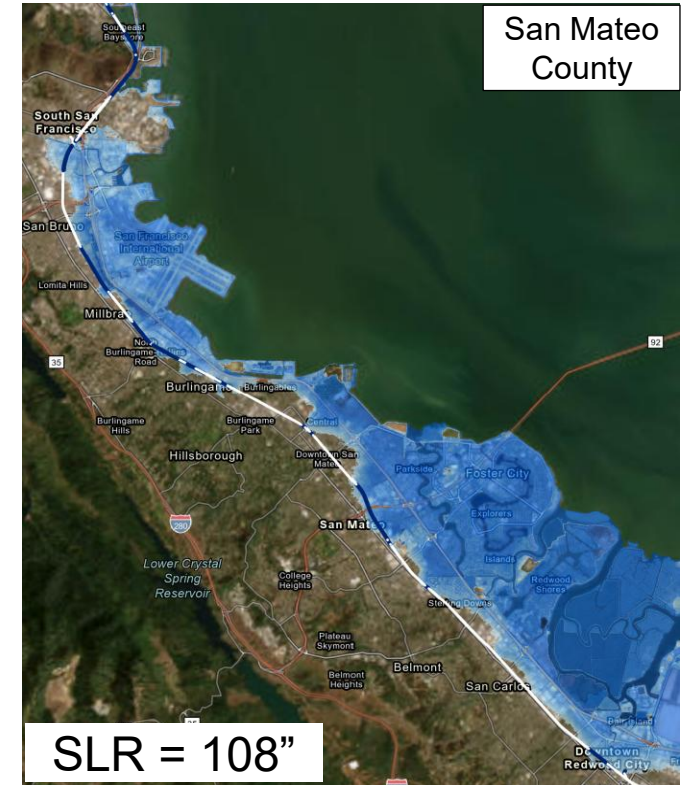
Future climate:

Temporary flooding from a storm by 2050

Permanent flooding by 2100 without any intervention



4th & King
2050 – Storm Surge & SLR
2100 - SLR



Northern SMC Corridor
2100 – SLR + Storm Surge +
King Tide Event

Extreme Heat

- Slow down order already an issue today (~4/yr since 2020)
- Can happen multiple times – very frequent
- Currently: minutes of delay, low asset damage (no rail buckling to date)
- Impacts passenger experience → reputational damage



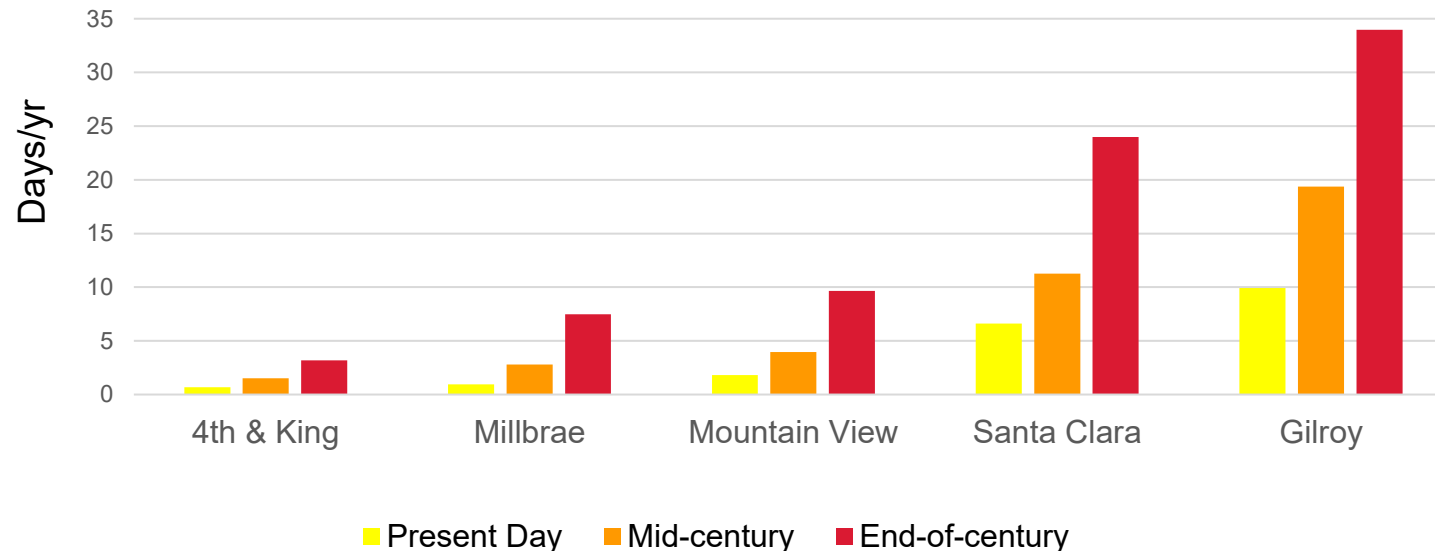
Example of track damage

Future climate:

Temperatures increase along service area:

- More frequent slow orders
- Larger sections affected

Average days / year exceeding 95F



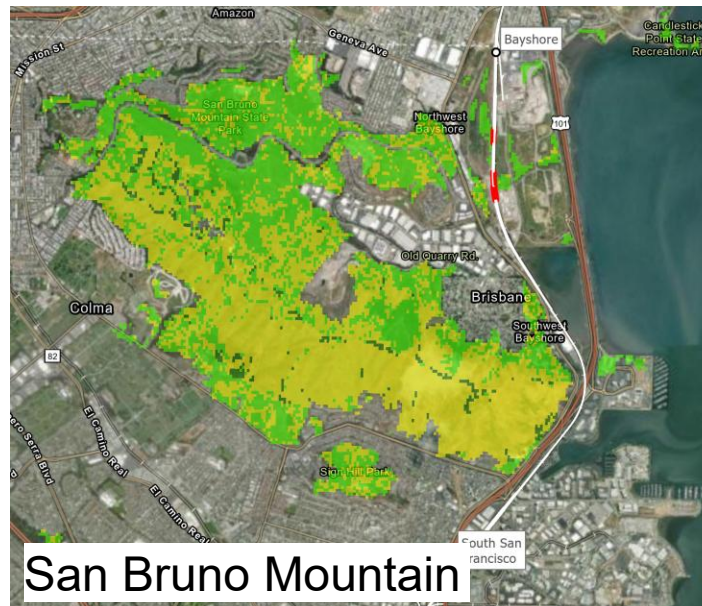
Wildfire

- Minimal Caltrain assets exposed to wildfire (now or in the future)
- 3 areas of concern: San Bruno Mountain, Communications Hill (San Jose), and Union Pacific-owned corridor
- Service impacts: bus bridge to bypass damaged segments
- Repairs to damaged infrastructure are generally quick
- Smoke will impact all transit options

Future climate:

Local wildfire likelihood remains similar

More poor air quality days



Smoke / poor air quality
September 2020

Wind and Power

- Direct and indirect impacts
- Tree fall on the OCS → Service disruption
- System has two sources of power → redundant, more resilient
- Power outages:
 - Rolling blackouts: Caltrain OCS is a PG&E Critical Facility Customer → not impacted
 - Unplanned blackouts and Public Safety Power Shutoffs (PSPS) → affected but unlikely to impact **both** traction power stations (SSF, San Jose)

Future climate:

Wind speeds not significantly different



Treefall on OCS, Burlingame
January 2023



Caltrain Next Steps

- Study represents the most comprehensive overview of Caltrain's system climate vulnerabilities
 - Major step in assessing and addressing vulnerability
- Combining what we heard from riders (concerns, lived experience, priorities, etc.) with vulnerability assessment data generated to:
 - Inform future adaptation planning
 - Undertake further studies focused on areas / assets of concern
 - Prioritize projects that bolster resiliency and service continuity

Recommendation Summary

Time Frame	Recommended Actions
Near-Term (< 3 years)	<ul style="list-style-type: none">• Leverage study findings to seek funding• Engage in regional adaptation planning efforts• Scope targeted adaptation solutions study• Assess ways to advance heat protection at stations• Align CIP with study findings• Strengthen proactive communication with customers on weather related service disruptions• Expand inventory of staff protective equipment• Consider additional weather-related Standard Operating Procedures
Mid-Term (3 – 5 years)	<ul style="list-style-type: none">• Propose updates to Design Criteria focused on resilience• Develop focused study on stormwater flooding in high-risk areas
Long-Term (5+ years)	<ul style="list-style-type: none">• Incorporate wildfire exposure in the review and replacement prioritization of wood ties along the Caltrain ROW

FOR MORE INFORMATION

WWW.CALTRAIN.COM

