Appendix G

CAIP Response to Public Comments

Public Comment Period May 14th -June 30th, 2026

Public and Comments Submitted

Letter Number	Commenter(s)
1	350 Humboldt (Danile Chandler)
2	Alex Banasiewicz
3	Corey Shaffer
4	EPIC-HWK-CRTP
5	Humboldt County
6	Wendy Ring

Category	Letter & Comment number	Comment or comment summary	Response
GHG emissions	L1. C1	*The CAIP draft report is typical of most government reports on climate change adaptation (for example, wildfires) in that it gives short shrift to actual mitigation to bring the earth's increasing temperature into stasis. Instead there is only implicit recognition given to the need for mitigation by noting the range of SLR to be expected will depend on GHG emissions reductions.*	The purpose of the CAIP is to present and review a suite of alternatives by which the Eureka/Arcata corridor could be maintained as an operational State Highway in light of projected SLR. The CAIP is not a document meant to address the root causes of SLR as this is a global, not localized phenomenon. Caltrans D1 is complying with all GHG standards as set by Caltrans Headquarters. See 1) https://dot.ca.gov/programs/environmental-analysis/air-quality/greenhouse-gas-ghg-climate-change 2) https://dot.ca.gov/programs/public-affairs/mile-marker/summer-2021/ghg and 3)https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/strategic-investment-planning/csis for more information. Furthermore, the GHG standards Caltrans complies with are influenced by the California State Transportation Commission, the CA State Air Resources Control Board, the legislature and the Governor's Office. Such entities would have the authority to regulate GHG emissions on a statewide scale.
SLR projections	L6. C3	*While Chapter 5 uses relative sea level rise projections based on hyperlocal measurements of subsidence in the North Bay*	0.8 ft is the localized SLR projection for the CAIP model for the year 2050 based on the

		part of Humboldt Bay (see Table 11) and Chapter 7 rates alternative options based on those projections with viaducts scoring highest even with cost being most heavily weighted, Chapter 8 reverts to the higher OPC relative sea level rise projections, with an intermediate scenario projection of 1.2 feet in 2050 and switches from considering a number of options to a plan for implementation of Project 0M270, which would raise the grade in the corridor's southbound lanes to 12 ft NAVD88.	Mad River Tide Gauge, while the OPC value is 1.2 ft in 2050 based on the North Spit Tide Gauge. The difference in numbers can be attributed to vertical land motion, where the Mad River Tide Guage sees less subsidence. While the Mad River Tide Guage is the closest in proximity to the Eureka/Arcata corridor, the authors are using the OPC projections (from North Spit Tide Guage) for planning as those values will be updated in future Statewide OPC Sea Level Rise Guidance updates. It is also the guidance standardly used by State Agencies when planning for SLR, and in this case represents a more conservative approach. 0M270 is an interim plan as modeling showed flood vulnerability in some locations under present conditions, so a smaller footprint interim solution is needed. See Chapter 4.6 of the CAIP. Long term CAIP options for areas of the highway treated by 0M270 are available in Chapters 7 & 8.
Additional modeling and monitoring and coordination	L1.C2	*RECOMMENDATION: Explicitly model the overlapping probabilities of the various seismic threats and the tsunami threats, incorporating the increased damage of tsunamis due to SLR.*	While the authors agree this type of information would be interesting, it is outside of the scope of the CAIP and not needed to move forward with a review of roadway treatments in light of SLR. Final bridge, viaduct, and embankment designs will consider seismic vulnerability.
	L3.C2	*My main recommendation is that Caltrans strengthen the CAIP by defining the proposed monitoring efforts as a coordinated corridor monitoring network rather than as separate studies.*	Caltrans led monitoring is limited by funding, capacity, and direct relevance to transportation projects. Caltrans did

		The draft already identifies several important monitoring needs, including groundwater observations near stream and slough channels, observations near the highway road base and drainage ditches, vertical land motion monitoring, shoreline water-level monitoring, and remote sensor cameras for wildlife-crossing data. These are all valuable, but their usefulness would be much greater if they were connected through a shared adaptive-management framework.	coordinate with local agencies while developing the CAIP and continues to work with partner agencies on monitoring projects. When an adaptive management framework working group run by relevant agencies/parties is established the authors are happy to contribute data. Given Caltrans' limited right-of-way, lack of regulatory jurisdiction, and constrained ability to only work on highway projects, it is, unfortunately, not the ideal agency to lead this effort.
	L1.C3	The precautionary principle includes all risks and their probabilities. If concrete probabilities are not calculable precautions still must be taken. Here are a few of the areas where the precautionary principle is not handled adequately in the CAIP: [see letter for examples] RECOMMENDATION: Determine what is an unacceptable risk and work backward to analyze recommended actions. Include deep uncertainty as well as probabilistic risks.	The authors agree and thus are not ruling out higher sea level rise scenarios. The CAIP will be updated as science, monitoring, and projections evolve, and thus does in fact represent a precautionary approach. For the purposes of the CAIP, unacceptable risk has been set at flooding which impedes the safe operation of the Eureka/Arcata corridor and our highway system. Ongoing monitoring, planning, and modeling will determine when roadway work is needed.
	L4.C4	Coordinate adaptation planning with other jurisdictions conducting wetland restoration and sea-level-rise adaptation efforts to maximize ecological benefits throughout Humboldt Bay.	See response to comment L3.C2
	L4.C13	We support the recommendations made by Cal Poly Humboldt in the vulnerability assessment to monitor the seasonal dynamics of groundwater elevation. Should CalTrans implement this recommendation, we request the resultant data	See response to comment L3.C2

		be shared publicly as this could benefit regional sea level rise planning.	
	L5.C8	Section 6.1.5 Caltrans should consider performing a more robust risk assessment for flooding on the Corridor to provide thorough and defensible justification for the impact thresholds. Factors to consider include flood duration, water velocity, traffic volumes, typical speeds, options for operational changes such as reducing vehicle speeds, the level of damage to the asset, and the feasibility of repairs. Caltrans should consider adding one or more additional thresholds for higher levels of severity to provide a broader range of conditions for comparison and to provide a more complete risk assessment. For example, Caltrans should consider assessing the risks of 8 inches, 12 inches, and 24 inches of water on the roadway.	See Chapter 6.1.5: "*Water depths exceeding 4 inches represent significant disruption of service likely requiring road closure. At this depth, most vehicles experience loss of traction and control, creating safety hazards. Research indicates 4 inches is the depth at which passage of small vehicles is no longer considered safe (Maghsoodifar et al., 2025). Additionally, prolonged flooding at this depth can cause structural damage to pavement and underlying materials, requiring repairs. Note this threshold should be re-evaluated before conducting future modeling"*. Caltrans has a duty to maintain a safe and operational highway system and thus a precautionary approach makes sense. The discretion of threshold choice is left to our individual District Management. 4 inches is a science-based value (again, see Maghsoodifar et al., 2025), which represents the flood depth at which we most likely begin to see significant impacts to highway operations (closures, pilot cars, etc.), thus representing the threshold at which Caltrans needs to change the roadway design. Any additional water would only result in the same response. For the purposes of the CAIP, the analyses used frequency of flooding to determine when an adaption solution would be needed. Duration of flooding was also

			assessed, and, as the science updates, this will play a factor in when a final project is programmed for construction.
Road Segments and treatments	L1.C4	RECOMMENDATION: Present an overview of vulnerability and risk near the beginning of the report that explicitly considers whole-corridor solutions and costs in light of both SLR and seismic hazards.	As noted in Chapter 7.5, the authors do not feel a whole corridor solution is realistic, thus a strong focus on feasible alternatives was made. Additionally see comment L3.C1 and response. The executive summary does provide an overview.
	L3. C1	I appreciate the CAIP's recognition that the Route 101 corridor between Eureka and Arcata must be treated as a long-term climate adaptation challenge, not simply as a one-time infrastructure project	The authors agree it is not only the most scientifically defensible approach, but also the most fiscally responsible given our limited funding and vast network of infrastructure that needs to be maintained.
	L2.C2	I believe that Humboldt Bay can be protected from the threats of sea level rise via a multi-pronged approach, which combines both natural and physical barriers. I believe that it will ultimately be necessary for the 101 safety corridor connecting the City of Arcata to the City of Eureka to be raised via a berm (much like the recently completed Indianola Undercrossing/Brad Mettam Memorial Interchange) to create a wall circling Humboldt Bay. I understand that this is no easy task, and will undoubtedly cost billions of dollars of investments. However, protecting this area will prove to be far more cost-efficient in the long-run, and the ROI from potential future economic development of this area will be well worth the cost.	While the cost of a raised embankment may be lower than a viaduct or bridge system in some cases, this accounts for only construction costs and leaves out the cost of environmental mitigation. Furthermore, public and agency input strongly expresses a preference for selective reconnection of former tidelands. See comment L4.C1. Lastly, it is anticipated that much of the area to the east of the highway will see a rise in groundwater over time. This will impact land use and drainage. See Chapter 6.1.3.
	L4.C1	Establish a clear preference for accommodation strategies where feasible. … Avoid, wherever possible, creating new continuous barriers that could exacerbate coastal squeeze and limit wetland migration. …	The purpose of the CAIP is to review and make public the consideration of all feasible adaptation measures and the timeline in which Caltrans likely needs to act. This is critical to fiscal planning. The CAIP did not establish a preferred alternative as this is done as part of the

		The CAIP should take into account these indirect impacts associated with hard barriers along the Arcata-Eureka corridor when assessing the cost of project alternatives. ... The final document should therefore more explicitly acknowledge that environmental performance must remain a primary consideration when selecting long-term adaptation pathways	CEQA process during project delivery with public input. The authors of the CAIP believe thorough consideration of adaptation strategies was given, while recognizing the infeasibility of some construction scenarios due to cost and adjacent land use. In these situations, hybrid solutions were proposed—See Chapter 7.3. Environmental performance is built into the permitting process of all Caltrans projects given regulation by jurisdictional agencies such as CDFW, the Waterboard, and the Coastal Commission.
	L4.C2	Prioritize viaducts in locations where they can restore hydraulic connectivity and facilitate tidal wetland migration	Viaducts were considered as viable options in areas where they could restore hydraulic connectivity and facilitate tidal wetland migration. The CAIP only serves to evaluate the alternatives (see Table 22). Final prioritization and selection will be made when funding is available.
	L4.C6	The elevation of Indianola Road beneath the recently completed crossing is only 12.08 ft NAVD88, qualifying it for adaptation under the CAIP's 16 ft NAVD88 threshold - the CAIP must consider adaptation measures for this facility	The CAIP focuses on Highway 101. The road under the Indianola Undercrossing, including the tie ins, must be addressed in coordination with the County. See the following edits to Chapter 7.5 *"Segment 5 would not need additional work as the elevation of the embankment here will be 16 – 30 ft NAVD88 once the Indianola Undercrossing Project is complete (Figure 57). The elevation of Indianola Road beneath the highway is 12.08 ft NAVD88, below the 16 ft treatment*

			threshold for the highway. Since Indianola Road is a county road, adaptation of this road will need to be coordinated with the County. Potential adaptation options include raising the elevation of Indianola Road and reducing the clearance height, which is currently 15.2 ft. Additionally, approaches to the bridge were overbuilt to accommodate a 1-2 ft raise of the bridge in the future. A living shoreline could be implemented here to enhance the resilience of coastal assets such as the Bay Trail, Indianola Road, and the highway (GHD, 2022).”
	L4.C5	Safe and separate bicycle and pedestrian facilities must be included in any infrastructure adaptation to sea level rise in the corridor, whether raised embankments, raised roadways, or viaducts.	The purpose of the CAIP is to review and make public the consideration of all feasible adaptation measures, which includes the consideration of bicycle infrastructure. This location is unique given the adjacent Humboldt Bay Trail. See the District 1 Active Transportation Plan (2021) for more information on our multimodal efforts- *“The Caltrans District 1 Active Transportation Plan identifies and prioritizes needs based on best practices, public input, and close coordination with partners…to ensure bicycle and pedestrian needs are addressed.”* https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/active-transportation-complete-streets/district1-finalreport-a11y.pdf
Cost	L4. C10	The CAIP fails to adequately consider costs in the cost comparison. The cost comparison presented in Section 7.7 should not be interpreted as a comprehensive economic	Mitigation, permitting, and maintenance costs will apply to both viaducts and embankments. Mitigation also must be

		comparison between viaduct and embankment alternatives. The draft acknowledges that several major categories of costs were excluded from the analysis, including environmental mitigation, long-term maintenance, permitting, and other project-related expenses. Most of these missing categories of cost would add cost to the embankment alternative and reduce cost for the viaduct alternative. As a result, the conclusion that viaducts cost approximately six times more than embankments reflects a misleading comparison of initial construction costs rather than the full holistic analysis of costs imposed by each alternative.	completed for temporary construction impacts, which would be significant for viaduct construction given pile driving and the need for a temporary road to detour traffic. It is also important to consider the land use impacts of both road treatments, including the resulting need for right-of-way acquisition. Maintenance costs of structures such as bridges and viaducts can at times exceed that of raised embankments, but it is site and design specific. Given the impracticality of accounting for these uncertainties until a project is initiated, the authors of the CAIP chose to focus strictly on construction costs at this point. See edits to section 7.7. More information was added to highlight the limitations of the analysis. *"Cost estimates will be refined and updated in the Project Initiation Document phase of future projects. Overall, the viaduct structures were estimated to be about six times as much as raised embankments, though this estimate excludes mitigation, permitting, maintenance costs, and right of way acquisition (Table 23)."*
Use of NbS	L1.C5	RECOMMENDATION: The use of nature-based solutions, often associated with adaptive management, needs to be carefully considered in this case because of the very high long-term risks.	Caltrans agrees and is actively watching local efforts to design a nature-based solution (NbS) living shoreline for Humboldt Bay, as well as other statewide NbS projects. Caltrans would not implement an NbS-only approach unless

			sufficient evidence demonstrated its adequate protective capacity. If Caltrans was to implement a NbS, it would most likely be a hybrid design approach employing traditional engineering and NbS.
	L2.C3	The second approach that I suggest is to expand the Arcata Marsh and Wildlife Sanctuary to extend around Humboldt Bay from Arcata to Eureka. This will create an additional layer of defense from rising sea levels, provide an abundance of natural habitats for endangered wildlife species, and have the added benefit of promoting the health and wellbeing of Humboldt County's residents via recreational activities.	This concept is similar to the proposed Humboldt Bay Living Shoreline Planning Project https://humboldtgov.org/2487/Sea-Level-Rise Caltrans is aware of this project and has spoken with the County. Caltrans has also spoken with the City of Arcata regarding their future marsh plans and how the future design of the Corridor could complement such efforts.
	L5.C11	Section 7.1 This section states that the "drawbacks" of incorporating soft protection measures along the Corridor are mainly logistical, referencing the need for permits and approvals and the uncertain availability of useable sediment. This description understates the significant challenges of these measures, which include funding, organizational capacity for project delivery, and the likely need for ongoing adaptive management	Caltran's agrees the "drawbacks" are significant. The authors of the CAIP did not intend to understate the significance and are fully aware this project likely represents a decade of planning effort including significant agency coordination and funding. If willing partners and a feasible path forward exists, Caltrans would like to be a part of this process Note the edits to section 7.1 *"The drawbacks of incorporating soft protection measures along the Corridor are mainly logistical; numerous permits and approvals would be required and the timeline for construction and maintenance would depend on the availability and delivery of useable sediment. Funding, organizational capacity for project delivery, and the need for adaptive management, including long-*

			term maintenance, also represent considerable challenges"
	L6.C5	CAIP's proposal for this most vulnerable Corridor Segment 4 is to install a salt marsh as living shoreline and wait to see what else might be needed at some undefined point in the future. After reading the design studies for the marsh project and learning more about salt marsh in Humboldt Bay, I believe that relying on a salt marsh built into the bay on top of soft mud, directly up against a rock armored railroad prism which allows no room for upland migration is not an appropriate temporizing measure for the most vulnerable segment of highway. Studies of sediment accretion in other marsh areas around the bay have shown that it is slower than the rate of relative sea level rise (USGS). This would especially be true for marsh between Bracut and Brainard which is cut off from Fay Slough, its historic source of sediment. Between questionable ability to retain elevation necessary to support marsh plants and the obstruction to upland migration, the marsh's longevity and protective value against erosion would be limited. 0M270 should be set aside for this segment in favor of a viaduct and reconnection of Fay Slough to the bay underneath it, so that a living shoreline, whether newly built along the bay or restored inland on formerly diked tideland, receives adequate sediment and has room to migrate upland before being drowned by rising tides. Bike and pedestrian infrastructure separate from motor vehicles must be included or we are simply exacerbating the problem we're attempting to solve	The CAIP does not suggest the sole installation of a salt marsh would be sufficient adaption to protect Segment 4 of the Corridor. This has been further clarified in section 7.5. See edited text below. *"Segment 4 spans North Brainard to South Indianola (Figure 56). This portion of the Corridor is particularly vulnerable to overtopping. Adaptation options along this stretch of the Corridor include a viaduct or a raised embankment, with the potential for inclusion of a living shoreline and hydraulic connection to the bay. Implementation of a living shoreline as a near- to mid-term response could enhance the Corridor's resilience to coastal flooding (GHD, 2022). Implementation of a living shoreline at this location would be in addition to other roadway adaptation measures. Longer-term adaptation response of a raised embankment or viaduct could follow as necessary. CDFW may also need to raise the access road to their maintenance facility parcel. Models project that flooding will also occur from water overtopping levees on the inland side along Freshwater Slough."* 0M270 is an interim project to address current vulnerabilities throughout the Corridor. Long term adaptations to address additional projected vulnerability in light of SLR will be addressed in future projects.

			0M270 affords time to both plan for and fund a long-term solution. Scrapping 0M270 and addressing only Segment 4 with a reconnection of Fay Slough would not address the current vulnerability throughout the rest of the corridor, nor would it be compatible with adjacent land use to the east of US 101 that is currently managed by the CA Department of Fish and Wildlife as freshwater habitat. It should be noted that a key feature of 0M270 is that it will not limit future opportunities to restore the Fay Slough connection.
Vulnerability assessment	L1.C6	By 2100 all parts of the corridor are anticipated to be under 4 inches of water 365 days a year. To be safe in 2100 with the most severe SLR the corridor would have to have 18 ft of elevation. This seems to be, although limited because of omission of factors such as seismic activity and tsunamis, the worst-case scenario that precautionary analysis requires be included. RECOMMENDATION: Make the vulnerability analysis more comprehensive and elevate it to centrality in the presentation of findings	While the CA Ocean Protection Council (OPC) recommends using the high (or most severe) SLR scenario when planning for critical infrastructure, this scenario incorporates "deep uncertainties" and is less likely to occur than the intermediate and intermediate-high scenarios. The intermediate-high scenario was used to balance the uncertainty in long-term scenarios with needing to keep the road operable. Note "*[b]ased on SLR projections at the time of this report, the findings from CAIP technical studies indicate a road raise to approximately 16 to 18 ft NAVD88 would provide adequate protection from coastal hazards through 2100* (see 6.1.5 'Vulnerability Assessment')." Appendix E contains spreadsheets which can be used to determine the frequency of

			varying flood depths under different scenarios. The comment states by 2100 all parts of the corridor are anticipated to be under 4 inches of water 365 days a year. This is incorrect as the spreadsheets show without 0M270 all parts of only the southbound lanes would be inundated 365 days a year. Flood frequency is lower for the northbound lanes. The spreadsheet tables include the worst-case high scenarios and can therefore be used for future planning efforts. Note the authors of the CAIP also recommend revising elevations with updated science. Because the spreadsheets cover multiple scenarios, and without further specific suggestions, the authors of the CAIP consider this analysis to be comprehensive. The intent was to create a targeted analysis. The authors agree that the vulnerability assessment is central and foundational to CAIP. However, to fully understand the vulnerability assessment the authors feel all background information presented is key.
	L5.C7	<u>Section 6.1.5</u> Figure 41 depicts a conceptual diagram showing the elements f a vulnerability assessment, which includes assessment of risk. The draft CAIP defines risk as the combination of the probability of a hazard and the consequences of that hazard. However, the draft CAIP contains only a limited analysis of the consequences of flood conditions. For example, the draft CAIP establishes impact thresholds for specified parameters including the depth of water on highway travel lanes and shoulders and selects a	See response to comment L5.C8

		water depth of 4 inches as the threshold for a severe condition. The document states, “Research indicates 4 inches is the depth at which passage of small vehicles is no longer considered safe (Maghsoodifar et al., 2025).” This statement is overly simplistic and does not, by itself, substantiate the selection of 4 inches of water as the threshold for a “severe condition.” Caltrans should provide more relevant supporting evidence and/or justification for setting this threshold at 4 inches.	
	L6.C1	Figure 44 shows projected road surface flooding over 4 inches from a 100 year storm on segment W 56 today (current lowest elevation 10.12 feet). With 4 inches stated as CalTrans safety limit requiring highway closure, this represents a risk of closure of 2 hours per year. This level of risk has undoubtedly been true for many years and, since actual road closure from flooding has only happened once in the history of the highway, it has been deemed an acceptable risk not requiring a major highway project.	Referring to segment W56, Figure 44 shows there would be at least 4 inches of water on the road more frequently than once every 100 years on average (0.06= 6x/100 yrs, on average) Given the projected, and realized, sea level rise, Caltrans expects the risk of inundation to increase through time. The CA Coastal Commission also made the creation of the CAIP a special condition for the Eureka- Arcata Corridor Improvement Projects (CDP 18-1078) The 4-inch threshold represents a planning level decision used in the model based on the best available science. Caltrans’ management reserves the right to determine the appropriate flood response and resulting road operations and /or closure on a case-by-case basis. “*Water depths exceeding 4 inches represent significant disruption of service likely requiring road closure. At this depth, most vehicles experience loss of traction and control, creating safety hazards.*

			Research indicates 4 inches is the depth at which passage of small vehicles is no longer considered safe (Maghsoodifar et al., 2025).”
	L6.C2	Tables 17 a and b show future projections for segment W 34, which mostly corresponds to Corridor Segment 4 in Chapter 7. This segment’s current lowest elevation is 9.28 feet. It is the only segment in the corridor that has actually ever flooded enough to close the highway and it is vulnerable from overtopping both the railroad prism and dikes to its east, causing flooding from both sides of the road. It isn’t clear what sea level elevation was used for 2030 in the Table 17 projections, since the most proximal scenario referenced in the document is 2050. Without raising the highway, the projected duration of closure for 4+ inches of flooding on W 34 in 2030 is 29 minutes per year. The projected closure time in 2050 is 2 hours per year, the same amount we already accept for segment W56.	Caltrans currently has an interim project anticipated to go to construction in the mid-2030s to address the immediate risk the highway faces (Chapter 4.6)
	L5.C9	<u>Section 6.1.5</u> The draft CAIP expresses exceedance probabilities in units of days per year and sets a threshold of 0.01days per year as the threshold for the probability that constitutes unacceptable risk. This approach to expressing exceedance probabilities may have certain technical merits (by accounting for events occurring multiple times a year), but the units are not intuitive for understanding. It’s difficult to understand what a small fraction of a day per year or event per year represents, or to have a sense of the difference between 0.01 days per year, 0.05 days per year, and 0.1 days per year. It would be very helpful to have more explanation of how exceedance probabilities in units of days per year or events per year relate to annual percent-chance. It would be helpful to create a table with columns showing the correspondence between annual percent-chance, days per	Comment noted for future work with this consultant. This contract is closed but Caltrans will work on future projects and with future consultants to ensure a more readily accessible explanation is included. For the purposes of understanding the CAIP as currently written, the probability of an event occurring 0.01 days/year equates to a 1% chance of occurring at least once a year. See Chapter 6.1.5 for more detail on the methods used to establish the vulnerably analysis. *“The impact categories were used to determine when severe impacts would be observed at a particular frequency. Because transportation*

		year, and events per year for a range of frequencies at representative locations along the Corridor.	*infrastructure often uses a 100-year return period as the design storm, the vulnerability assessment was also set up to evaluate when the probability of severe impacts exceeded 0.01 day (d)/yr (approximately 0.01 events per year or 100-year storm frequency). This standard is common practice in transportation engineering and provides a consistent basis for evaluating vulnerability across different infrastructure types and locations. In addition to revealing when in time a particular zone will become vulnerable to specified levels of flooding, the vulnerability assessment enables comparison of vulnerabilities across zones – this is crucial for prioritization of adaptation projects, as a single project that treats the entire Corridor at once is likely not feasible.*"
	L6.C9	One additional point of concern I have is whether the elevations of sea level which accompany El Nino have been accounted for in modeling. Waves and thermal expansion from a strong El Nino increase sea level elevations along the eastern Pacific by up to 2 feet for months. This was not mentioned in any modeling scenario descriptions. While it has long been thought that there is no connection between ENSO and climate change, recent research found a pattern of stronger El Ninos and La Ninas since 1960 and agreement predicting its continuation using multiple models (Hong, 2026). If El Nino SLR and its potential amplification hasn't been taken into account, then sea level rise projections should be revised to include it.	The SLR scenarios come from the Ocean Protection Council (OPC). Since these projections are based on global climate models, and recommended for use by State agencies, Caltrans will not be altering these values. OPC does recommend the scenarios be used with extreme storm events and the CAIP modeling followed this guidance (see Section 4 of the Coastal Technical Memo (Ludka et al. 2025). *"As part of the Humboldt Bay sea-level rise modeling and inundation vulnerability mapping project (NHE, 2015), a two-dimensional hydrodynamic model (2D model) was developed for Humboldt Bay (Figure 4.1) to efficiently conduct long term*

			sea-level change simulations. NHE (2015) used the 2D model to simulate a 100-year hourly time series (1913 to 2012) of still water levels in Humboldt Bay forced only by a sea-level height series open boundary condition (OBC). The 100-year still water series accounted for astronomical tides and non-tidal effects (e.g. storm surge and El Niño variability) but did not account for local wind setup in Humboldt Bay. For this assessment, the existing NHE (2015) 2D model was leveraged to simulate a 74-year hourly time series (1950 to 2023) of reference water levels (tide + storm surge + wind setup) using sea-level height and wind speed/direction series boundary conditions."
Engagement	L1.C7	The CAIP presents a 5 point qualitative method of gathering community input which is called a public engagement plan (PEP). But it is not clear if and how it has been used. RECOMMENDATION: Clarify which types of information gathering have been used already along with documentation (perhaps in an appendix) and when information will be gathered from which groups in the future.	Comment is unclear as there is not a 5-point engagement plan. However, edits have been made to Chapter 3.4 to increase clarity of public engagement efforts. See changes below. *"During the development of the CAIP, Caltrans ~~engaged~~ consulted with technical experts, ~~the~~ held four in person workshop meetings with the TAC (refer to Section 3.1 List of Partners and Agencies) and engaged with the public during the public review period and the 101 Open House. D~~etailed d~~escriptions of engagement activities and methods, and a list of stakeholders can be found in Appendix D. Future engagement activities for CAIP updates will follow the recommendations of the PEP. However, as*

			projects are programmed for construction each project will develop its own PEP."
	L5.C2	<u>Section 3.1</u> This section states that a Technical Advisory Committee (TAC) was established to provide guidance and feedback throughout development of the CAIP. Caltrans should consider summarizing how the TAC's input was incorporated into the CAIP.	Change made. See changes to section 3.1 *"…A Technical Advisory Committee (TAC) was established to provide guidance and feedback throughout development of the CAIP. The TAC was comprised of representatives from the CCC, CDFW, City of Eureka, City of Arcata, Humboldt County, Cal Poly Humboldt, Northern Hydrology and Engineering, Caltrans, GHD, the Wiyot Tribe, Humboldt County Association of Governments, and California State Water Resources Control Board.* *The TAC provided feedback during four in person workshops including the modeling parameters, adaptation options, location of important adjacent infrastructure, access concerns regarding future land use, weighting of criteria in the multicriteria evaluation tool. The TAC was also provided a draft of the CAIP for early feedback prior to the public comment period."* See edits to Section 8. *"The conceptual phased implementation plan (Figure 66) is informed by vulnerabilities identified in CAIP technical studies, planned transportation projects along the Corridor, and the 2024 OPC SLR Scenarios. Under the intermediate SLR*

			scenario, the need for additional highway adaptations beyond 0M270 is not anticipated until around 2060 (see Section 6.1.5 Vulnerability Assessment). However, if monitoring indicates accelerated SLR, interim adaptations would be advanced accordingly. For example, incremental raising of the Bay Trail could provide temporary resilience until environmental triggers are reached, at which point construction of longer-term measures could be implemented. *Feedback from the TAC supports interim adaptations such as 0M270 until a longer-term project is initiated. Primary concerns from the TAC included 1) economic concerns and logistics need to be at the forefront of project planning ie., what can realistically be afforded? 2) environmental performance also needs to be a top priority 3) any future adaptation plan needs to be done in concert with existing and planned future land use on appropriate and economically sound timelines. The TAC supports the flexible approach and the option to modify flood threshold levels in future analyses, including at other highway locations."*
Evaluation Criteria	L1.C8	RECOMMENDATION: Consider whether the CAIP would benefit more by explicitly including all the evaluation factors as the overarching structure for the report or whether the evaluation criteria should be more carefully calibrated to what the CAIP actually has undertaken	The overall structure of the report is built around the hazard analyses and vulnerability assessment as these are critical to understanding the road flood potential. Evaluation criteria for road treatments cannot be considered until

			after the existing conditions and future vulnerabilities are established.
	L4.C3	Incorporate the following information and criteria weights into a re-evaluation of adaptation strategies. a. Evaluate adaptation alternatives based on their ability to support future salt marsh, eelgrass, and estuarine habitat restoration. b. Explicitly recognize that shoreline armoring and flood barriers often transfer flood and erosion impacts to neighboring areas, creating unintended environmental consequences and financial costs. c. Consider the indirect financial costs associated with the redirection of ocean waters caused by hard barriers. d. Weight criteria 3 and 8 more heavily to prioritize the protection of essential infrastructure (3) and environmental performance (8) of adaptation strategies.	a) The coastal squeeze, self-mitigation, environmental performance and the use of Nature based solutions captures this b & c) Section 7.1 covers maladaptation and the negative and unintended consequences of hard armoring. The financial costs are not explicitly covered due to the difficulty in estimating a number. The comment has been noted and future updates to the CAIP may consider adding a cost benefit hard armoring category to the ranking criteria. See edits to section 7.6 *"Future updates should consider adding criteria to evaluate the cost benefit of strategies. For example, would this strategy result in unintended environmental and economic consequences to adjacent parcels?"* d) All evaluation criteria are currently weighted equally with the exception of cost. This decision was made based on feedback from the TAC and the inherent realism of needing a project to be funded if it is to be built. This generated what the authors believe to be justifiable starting point for overall review, however as projects for each highway segment move forward a new alternatives analysis, and accompanying environmental document, will be completed. At this

			time the project development team, with input from the community, can change the evaluation criteria. It is important to remember the primary function of the CAIP was to complete a hazard analysis and vulnerability assessment for the corridor, and not to select road the preferred road treatment.
	L4.C5	Since traffic volumes respond to the infrastructure available, forecasting traffic volume based on population threatens the self-fulfilling prophecy of inviting higher traffic volumes with larger infrastructure - traffic volumes must not be directly correlated with population.	Traffic volumes were not a major factor in the adaptation planning effort. Traffic volumes were reviewed in the economic analysis for the purpose of determining the cost of a road closure. None of the proposed adaptation options are capacity increasing, rather the CAIP simply states future volumes should be monitored (which represents a standard planning approach).
	L4.C7	Provide summaries of the information that was used to determine whether an adaptation strategy meets an evaluation criteria	Summaries of the ranking criteria are provided in chapter 7.6.1. Ranking score cards are in Appendix F and Table 21 was used to evaluate each option. Scores were determined based on feedback from TAC members and Caltrans staff. Factors like adjacent land use, local coastal plans, socioeconomic factors, consideration to infrastructure impact on hydrology and environmental dynamics, mitigation expertise and local knowledge were used to determine final scores The CAIP is a living document, and the ranking can change with the next update
	L6.C6	Consideration must be given to resilience not only to sea level rise, but also to other disasters. The CAIP affirms that a viaduct would be more resistant than an embankment to powerful	The purpose of the CAIP is to review and make public the consideration of all feasible adaptation measures and the

		storms, floods, earthquake liquefaction and tsunamis. Severing Humboldt from help in the event of these disasters would impair both emergency response and long term recovery.	timeline in which Caltrans likely needs to act in light of sea level rise. This is critical to fiscal planning. The CAIP did not establish a preferred alternative as this is done as part of the CEQA process during project delivery with public input. Consideration of other factors such as seismic design and threats of other hazards is considered when selecting a preferred alternative for a programmed project.
	L4.C11	Evaluation Criteria Should be Weighted to Reflect Community Priorities ... ECONOMIC . (3) Maintain essential infrastructure or community assets: "Strategies that protect essential infrastructure or community assets meet this criterion, while strategies that harm essential infrastructure or community assets do not." The corridor currently shields critical infrastructure - natural gas, electricity, water, and waste water lines (see map on CAIP p. 48). Disruption of the services provided by this infrastructure could have cascading impacts throughout the region, thus this criteria should be weighted to reflect the reliance of our region on that infrastructure. . ENVIRONMENT . (8) Environmental Performance: "Strategies with no permanent negative impacts (temporary negative impacts are less than a year) or all final environmental impacts are beneficial meet this criterion, while strategies that result in numerous or extensive environmental impacts do not."	See response to L4.C3 (d) See section 4.4: *"The highway system frequently crosses or interacts with floodplains, but the FHWA has emphasized that highways are not designed or intended to function as flood control structures (i.e., as a levee) (USDOT, FHWA, 2008). Consequently, FHWA does not set flood control standards for highway embankments. For example, highway embankments do not include design features, such as an internal impervious core and freeboard, required for a levee or other flood control structure. The fill material typically used in highway embankments does not provide a sufficient barrier against water; therefore, a highway embankment is vulnerable to piping, seepage, and infiltration. Most interstate embankments were constructed to avoid overtopping by a flood with a 2 percent chance of being exceeded in any given year (50-year flood). FHWA notes this requirement does not imply an*

		... To truly reflect community priorities in the evaluation tool, CalTrans should seek community input on which criteria should be weighted heavier than others, and use that feedback to increase or decrease the weights of various criteria for the next iteration of the CAIP document.	*embankment serves as a flood control, but rather the intent is to prevent loss of the embankment. FHWA guidance clearly states that designating highways as levees is not an acceptable practice and should be opposed. This guidance is based on several factors, including the inadequacy of highway design for flood control purposes, the potential for unsustainable costs, liability, and damages, the need for specialized engineering evaluations by professionals with expertise in flood control systems, and that FHWA lacks the authority to undertake flood control responsibilities."*
	L5.C12	<u>Section 7.6.2</u> The draft CAIP presents a three-tier rating scale for various criteria to assess adaptation options. This approach is very simplified and the value for comparing options seems limited.	Comment noted and this feedback has been received from other sources. The CAIP evaluation criteria were based on the SANDAG tool and this generated what the authors believe to be justifiable starting point for overall review. The purpose of the CAIP is to review and make public the consideration of all feasible adaptation measures and the timeline in which Caltrans likely needs to act in light of sea level rise. This is critical to fiscal planning. The CAIP did not establish a preferred alternative as this is done as part of the CEQA process during project delivery with public input. Consideration of other factors, including a more in-depth alternative analysis will be completed when selecting a preferred alternative for a programmed project.

Implementation Plan	L4.C9	The conceptual implementation plan should ensure the long-term and complete protection of the corridor by prioritizing long over short term adaptation strategies in the CAIP. ... The Conceptual Implementation Plan (CIP) relies too heavily on the intermediate sea level rise scenario and short and mid-term adaptation strategies, failing to adequately plan and prioritize timely implementation of long-term strategies. The precautionary approach (defined by the Coastal Commission as using high and extreme projections for SLR) and the OPC SLR guidance recommend use of the intermediate-high and high scenarios for long-term planning. ... CalTrans should not wait until after the implementation of the 12-foot grade raise via project 0M270 to "confirm the anticipated SLR pathway and refine the timing of future adaptation projects" (p. 158).	See comment L1C6 While the CA Ocean Protection Council (OPC) recommends using the high (or most severe) SLR scenario when planning for critical infrastructure, this scenario incorporates "deep uncertainties" and is less likely to occur than the intermediate and intermediate-high scenarios. The intermediate-high scenario was used to balance the uncertainty in long-term projects with needing to keep the road operable. Note *"[b]ased on SLR projections at the time of this report, the findings from CAIP technical studies indicate a road raise to approximately 16 to 18 ft NAVD88 would provide adequate protection from coastal hazards through 2100* (see 6.1.5 'Vulnerability Assessment')." Note the authors of the CAIP also recommend revising elevations with updated science. 0M270 represents an interim project as the State budget cannot currently afford to fund the ideal long-term solution to address all vulnerability throughout the corridor. Note feedback from the TAC supports interim adaptations such as 0M270 until a longer-term project is initiated. Caltrans D1 manages nearly 1000 miles of highway system (Humboldt Del Norte, Lake and Mendicino counties), thus project prioritization and budgeting must consider and balance project need throughout the District.

Completeness of the "Plan"	L1. C9	A plan would have actions that show who is conducting them and their costs and sources of funding. Instead the CAIP considers several possible sources of funding and who might apply for them. Likewise, the CAIP documents the patchwork ownership of dikes but suggests no overall plan to manage this patchwork or replace it with a single entity. If this were the actual plan, we would be alarmed at its lack of specificity. RECOMMENDATION: Retitle the report as "Comprehensive Adaptation & Implementation Plan Considerations." Indicate, if possible, who will create an actual plan and when; or if that is not possible, what would have to happen for a plan to be proposed.	Comment noted. The name of the CAIP and the requirements were created by the CA Coastal Commission in Special Condition II of the Eureka-Arcata Corridor Improvement Projects (CDP 18-1078). The CAIP functions as a high-level planning document. When a project is initiated, more details like funding etc are determined. Caltrans cannot legally manage a series of privately owned dikes.
	L5.C1	<u>Section 1</u> This section states that the purpose of the CAIP is to develop long-term strategies that address the anticipated impacts of climate change and coastal hazards along the Eureka-Arcata Route 101 Corridor. The first listed objective is to identify a suite of strategies to protect, relocate, or otherwise adapt the Corridor. Caltrans should consider identifying the fundamental elements of a strategy, or further explaining what type of strategies are presented in the draft CAIP. The draft CAIP appears to be limited to general conceptual strategies rather than specific strategies. An example of a report with more specific strategies is the Dumbarton Bridge West Approach + Adjacent Communities Resilience Study (June 2020). This document presents specific implementation strategies for three alternatives, which include strategy narratives, key features, key actions needed to implement the alternative, descriptions of ecosystem services, plan view schematics and typical sections, cost estimates, and project implementation phasing and timelines.	When writing the CAIP the authors did review the Dumbarton Bridge West Approach + Adjacent Communities Resilience Study (June 2020). While the study is excellent, it is much more analogous to an alternatives analysis, which Caltrans will do when a project from the CAIP is initiated. The purpose of the CAIP is to present and review a suite of alternatives by which the corridor could be maintained as an operational State Highway in light of projected SLR by looking at the frequency of flooding for determination of when an adaption solution would be needed. The CAIP reviews and makes public the consideration of all feasible adaptation measures and the timeline in which Caltrans likely needs to act. This is critical to fiscal planning. The CAIP did not establish a preferred alternative as this is done as part of the CEQA process during project delivery with public input. The detail the commenter

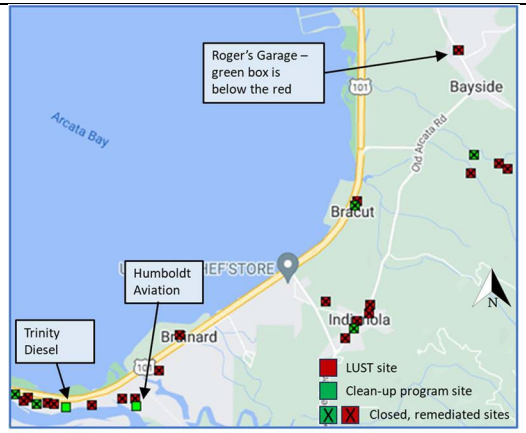
			requests would be provided during the alternatives analyses when a project is programmed.
	L5.C13	Section 8 This section states that raising the Bay Trail "could be implemented" as an interim measure to enhance short-term resilience for both the trail and the highway, and states that living shorelines "may also serve" as short- to mid-term adaptation strategies. However, the draft CAIP doesn't describe what role Caltrans envisions taking to implement these measures. The CAIP would be significantly improved by describing how Caltrans intends to advance and/or support these concepts and identifying specific actions that Caltrans can take. Without this content, the CAIP is limited to being primarily a repository of information rather than a truly strategic plan.	As stated in the response to L5.C12, the purpose of the CAIP was to review and makes public the consideration of all feasible adaptation measures and the timeline in which Caltrans likely needs to act. The CAIP does not fund or program projects but rather establishes the need and justification for suggested projects. Caltrans' asset management will decide when to program projects the CAIP suggests based on need and budget. In the meantime, Caltrans is happy to partner on projects funded outside of Caltrans, ie resiliency grants etc.
References	L2.C1	My graduate project focused entirely on this subject, and is published with the Cal Poly Pomona Library, found here: https://www.cpp.edu/env/urp/docs/alexgeromebanashiewiez.pdf	Thank you for sharing this resource. The authors have saved copy in their project file.
	L5.C3	Section 4.2 This section references the Sea Level Rise Adaptation Plan for Transportation Infrastructure and Other Critical Resources in the Eureka Slough Hydrographic Area, Humboldt Bay (March 31, 2021). However, the responsible agencies for the plan are improperly described. The County of Humboldt was the lead agency for this plan and also the grantee for an Adaptation Planning Grant administered by Caltrans. The plan was developed in collaboration with the City of Eureka and Humboldt County Association of Governments (HCAOG) who served as co-sponsors. While GHD, Inc. was one of the professional consultants that helped develop the plan, the plan should be referenced as a Humboldt County plan with the City of Eureka and HCAOG as co-sponsors.	Thank you for the clarification, the reference has been updated. *"The Jacobs Avenue area is protected from coastal flooding by a system of dikes along the southern shoreline that borders Eureka Slough. Humboldt County developed the "Sea Level Rise Adaptation Plan for Transportation Infrastructure and Other Critical Resources in the Eureka Slough Hydrographic Area, Humboldt Bay." Humboldt County was the lead agency for this plan and the grantee for the Adaptation Planning Grant administered by* Caltrans.

			The plan was developed in collaboration with the City of Eureka and Humboldt County Association of Governments (HCAOG) who served as co-sponsors. This plan, primarily authored by ESA and GHD, identified raising the surrounding dikes as a possible adaptation strategy to protect Jacobs Avenue from SLR flooding, though implementation of this plan is contingent on funding (GHD et al., 2021).
	L5.C4	Section 4.2 This section mentions that the Humboldt Bay Trail provides protection to the Route 101 Corridor. Caltrans should consider identifying that the City of Eureka, City of Arcata, and County of Humboldt each developed portions of the Bay Trail over the last 15 years. Caltrans should consider describing how portions of the Bay Trail were specifically designed to mitigate immediate flood risks along the shoreline, which benefited the Route 101 Corridor (see also comment below for Section 5.2). Technical information for Humboldt Bay Trail South is available in the Project Description Report (September 2020) which describes the basis of design for the elevations of the trail corridor. … Section 5.2 This section mentions that flooding on December 31, 2005, caused temporary closure of the Route 101 between Brainard and Bracut and notes that "Only one storm event has resulted in the closure of the Corridor." Caltrans should consider providing more historical context for flooding along the Corridor, how the flood exposure has changed over time due to interventions, and acknowledge the efforts by other entities to support reduction of flood hazards on the state highway. Prior to construction of the Bay Trail, the lowest elevation along the railroad grade between Brainard and Bracut was 9.6 feet	Thank you for the additional information. This and the Project Description Report (September 2020) has been added to section 4.2: *"The Bay Trail is a paved, multi-use path that connects the communities surrounding Humboldt Bay. The City of Eureka, City of Arcata, and County of Humboldt each developed portions of the Bay Trail over the last 15 years. It supports both recreational use and active transportation and is part of the regional Great Redwood Trail and the statewide California Coastal Trail. The trail follows the edge of Humboldt Bay, running primarily between the railroad and the Corridor, except for a one mile stretch that detours along the dike around the Brainard Mill Site. In addition to providing multimodal coastal access, the trail offers some protection to the Corridor – for example, the section between Brainard and Bracut has armoring and certain segments of the trail are higher in elevation than the existing highway. This*

		NAVD88. The December 31, 2005 flooding event had a peak water surface elevation of 9.55 feet NAVD88 at the North Spit gage and there was likely at least one foot of wind setup along the eastern shoreline of Arcata Bay. Water from Humboldt Bay spilled over the railroad corridor and flooded Highway 101 because the water surface elevation was at least one foot higher than the railroad prism. The Bay Trail construction in 2024-2025 raised the railroad grade in that area to a minimum elevation of 11.5 feet NAVD88, which was the primary reason why Route 101 avoided any flooding from the bay during the extreme flooding in early January 2026, (which had a peak water surface elevation of 10.37 feet NAVD88. The absence of flooding on the Route 101 Corridor during the series of early January 2026 flood events demonstrated the tangible flood protection benefits to Route 101 from construction of the Bay Trail.	*portion of the Bay Trail was specifically designed to mitigate immediate flood risks along the shoreline, which benefits the Corridor. Technical information for Humboldt Bay Trail South is available in the Project Description Report (Humboldt County, 2020) which describes the basis of design for the elevations of the trail corridor."* Section 5.2 has been updated to include the commenter's historical context regarding the Bay trail and its flood prevention assistance: *"One storm event in recent history resulted in the closure of the Corridor. On December 31, 2005, a combination of high tides and strong winds led to extremely elevated water levels – measuring 9.55 ft NAVD88 at the North Spit Tide Gauge (National Oceanic and Atmospheric Administration (NOAA), 2026). Wind setup elevated water surface elevations, likely by at least a foot, resulting in approximately 10.55ft NAVD88 for water surface elevation. Water from Humboldt Bay spilled over the railroad corridor and flooded a section of the Corridor between Brainard and Bracut because the water surface elevation was higher than the railroad prism, which was 9.6 ft NAVD 88 prior to being raised to 11.5 ft in 2025."*
	L5.C5	Section 4.5 This section references the U.S. Army Corps of Engineers' National Levee Database and includes a map identifying levees around northern Humboldt Bay. The text states that the levees	Thank you for the clarification, the term has been changed from "registered" to "identified"

<table>
<tr><td></td><td></td><td>are “registered” with the Army Corps of Engineers, which is a vague and potentially misleading term because the National Levee Database does not have a registration process and the Army Corps of Engineers has not analyzed the levees with respect to any criteria. The National Levee Database simply identifies certain levees based on historical mapping and readily available documentation. To avoid confusion, Caltrans should consider using the term “identified” rather than “registered.” It’s important to note that the labeling for certain levees in the database is potentially misleading. Most of the levees identified as “Humboldt County levees” are not owned and maintained by the County as a public agency; the labeling appears to simply refer to their location being situated within the county.</td><td></td></tr>
<tr><td></td><td>L5.C6</td><td><u>Section 6.1.2</u>
The CAIP should clarify the reference year for the sea level rise amounts listed in Table 11.</td><td>Edit made
Table 11. SLR scenarios considered for this report, corresponding to magenta dots in Figure 25. SLR values are relative to the year 2000.
<table><tr><th>Scenario</th><th>2023</th><th>2050</th><th>2100</th><th>2150</th></tr><tr><td>Current Condition</td><td>X</td><td></td><td></td><td></td></tr><tr><td>Intermediate</td><td></td><td>0.8 ft (0.24 m)</td><td>3.1 ft (0.94 m)</td><td></td></tr><tr><td>Intermediate - High</td><td></td><td></td><td>4.9 ft (1.5 m)</td><td>8.3 ft (2.5 m)</td></tr><tr><td>High</td><td></td><td></td><td>6.6 ft (2.0 m)</td><td>11.9 ft (3.6 m)</td></tr></table></td></tr>
<tr><td>Suggested Future Work</td><td>L3.C3</td><td>I encourage Caltrans to include, either in the CAIP or in a future implementation appendix, a clear monitoring architecture that identifies: The key indicators that will be tracked across the corridor; The agencies or partners responsible for data collection, validation, and stewardship;
The update intervals for each type of monitoring data;
QA/QC procedures and public reporting formats;
How monitoring results will be integrated across groundwater, drainage, shoreline, roadway, and ecological systems; and
The thresholds that would trigger reevaluation, maintenance actions, project scoping, design changes, funding requests, or implementation of adaptation measures.</td><td>Comment noted. Caltrans is still determining the scope of future monitoring.</td></tr>
<tr><td></td><td>L3.C4</td><td>I also encourage Caltrans to make appropriate monitoring outputs public-facing through plain language summaries, accessible maps, and downloadable data where feasible.</td><td>Comment noted. Caltrans is still determining the scope of future monitoring.</td></tr>
</table>

		Public-facing monitoring would improve transparency, strengthen trust, and help community members understand how changing environmental conditions are influencing future corridor decisions	
	L4.C12	The elevation of Indianola Road beneath the recently completed crossing is only 12.08 ft NAVD88, qualifying it for adaptation under the CAIP's 16 ft NAVD88 threshold - the CAIP must consider adaptation measures for this facility	See response to L4. C6
	L4.C8	Incorporate information documenting historic contamination along the corridor, and how site remediation may contribute to project constraints … The CAIP must consider and address the potential for contaminants in soil and groundwater to be remobilized off-site, and how impacts to the aquatic ecosystems will be avoided during construction and as a result of any adaptation projects that are implemented.	Documentation of publicly known historic contamination along the Corridor may be considered in future updates to the CAIP. Currently there is a review of Contaminated Sites in the groundwater technical memo. "*The impact of groundwater elevation changes due to SLR does not appear to pose a significant threat of interacting with known contaminated sites within the project area. Identified sites have all been fully remediated or have had the contaminant source removed and are being monitored. The known sites are concentrated in the southern portion of the project area, mostly along Jacobs Avenue, and this location remains an active industrial area with the potential for additional releases*."

			 In future updates the CAIP will not address the construction scenario specifics which would remobilize contaminants and how to avoid such impacts as this would be done during the alternative analyses and CEQA phase during project delivery.
	L4.C10	Caltrans should consider adding "Operational Changes" as a potential adaptation strategy. For example, implementing measures to induce motorists to drive at slower vehicle speeds through the corridor during low-magnitude, short-duration flood conditions	Operational changes are made in the field during emergency management situations. However, this is not a long-term solution to address flooding. While slower speeds would alleviate some safety concerns, there is always inherit risk in driving through floodwaters.
	L5.C14	This section states that the CAIP is a living document and will be updated to reflect the best available science, observed conditions, and funding considerations. The CAIP would be improved by providing more specific information related to future updates and addressing some natural questions, including: • Approximately when does Caltrans anticipate that an update may be needed? (5-10 years? 10-20 years? If certain thresholds are exceeded?) • Approximately how much time and how much funding would be needed to update the CAIP?	The CAIP will be updated when the CA Ocean Protection Council (OPC) updates their SLR guidance (approximately every 5 years) as updates may directly impact the vulnerability analysis and the timeframe Caltrans should expect to see flooding on the corridor. The time and funding need will depend on the scope of the update required and cannot be determined at this time.

		Would it be comparable to the original development, or less?	
0M270	L6.C4	Project 0M270 is labelled in Figure 66 as a "non-CAIP project" and how this grade elevation fits with the earthen embankment alternative in the current planning process is unclear. Does it refer to the earthen embankments presented as one option in CAIP or would those embankments be added on top of the "non CAIP" grade elevation? Either way, the road closure predictions in Chapter 5 reveal no economic reason to go ahead with grade elevation as an interim measure. The cost of closing 101 in Humboldt was cited in CAIP planning documents as $2.7 million per day in 2030 dollars or $112,500 per hour. Using the above projections, the amount saved by raising the grade to prevent temporary highway closures between now and 2070 would be around $4.5 million. This is a very small gain compared with a construction cost of $35 million.	The CAIP costs by segment were generated independent of 0M270. While 0M270 is a planned project, it has not begun, thus funding has not been finalized. 0M270 brings the road elevation of the southbound lanes to 12 ft, and the suggested CAIP project would bring the final elevation to at least 16 ft. The CAIP cost estimates don't include earthwork due to the uncertainty in estimating until a design is created with geotechnical studies (i.e., determine what type and volume of fill). The source of the commenter's final numbers is unclear. While $2.7 million is from the economic analysis, the calculation to $4.5 million and $35 million is unclear. Furthermore, the decision to adapt the road in light of sea level rise is not made solely on economics. This route serves as an important evacuation corridor and a primary route used by emergency services. Highway closures also result in substantial impacts on communities along the detour routes. As Caltrans does not own or operate the detour routes, Caltrans has no way to ensure said routes are not flooded and remain passable in a large storm event.
	L6.C7	Delaying a long term solution in favor of raising the grade or installing a short-lived living shoreline means that construction costs for a more definitive solution will increase substantially. From 2003 to 2017, the cost of highway construction in California increased 143% (TS, 2017). According to the FWHA	Construction costs have increased, and it's fair to assume this will continue. However, this does not change the fact that Caltrans currently doesn't have funding for a long-term corridor-wide project,

		national highway construction costs have rised 70% since 2020 (Pew, 2026). Other costs include the loss of urgency to develop a longterm solution so we are caught with our pants down (or our pant legs rolled up) if we don't act in time and the increasing difficulty of obtaining funding as costs rise and demands on the state to pay for climate disasters and adaptation needs escalate. Another round of planning down the road will also add years of delay. Planning for the Indianola overpass began in 2002 and construction was only completed this year	especially given the anticipated frequency and magnitude of flooding when compared to other statewide locations.
	L6.C8	Sea level rise is a significant threat but the revised and much lower rate of relative sea level rise in northeastern Humboldt Bay, compared with the more rapid rate at the North Jetty tide gauge, gives us more time than initially thought to do things right. Beginning with a viaduct to protect the corridor's most vulnerable segment should be the preferred approach and CalTrans' first priority for sea level rise adaptation in the Eureka Arcata corridor so that learning can take place as early as possible and be applied to planning for other vulnerable segments.	The authors agree that the revised rate and 0M270 give us time to thoughtfully plan the long-term project and gather funds.

350 Humboldt CAIP Comments

Thank you for a chance to comment on the excellent CAIP draft. The draft contains an enormous amount of information relevant to risks and how to plan for them. It has a commendable focus on nature-based solutions and on adaptive management. It is also commendably detailed in dividing up the Highway 101 corridor into 13 segments. It references in detail other relevant research. So we consider it a job well done.

We do have a number of suggestions for ways in which the final version could be clarified and improved. Some of these suggestions stem from our status as a climate action organization and some from difficulties we encountered in reading and understanding the report. We should also acknowledge that although we spent quite a number of hours attempting to understand the report some of what we have characterized as needing improvement may simply reflect our inadequate understanding.

The role of climate change in causing sea level rise (SLR) and opportunities to mitigate are not highlighted sufficiently.

The CAIP draft report is typical of most government reports on climate change adaptation (for example, wildfires) in that it gives short shrift to actual mitigation to bring the earth's increasing temperature into stasis. Instead there is only implicit recognition given to the need for mitigation by noting the range of SLR to be expected will depend on GHG emissions reductions. L1.C1

This graphic from the World Meteorological Society makes several important points including, a) that some increases in SLR are baked in for hundreds to thousands of years and the *rate* of SLR is increasing.

There is another consideration that make it important to educate CAIP readers about climate mitigation. Climate tipping points, many of which are feedback loops, are not built into the models used in the Paris Agreement because their timing is not known. These uncertainties make the precautionary principle absolutely essential in any adaptation analysis. They also may tip the balance in strategic choices. The most obvious tipping point is the melting of the Antarctic ice sheet. Recent studies of Thwaites seem to indicate the irreversible melting of the ice sheet is more likely in the near term than anticipated in AR6 models.

Finally, we need to consider the escalating costs of adaptation. We need to tackle mitigation quickly because society's resources will be taxed to just deal with (escalating) adaptation needs. That is why the Bezos 10-billion-dollar Earth Fund CEO, Andrew Steer, warned in an interview: This is the decisive decade….if we don't get it right this decade, actually next decade it will be impossibly expensive to do anything and will quite frankly be too late."[1]

RECOMMENDATION: Make very explicit the connection between mitigation and adaptation. The more mitigation the less adaptation needs to be planned for. Include what readers can do:

- electrify their homes and vehicles,
- support public transit and infill,
- support renewable energy including the offshore wind turbines,
- and most important of all, at every level support elected officials who will tackle mitigation.

Beyond scope of CAIP

Earthquake and SLR risks cannot be considered separately.

The CAIP draft did a service in presenting earthquake and tsunami effects in the same document as SLR. For example, we learned that the effects of distant or nearby tsunamis would likely be the same and that an earthquake of over M8.0 is expected along the Cascadia subduction fault. Also, "SLR will amplify the effects of future tsunamis. Under future SLR scenarios, wave heights of tsunamis generated by more frequent, smaller earthquakes have the potential to equal or exceed historical wave heights of tsunamis triggered by larger earthquakes."

We also learned that "The area around the Corridor, and all low-lying areas around Humboldt Bay, are potential liquefaction hazard zones."

Yet the all-important vulnerability analysis does not consider earthquakes or tsunamis.

RECOMMENDATION: Explicitly model the overlapping probabilities of the various seismic threats and the tsunami threats, incorporating the increased damage of tsunamis due to SLR.

L1.C2

[1] https://www.bloomberg.com/news/articles/2023-05-04/transcript-zero-episode-37-how-the-bezos-earth-fund-spends-its-billions#xj4y7vzkg

The report laudably includes the precautionary principle, but it is inconsistently applied.

The precautionary principle includes all risks and their probabilities. If concrete probabilities are not calculable precautions still must be taken. Here are a few of the areas where the precautionary principle is not handled adequately in the CAIP:

- Long-term potentials for SLR from early Antarctic ice loss. California's 2024 Guidance spans 2.6 ft to 11.9 ft by 2150 and notes higher amounts cannot be ruled out. This is genuine "deep uncertainty." For Humboldt specifically, this means the subsidence-driven rise is effectively locked in by tectonics regardless of the global emissions pathway, while the ice-sheet tail determines how catastrophic the high end becomes.

  > "This includes potential runaway processes such as 'Marine Ice Cliff Instability.' Scientists are still unable to discount some low probability, but potentially catastrophic, very high-end sea-level scenarios that go well beyond the upper likely range of the high emissions IPCC scenario (~102 cm global rise) by 2100."[2]

- The 2024 Sea-Level Rise Guidance report presents probabilistic values for the North Spit, but qualitative figures ("above GMSL" and "highest in state") for the Mad River Slough and Hookton Slough. The CAIP focuses on the North Spit probabilities.
- The CAIP has overtopping probabilities for SLR and for tide height but not joint probabilities.
- Many decisions can be made with respect to incremental change, with the increments being modeled in probability distributions. But risk analyses start with what is an unacceptable risk and work backward. As the 2024 guidance says, it must include the worst-case possibility. Loss of Highway 101 for a substantial time is unacceptable as it is likely that Old Arcata Road would also be lost and contact between northern and southern parts of the county would involve hundreds of extra miles of travel and the creation of completely new supply chains. Unfortunately, the report does not have an explicit statement of what is an unacceptable risk. One can infer, for example, from the CAIP analysis of depth of flooding on the road, that what constitutes an unacceptable risk in the short term (4 inches), but this is not set into a long-term overall statement of unacceptable risk.
- The precautionary principle allows us to choose: "there are a lot of different ways to be wrong, some of them worse than others. The question for policy makers in this case is: What's the right way to be wrong?"

[2] Coastal Commission. "CALIFORNIA COASTAL COMMISSION SEA LEVEL RISE POLICY GUIDANCE: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits." (2024).

RECOMMENDATION: Determine what is an unacceptable risk and work backward to analyze recommended actions. Include deep uncertainty as well as probabilistic risks. L1. C3

The CAIP commendably divides the corridor into thirteen sections. However, focusing the analysis section by section risks losing the forest for the trees.

As one reads through the various options for each section of the corridor, from retreat to protect, it is hard to keep in mind or to create in mind an overview that might apply to the entire corridor. Such an alternative exists in the proposal to develop a whole new highway to the west of the existing highway. It is given, in our view, short shrift. Perhaps because of lacks in the examination of precautionary actions.

RECOMMENDATION: Present an overview of vulnerability and risk near the beginning of the report that explicitly considers whole-corridor solutions and costs in light of both SLR and seismic hazards. L1. C4

Nature based adaptation has limitations that are not consistently addressed.

SLR planning has been done in the Netherlands for a very long time. We looked to a paper on nature-based solutions there to illuminate possibilities here.

> "Our results imply that the multifunctionality and adaptivity intrinsic to Nature-based Solutions are two sides of a coin. They enable robust short-term strategies but increase uncertainty and the risk of lock-in and sunk investments in the longer term."

Issues have to do with societal preferences for weighing flood prevention against costs. In the US we are poor at this, consistently rebuilding in flood plains. This whole issue is increasingly being politicized in California, as discussed with clarity in the book *California Against the Sea: Visions for Our Vanishing Coastline* by Rosanna Xia.

Adaptive nature-based policies allow for postponing major policy choices. However, if a policy switch is required eventually, incremental adaptivity will have led to additional costs. If a pessimistic scenario "cannot be ruled out, other adaptation scenarios must be prepared for, such as hard-engineered or vulnerability-reducing strategies that may be able to maintain flood safety under high-impact but low-likelihood sea-level rise scenarios. The challenge lies in deciding when strategies should be switched."

RECOMMENDATION: The use of nature-based solutions, often associated with adaptive management, needs to be carefully considered in this case because of the very high long-term risks. L1.C5

Vulnerability assessment is the core of the work, but it should be highlighted.

The vulnerability analysis is really at the center of the report. It supports identification of "trigger years" for adaptive management action. (A complete set of tables for all six vulnerability zones can be found in Appendix E. Anticipated vulnerabilities are also shown in Figure 44.) By 2100 all parts of the corridor are anticipated to be under 4 inches of water 365 days a year. To be safe in 2100 with the most severe SLR the corridor would have to have 18 ft of elevation. This seems to be, although limited because of omission of factors such as seismic activity and tsunamis, the worst-case scenario that precautionary analysis requires be included.

RECOMMENDATION: Make the vulnerability analysis more comprehensive and elevate it to centrality in the presentation of findings. L1.C6

Plans for public input are ambiguous and insufficiently documented.

The CAIP presents a 5 point qualitative method of gathering community input which is called a public engagement plan (PEP). But it is not clear if and how it has been used. For example, there is a very comprehensive list of groups whose views would be relevant (including 350 Humboldt) but it is difficult to determine which if any had their opinions solicited. Table 21 seems to indicate a process had taken place with a conclusion that favored viaducts with nature-based solutions for many of the corridor segments. There was also mention of a workshop tentatively to be held in 2026. However, no documentation of participants, their selection, and the process used in decision-making is linked to the conclusions (in Table F1 – F12). The Engagement Timeline shows many meetings but no content or method. One might think that only at this stage would systematic feedback be solicited (using the Performance Metrics outlined in the Appendix). L1.C7

RECOMMENDATION: Clarify which types of information gathering have been used already along with documentation (perhaps in an appendix) and when information will be gathered from which groups in the future.

The multiple factor evaluation proposed for use by stakeholders is far more comprehensive than the CAIP report; they should map together.

The CAIP adopts these evaluation domains: Society and Equity; Economic; Environment; Feasibility; and Robustness. These criteria are considerably broader than the explicit mapping of the CAIP, although they are all covered in some measure. If the criteria are to be used in assessing the CAIP they should form the structure for CAIP analysis. Compared to the criteria the CAIP analysis looks spotty, as if the evaluation criteria were an afterthought.

The criteria clearly have important consequences if used. To provide an example from New Orleans, after Hurricane Katrina there was relatively little discussion about whether to rebuild.

However, a recent study used several lines of evidence to conclude that managed retreat for the entire area of 1 million people will be the only option.

These societal, economic and feasibility decisions go beyond the CAIP framework. It should at least be explicit which options will need to be considered, by which decision makers, when.

RECOMMENDATION:

Consider whether the CAIP would benefit more by explicitly including all the evaluation factors as the overarching structure for the report or whether the evaluation criteria should be more carefully calibrated to what the CAIP actually has undertaken. L1.C8

It should be made clear at the onset that the CAIP is not a plan but a series of analyses that are relevant to a plan.

A plan would have actions that show who is conducting them and their costs and sources of funding. Instead the CAIP considers several possible sources of funding and who might apply for them. Likewise, the CAIP documents the patchwork ownership of dikes but suggests no overall plan to manage this patchwork or replace it with a single entity. If this were the actual plan, we would be alarmed at its lack of specificity. L1.C9

RECOMMENDATION: Retitle the report as "Comprehensive Adaptation & Implementation Plan Considerations." Indicate, if possible, who will create an actual plan and when; or if that is not possible, what would have to happen for a plan to be proposed.

Daniel Chandler, Ph.D.
For the 350 Humboldt
Steering Committee

From: Alex Banaskiewicz
To: NCCA@DOT
Subject: Caltrans District 1 - Comprehensive Adaptation and Implementation Plan Now Open for Public Comment
Date: Tuesday, June 30, 2026 10:55:37 PM

Greetings,

My name is Alex Banaskiewicz. I graduated from Cal Poly Pomona with a Master's degree in Urban and Regional Planning. I interned with the City of Arcata's Planning Division, and now I work as an Associate Planner with the County of Trinity's Planning Division. I have spent years of my life working on Land Use Planning, Urban Design, and Environmental Sustainability.

During my time as a graduate student at Cal Poly Pomona, I spent a great amount of my time and effort on researching/designing sea level mitigation for the City of Arcata and Humboldt Bay. My graduate project focused entirely on this subject, and is published with the Cal Poly Pomona Library, found here: https://www.cpp.edu/env/urp/docs/alexgeromebanashiewiez.pdf L2.C1

I believe that Humboldt Bay can be protected from the threats of sea level rise via a multi-pronged approach, which combines both natural and physical barriers. I believe that it will ultimately be necessary for the **101 safety corridor connecting the City of Arcata to the City of Eureka to be raised via a berm** (much like the recently completed Indianola Undercrossing/Brad Mettam Memorial Interchange) to create a wall circling Humboldt Bay. I understand that this is no easy task, and will undoubtedly cost billions of dollars of investments. However, protecting this area will prove to be far more cost-efficient in the long-run, and the ROI from potential future economic development of this area will be well worth the cost. L2.C2

The second approach that I suggest is to **expand the Arcata Marsh and Wildlife Sanctuary to extend around Humboldt Bay from Arcata to Eureka**. This will create an additional layer of defense from rising sea levels, provide an abundance of natural habitats for endangered wildlife species, and have the added benefit of promoting the health and wellbeing of Humboldt County's residents via recreational activities. L2.C3

Please consider my suggestions; there are many examples globally of the effectiveness of berms and living shorelines mitigating the harms of sea level rise. If you would like any further help with this monumental task, please feel free to contact me directly via my email: *alexbanaskiewicz@yahoo.com*

Thank you for everything that you do, and may we plan for a brighter future!

From: Corey Shaffer
To: NCCA@DOT
Subject: Public Comment on Eureka-Arcata Route 101 Corridor CAIP: Corridor Monitoring Architecture
Date: Saturday, June 6, 2026 7:13:22 PM

Dear Caltrans District 1 CAIP Team,

I am writing to submit a public comment on the Draft Eureka-Arcata Route 101 Corridor Comprehensive Adaptation and Implementation Plan.

I appreciate the CAIP's recognition that the Route 101 corridor between Eureka and Arcata must be treated as a long-term climate adaptation challenge, not simply as a one-time infrastructure project. I also appreciate that the plan identifies the need for ongoing monitoring, updated sea-level-rise projections, and future adaptation decisions as conditions change. L3.C1

My main recommendation is that Caltrans strengthen the CAIP by defining the proposed monitoring efforts as a coordinated corridor monitoring network rather than as separate studies. L3.C2

The draft already identifies several important monitoring needs, including groundwater observations near stream and slough channels, observations near the highway road base and drainage ditches, vertical land motion monitoring, shoreline water-level monitoring, and remote sensor cameras for wildlife-crossing data. These are all valuable, but their usefulness would be much greater if they were connected through a shared adaptive-management framework.

I encourage Caltrans to include, either in the CAIP or in a future implementation appendix, a clear monitoring architecture that identifies: L3.C3

1. The key indicators that will be tracked across the corridor;
2. The agencies or partners responsible for data collection, validation, and stewardship;
3. The update intervals for each type of monitoring data;
4. QA/QC procedures and public reporting formats;
5. How monitoring results will be integrated across groundwater, drainage, shoreline, roadway, and ecological systems; and
6. The thresholds that would trigger reevaluation, maintenance actions, project scoping, design changes, funding requests, or implementation of adaptation measures.

This would help ensure that monitoring does not become passive data collection. Instead, it would function as the feedback system that keeps the CAIP alive over time.

In particular, groundwater elevation, road-base wetting and drying, drainage ditch performance, shoreline water levels, vertical land motion, roadway flooding, and wildlife-crossing data should be integrated into a shared decision framework. This would help connect

observed environmental change to transportation safety, ecological connectivity, maintenance needs, and long-term adaptation timing.

I also encourage Caltrans to make appropriate monitoring outputs public-facing through plain-language summaries, accessible maps, and downloadable data where feasible. Public-facing monitoring would improve transparency, strengthen trust, and help community members understand how changing environmental conditions are influencing future corridor decisions. L3.C4

I am not submitting this comment to prescribe a specific engineering alternative. Rather, I encourage Caltrans to strengthen the adaptive-management layer of the CAIP so that future decisions are guided by clear indicators, transparent thresholds, and coordinated environmental monitoring.

Thank you for the opportunity to comment and for the work being done to plan for the long-term resilience of this important North Coast transportation corridor.

Sincerely,

Corey Shaffer
Lake County, California
Undergraduate Environmental Science Student

Submitted to NCCA@dot.ca.gov

June 30, 2026

Roxanne Robertson
Environmental Scientist
Caltrans District 1 Climate Branch

Kaitlyn Woolling
Environmental Scientist
Caltrans District 1 Climate Branch

Lorna McFarlane
Environmental Scientist Senior
Caltrans District 1 Climate Branch

RE: EPIC, Humboldt Waterkeeper, & CRTP comments on the Draft Eureka–Arcata Route 101 Corridor Comprehensive Adaptation & Implementation Plan (CAIP)

Outline & Table of Contents

On behalf of the Environmental Protection Information Center (EPIC), Coalition for Responsible Transportation Priorities (CRTP), and Humboldt Waterkeeper, please accept the following comments on the Draft Eureka–Arcata Route 101 Corridor Comprehensive Adaptation & Implementation Plan (CAIP).

I. Summary

We commend CalTrans for engaging the public on the development of coastal hazard adaptation strategies for the six-mile portion of US 101 between Eureka and Arcata—known as the Eureka-Arcata corridor, or safety corridor. While the CalTrans has included the expertise of local scientists, we offer the following insights and recommendations from our unique environmental and community-centered perspectives.

For the reasons outlined below, we urge Caltrans to revise the final CAIP to: L4.C1

1. Establish a clear preference for accommodation strategies where feasible.
2. Prioritize viaducts in locations where they can restore hydraulic connectivity and facilitate tidal wetland migration. L4.C2
3. Incorporate the following information and criteria weights into a re-evaluation of adaptation strategies. L4.C3
    a. Evaluate adaptation alternatives based on their ability to support future salt marsh, eelgrass, and estuarine habitat restoration.
    b. Explicitly recognize that shoreline armoring and flood barriers often transfer flood and erosion impacts to neighboring areas, creating unintended environmental consequences and financial costs.
    c. Consider the indirect financial costs associated with the redirection of ocean waters caused by hard barriers.
    d. Weight criteria 3 and 8 more heavily to prioritize the protection of essential infrastructure (3) and environmental performance (8) of adaptation strategies.
4. Avoid, wherever possible, creating new continuous barriers that could exacerbate coastal squeeze and limit wetland migration. L4.C1
5. Coordinate adaptation planning with other jurisdictions conducting wetland restoration and sea-level-rise adaptation efforts to maximize ecological benefits throughout Humboldt Bay. L4.C4
6. Safe and separated bicycle and pedestrian facilities must be included in any infrastructure adaptation to sea level rise in the corridor, whether raised embankments, raised roadways, or viaducts. L4.C5
7. Since traffic volumes respond to the infrastructure available, forecasting traffic volume based on population threatens the self-fulfilling prophecy of inviting higher traffic volumes with larger infrastructure - traffic volumes must not be directly correlated with population. L4.C5
8. The elevation of Indianola Road beneath the recently completed crossing is only 12.08 ft NAVD88, qualifying it for adaptation under the CAIP's 16 ft NAVD88 threshold - the CAIP must consider adaptation measures for this facility. L4.C12
9. Consider and thoroughly evaluate the minor retreat inland concept mentioned in Table 19, but is not further discussed in the CAIP. L4.C6

10. Provide summaries of the information that was used to determine whether an adaptation strategy meets an evaluation criteria. L4.C7
11. Incorporate information documenting historic contamination along the corridor, and how site remediation may contribute to project constraints. L4.C8
12. The conceptual implementation plan should ensure the long-term and complete protection of the corridor by prioritizing long over short term adaptation strategies in the CAIP. L4.C9

II. Missed Opportunities in the Evaluation of Adaptation Strategies

A. Viaducts and other forms of accommodation provide substantial environmental benefits

The draft appropriately recognizes that the Eureka–Arcata Corridor sits within one of California's most climate-vulnerable estuarine environments and that Humboldt Bay is experiencing some of the fastest relative sea-level rise on the West Coast. The document also correctly identifies retreat, accommodation, and nature-based adaptation as important tools available to future decision makers. L4 C1,2

However, the final CAIP should place substantially greater emphasis on accommodation strategies, particularly viaducts, expanded hydraulic connectivity, and strategic tidal restoration, wherever feasible. The long-term goal should not simply be to keep Highway 101 above water. Instead, it should be to maintain transportation infrastructure while restoring the natural functions of Humboldt Bay and avoiding future environmental degradation.

The CAIP itself notes that much of the land east of the corridor was historically connected to Humboldt Bay through a network of tidal sloughs and wetlands. These areas were diked, drained, and disconnected from the bay over the past century, transforming former tidal marshes into agricultural and developed lands. Today, sea-level rise presents not only a threat but also an opportunity: the opportunity to reconnect portions of these former tidelands to the bay and restore ecological functions that have been lost for generations. Where feasible, viaducts represent the adaptation strategy most consistent with that opportunity.

Shoreline barriers can prevent the landward migration of tidal wetlands under sea-level rise, resulting in "coastal squeeze" and long-term loss of salt marsh and beach habitat.[1] Unlike raised embankments, viaducts allow water, sediment, fish, wildlife, and tidal processes to move beneath transportation infrastructure. The CAIP acknowledges that viaducts can restore hydraulic connectivity between historic tidal flats and Humboldt Bay, reduce wetland impacts through a smaller footprint, avoid coastal squeeze, and create opportunities for habitat restoration. These benefits are central to the long-term ecological future of Humboldt Bay.

[1] Leo, K.L., et al. (2019). "Coastal Habitat Squeeze: A Review of Adaptation Solutions for Saltmarsh, Mangrove and Beach Habitats." *Ocean & Coastal Management*.

In particular, viaducts could allow portions of currently diked or disconnected lands to transition back toward functioning tidal wetlands as sea levels rise. Over time, this would create opportunities for the expansion of salt marsh and eelgrass habitat, two of the most valuable ecosystems in Humboldt Bay. These habitats provide nursery grounds for fish, support migratory birds, improve water quality, sequester carbon, and help buffer shorelines from wave energy and flooding. Alternatively, the highway could be rerouted inland, allowing the Bay to naturally expand into areas that it once existed previously.

By contrast, raising Highway 101 primarily as a continuous embankment risks creating a larger and more permanent barrier between Humboldt Bay and adjacent low-lying lands. While embankments may be less expensive initially, they could lock the region into a future in which rising seas are trapped on one side of the highway while ecological systems decline on the other. Such an outcome would be inconsistent with the Coastal Act's directive to protect and enhance coastal resources and natural shoreline processes.

B. Hardening would cause significant environmental and economic impacts

The danger is not merely the loss of restoration opportunities. Hard barriers frequently create new environmental problems elsewhere. The draft CAIP correctly notes that shoreline armoring can become maladaptive and may contribute to habitat loss, beach loss, and increased erosion in adjacent areas. Shoreline armoring alters habitat distribution, ecological connectivity, productivity, and species assemblages across coastal ecosystems.[2] The same principle applies at a larger landscape scale. When water is prevented from occupying one area, it does not disappear—it is displaced. Floodwaters and tidal energy are redirected toward neighboring shorelines, wetlands, infrastructure, and communities. Armored shorelines can reflect wave energy, increasing nearshore erosion and sediment export in neighboring areas.[3] L4.C1

Therefore, a strategy that relies heavily on embankments, levees, or shoreline armoring may protect one location while increasing pressure elsewhere around the bay. Having sea waters that could have inundated agricultural and sparsely populated areas East of the 101 corridor instead inundate Eureka and Arcata is not a sustainable solution. Doing so could substantially increase the need for coastal armoring and protection of these more developed areas of Humboldt Bay at a significant cost. Of course, that armoring would then transfer sea level rise impacts to yet another area of the Bay, creating a race to the bottom that hurts all communities and ecosystems around the bay. As sea levels continue to rise throughout the century, these unintended consequences are likely to become more pronounced and more expensive to address. **The CAIP should take into account these indirect impacts associated with hard barriers along the Arcata-Eureka corridor when assessing the cost of project alternatives.** This should be explicitly referenced in the evaluation criteria.

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[2] Gittman, R.K., et al. (2018). "Generalizing Ecological Effects of Shoreline Armoring Across Soft Sediment Environments." *Estuaries and Coasts* 41(S1): 180–196

[3] Prosser, D.J., et al. (2018). "Impacts of Coastal Land Use and Shoreline Armoring on Estuarine Ecosystems: An Introduction to a Special Issue." *Estuaries and Coasts* 41(S1): 2–18.

Accommodation strategies avoid many of these problems because they work with natural processes rather than attempting to permanently resist them. Viaducts, larger bridge openings, hydraulic connections, breached dikes, living shorelines, or even rerouting the highway inland, can allow the bay to expand into suitable areas while preserving transportation functionality. They create flexibility for future conditions instead of requiring ever-larger barriers as sea levels rise.

The CAIP's multicriteria analysis found that adaptation strategies incorporating living shorelines, hydraulic connectivity, and viaducts generally performed best from an environmental perspective. **The final document should therefore more explicitly acknowledge that environmental performance must remain a primary consideration when selecting long-term adaptation pathways**. L4. C1, 2

This is particularly important because Humboldt Bay represents one of California's greatest opportunities for climate-resilient wetland restoration. Decisions made for the Highway 101 corridor will shape whether future sea-level rise results in the expansion of tidal habitat or the progressive degradation of the bay's ecological resources. The environmental benefits may not only be local but could also have broader benefits. The Coastal Commission's 2024 Sea Level Rise Adaptation Policy specifically states"[r]esearch has highlighted that nature-based adaptation strategies could also enhance climate adaptation through a variety of co-benefits, including increased carbon sequestration, urban cooling, and stormwater management (Buma et al., 2024)."[4]

Hardening causing groundwater level rise: A recent study found that shoreline barriers can amplify coastal groundwater hazards, exacerbating saltwater intrusion and emergence of groundwater.[5] Groundwater hazards can require pumping due to reduced soil drainage capacity, which can further increase salinity and degrade groundwater quality. The potential for pumping to lead to further intrusion can be especially problematic near contaminated sites such as the former lumber mill sites (Brainard and Bracut) and the Bracut Marsh, which was recently the subject of a U.S. EPA Brownfields Phase II Environmental Site Assessment and was found to be contaminated by legacy dioxins and furans as well as metals from former lumber mill activities.[6] Although increased contamination transport is listed as a potential threat under section 6.1.3 Groundwater Hazards - there is a lack of information in the CAIP about how that threat will be addressed.

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[4] California Coastal Commission. (2024). *Sea level rise policy guidance: 2024 adopted update*. State of California. https://documents.coastal.ca.gov/assets/slr/guidance/2024/2024AdoptedSLRPolicyGuidanceUpdate.pdf; Buma, B., Gordon, D.R., Kleisner, K.M. et al. 2024. Expert review of the science underlying nature-based climate solutions. Nature Climate Change. https://doi.org/10.1038/s41558-024- 01960-0.

[5] Su, X., K.M. Befus, and M.A. Hummel. 2024. "Shoreline Barriers May Amplify Coastal Groundwater Hazards with Sea-Level Rise." Scientific Reports 14:15559. https://www.nature.com/articles/s41598-024-66273-w

[6] GeoTracker. N.d. Bracut Marsh, 4065 US Highway 101, Eureka, CA. Regional Board Case #1NHU1005. https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T10000024381

Shoreline hardening can also alter tidal dynamics, elevating extreme water levels by as much as 10 cm for 1.5 m of sea level rise, whereas wetland restoration can reduce extreme water levels by as much as 20 cm.[7]

C. The CAIP fails to adequately consider costs in the cost comparison

The cost comparison presented in Section 7.7 should not be interpreted as a comprehensive economic comparison between viaduct and embankment alternatives. The draft acknowledges that several major categories of costs were excluded from the analysis, including environmental mitigation, long-term maintenance, permitting, and other project-related expenses. Most of these missing categories of cost would add cost to the embankment alternative and reduce cost for the viaduct alternative. **As a result, the conclusion that viaducts cost approximately six times more than embankments reflects a misleading comparison of initial construction costs rather than the full holistic analysis of costs imposed by each alternative.** L4.C10

First, the analysis does not account for the potentially substantial mitigation costs associated with embankment construction. Throughout the CAIP, viaducts are recognized as providing important environmental benefits, including restoration of hydraulic connectivity, reduced wetland impacts due to a smaller footprint, avoidance of coastal squeeze, and opportunities for salt marsh habitat creation. As discussed in the previous section, embankments create larger footprints, constrain tidal exchange, impede wetland migration, will have groundwater impacts, and other environmental impacts. These impacts will likely require compensatory mitigation under state and federal permitting requirements. The draft acknowledges that the mitigation value of viaducts is difficult to quantify at this stage, but that uncertainty should not be treated as zero. Excluding mitigation costs disproportionately favors embankments and understates the true cost difference between alternatives.

Second, the analysis does not account for indirect costs imposed on neighboring jurisdictions, landowners, and public agencies when embankments alter the movement and storage of floodwaters. An embankment functions as a barrier across the landscape. Water that would otherwise spread across historic floodplains or future tidal wetlands will be redirected elsewhere. This can increase flood elevations, erosion, drainage challenges, and infrastructure costs in adjacent areas, notably the cities of Eureka and Arcata. Those costs may ultimately be borne by local governments, resource agencies, landowners, and future adaptation projects rather than Caltrans. A complete economic analysis should evaluate whether embankment alternatives transfer flood-management costs to other parties and compare those costs against the greater hydraulic connectivity provided by viaducts.

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[7] Nederhoff, K., R. Saleh, P. L. Barnard, and M. Stacey. 2025. “Mitigating Flood Risks in Urban Estuaries: Tidal Dynamics, Shoreline Hardening, Nature-Based Solutions, and Floodgates in San Francisco Bay.” J. Waterway, Port, Coastal, Ocean Eng. 151(6): 04025031. https://ascelibrary.org/doi/epdf/10.1061/JWPED5.WWENG-2342

Third, the comparison does not evaluate long-term maintenance costs. The CAIP itself notes that viaducts are less susceptible to rutting, fatigue failure, and water infiltration impacts than earthen embankments. The document also states that drainage channel maintenance associated with viaducts would be "markedly reduced or non-existent." In contrast, embankments in a low-lying estuarine environment may require ongoing maintenance associated with settlement, drainage infrastructure, erosion protection, culverts, and adaptation to changing sea-level conditions. A project intended to function through 2100 should be evaluated using life-cycle costs rather than construction costs alone.

For these reasons, the cost comparison presented in Section 7.7 should be characterized as a preliminary capital-cost comparison rather than a comprehensive economic analysis. Before selecting long-term adaptation strategies, Caltrans should prepare a life-cycle cost assessment that includes environmental mitigation, long-term maintenance, permitting obligations, indirect flood impacts on neighboring jurisdictions, and ecosystem-service benefits associated with restored tidal habitat and hydraulic connectivity.

D. Evaluation Criteria Should be Weighted to Reflect Community Priorities L4.C11

The tool used to evaluate adaptation strategies has fourteen criteria, any of which can be weighted to 'reflect local priorities'. Of the fourteen evaluation criteria, only "cost" is weighted more heavily than others, which reflects the priorities of CalTrans - not the local community. While cost is an integral factor to consider when evaluating the feasibility of adaptation options, weighting only the cost criteria fails to adequately prioritize sustainability. According to the evaluation tool, there are three categories of criteria that make up sustainability: Society and Equity, Economy, and Environment. Cost falls under the Feasibility category - weighting only the "cost" criteria unfairly skews the evaluation away from sustainability.

The indirect impacts associated with shoreline hardening, environmental benefits of viaducts, and life cycle costs outlined in the above sections should be incorporated into the evaluation tool. Additionally, we recommend the following specific criteria receive higher weights:

- ECONOMIC
  - **(3) Maintain essential infrastructure or community assets**: "Strategies that protect essential infrastructure or community assets meet this criterion, while strategies that harm essential infrastructure or community assets do not." L4.C11
    - *The corridor currently shields critical infrastructure - natural gas, electricity, water, and waste water lines (see map on CAIP p. 48). Disruption of the services provided by this infrastructure could have cascading impacts throughout the region, thus this criteria should be weighted to reflect the reliance of our region on that infrastructure.*
- ENVIRONMENT
  - **(8) Environmental Performance**: "Strategies with no permanent negative impacts (temporary negative impacts are less than a year) or all final environmental impacts are beneficial meet this criterion, while strategies that result in numerous or extensive environmental impacts do not."

- *The Humboldt Bay community relies upon the estuary for food, income, and recreation. Weighting this criteria more heavily would result in an evaluation, and selection, of adaptation strategies better aligned with community values and priorities.*

In addition to these added weights, unintended negative consequences of an adaptation strategy should decrease the likelihood of that strategy meeting the criteria impacted by such consequences. For example, Cal Trans should explicitly recognize and account for the impacts from shoreline armoring and flood barriers, which often transfer flood and erosion impacts to neighboring areas, creating unintended environmental consequences and financial costs.

To truly reflect community priorities in the evaluation tool, CalTrans should seek community input on which criteria should be weighted heavier than others, and use that feedback to increase or decrease the weights of various criteria for the next iteration of the CAIP document. We recommend designing and deploying a short survey to gauge the public's priorities during the public workshop tentatively planned for the end of this year. L4.C11

E. What information contributed to determining if criteria were met?

CalTrans should share more information on the methodology behind the evaluation tool. L4.C7

For example, under criteria number 8 - Environmental Performance it is noted that, "strategies with no permanent negative impacts (temporary negative impacts are less than a year) or all final environmental impacts are beneficial meet this criterion, while strategies that result in numerous or extensive environmental impacts do not." (p. 146) Scientists and knowledgeable citizens could better contribute to the CAIP if CalTrans shares the information that was used to determine the extent of an environmental impact.

While Table 21 (starting on p.148) provides more detail on what each numerical score means for each criteria and Appendix F provides the final scores and criteria weight given to each adaptation strategy, more specific information is needed to demonstrate how CalTrans arrived at scores for each criteria and adaptation strategy. **We recommend an additional appendix to cover this topic.**

III. Evaluate Minor Retreat Inland Alternative

L4.C6

CalTrans should consider and thoroughly evaluate an alternative that involves relocating the highway midway between its current alignment and Old Arcata Road. This approach could have several advantages, including eliminating the need for shoreline hardening, elevating the corridor, and construction of living shorelines by converting mudflats and eelgrass habitat (which would require tremendous amounts of clean fill). It could also restore tidal influence to many acres of former tidelands, restoring large areas of saltmarsh and salmon-bearing stream habitat. This strategy also reduces traffic flow logistics, by producing less disruption to travelers on the existing roadway during construction. Most importantly, it would be a longer-term solution as

opposed to the raised embankment approach to “Protect” the highway, which would be an expensive, impactful, half-measure that would only last until 2050 or, at most, 2060.

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IV. Transportation

A. Safe and Separated Bicycle and Pedestrian Facilities

L4.C5

Safe and separated bicycle and pedestrian facilities must be included in any infrastructure adaptation to sea level rise in the corridor, whether raised embankments, raised roadways, or viaducts. The Humboldt Bay Trail currently provides a safe bike and pedestrian facility, but is also vulnerable to the effects of sea level rise. And while the trail is not technically within Caltrans right-of-way, it is part of the same transportation corridor, a fact recognized by the California Coastal Commission when permitting the Eureka-Arcata Corridor Improvement Project.

It is crucial for the CAIP to specify that each and every project which includes sea level rise adaptation as part of its design must include safe and separated bicycle and pedestrian facilities. As the CAIP notes, adaptation projects in the corridor are likely to be built piecemeal, rather than all at once, and each project is likely to have multiple objectives. In that context, project managers may not prioritize bicycle and pedestrian facilities, particularly if the Humboldt Bay Trail is still functional at the time of project construction and/or surrounding corridor segments do not yet have bicycle and pedestrian facilities. But in order to ensure complete bicycle and pedestrian facilities throughout the corridor as sea level rise progresses, each project must include them.

B. Planning for Future Transportation Volumes

L4.C5

The CAIP notes that traffic volume forecasts are based in part on population (p.112). However, traffic volumes need not be—and for the sake of reducing greenhouse gas emissions must not be—directly correlated with population. Rather, we know from the well-established principle of induced travel that traffic volumes respond to the infrastructure available, and projecting future traffic growth becomes a self-fulfilling prophecy if we build higher capacity highways to accommodate these projections. For this reason, it is critical not to overbuild future vehicular infrastructure and instead to prioritize better pedestrian, bicycle, and transit infrastructure to encourage greater use of these climate-friendly modes.

L4.C12

C. Elevation of the Indianola Undercrossing

The CAIP identifies facilities under 16 ft NAVD88 as requiring adaptation for sea level rise, and notes that the elevation of Indianola Road beneath the recently complete undercrossing is only 12.08 ft NAVD88. Yet because US-101 itself is not at risk from sea level here, due to being raised above Indianola Road, the segment of US-101 including the undercrossing is listed as not requiring any adaptation measures.

While Indianola Road may not be a Caltrans facility, the portion beneath US-101 is within Caltrans right-of-way and is at risk from sea level rise. It is an important vehicular connection to

US-101 and an important bicycle and pedestrian connection to the Humboldt Bay Trail, a crucial part of the Eureka-Arcata transportation corridor. The CAIP must consider adaptation measures for this facility.

V. Conceptual Implementation Plan

The Conceptual Implementation Plan (CIP) relies too heavily on the intermediate sea level rise scenario and short and mid-term adaptation strategies, failing to adequately plan and prioritize timely implementation of long-term strategies. The precautionary approach (defined by the Coastal Commission as using high and extreme projections for SLR) and the OPC SLR guidance recommend use of the intermediate-high and high scenarios for long-term planning. The CIP draft timeline initiates long-term strategies in 2060 - at that point the high scenario projection is already double the intermediate scenario. The actions of the current federal administration, impacts of seasonal cycles (i.e., El Niño), and record breaking King Tides in Humboldt Bay this past winter should all be taken under consideration when choosing which scenario and environmental triggers are used to develop this timeline. While the phased approach may be necessary due to project constraints, **the CIP should prioritize early planning of long-term solutions to avoid the continual band-aid application of short and mid-term strategies, and take on a stronger sense of urgency to respond to SLR.** L4.C9

CalTrans should not wait until after the implementation of the 12-foot grade raise via project 0M270 to "confirm the anticipated SLR pathway and refine the timing of future adaptation projects" (p. 158). The CAIP is the appropriate document to identify lon
The CIP notes that the timeline for long-term projects may shift according to the implementation of additional short or midterm measures that enhance the resilience of the corridor. Both of these offers for flexibility raise concerns of snowballing costs and lack of true long-term planning. Given current funding constraints, implementation of long-term strategies should be prioritized over short and midterm strategies, to limit the amount of funding needed to completely protect the corridor. Short term strategies like the raised embankment scored poorly overall

In the case that short or midterm measures are necessary, the timeline for planning and building long term measures should be *accelerated*, even if those short or midterm measures enhance corridor resilience. In this scenario, at a minimum, short and midterm measures that work in tandem with or enhance future long-term measures should be prioritized.
For example, breaching the levee at Fay Slough Wildlife Area would pair well with the long-term solution of building a viaduct - the levee breach could prevent tidal flood waters from overtopping the corridor, create saltwater marsh habitat and act as mitigation for the future viaduct. Additionally, living shorelines are identified as useful interim measures, but they should only be considered as mitigation or in tandem with other measures due to the current infeasibility of sourcing the clean fill necessary to build them.

As evidenced by the seven years between approval of CDP 1-18-1078, and the publication of this CAIP, planning alone can take years, and by the time long-term strategies are properly permitted, local communities could already face unsafe and or impossible travel through the

corridor. **CalTrans has an opportunity and obligation to plan the long-term and complete protection of the corridor by prioritizing long over short term adaptation strategies in the CAIP.**

VI. Addressing Historic Contamination

L4.C8

Throughout the CAIP, there are references to Brainard and Bracut Industrial Park, both of which are known contaminated sites adjacent to Highway 101. However, neither the CAIP nor the Technical Memo assessing groundwater hazards[8] include information on the soil and groundwater contamination from these former lumber mills, resulting in a major omission in the Groundwater Hazard Section (6.1.3). In the Coastal Commission staff report for the Humboldt Bay Trail South Coastal Development Permit, Special Conditions required that soil impacted with arsenic and lead in segments 4, 7, and 8, and soils impacted with dioxins in segment 5 shall be contained, handled, and properly disposed of in a manner that prevents discharge of contaminated soil and groundwater to the surrounding environment and that excess soil shall not be reused on site as fill material.[9] These segments are adjacent to the Brainard Lumber Mill nor the Bracut Industrial Park, neither of which have been the subject of Phase II Environmental Site Assessments to characterize the extent and magnitude of soil and groundwater contamination (Figure 1). Until site assessments have been completed, it is reasonable to assume that further contamination is present on both of these former lumber mill sites. The State Coastal Conservancy's Bracut Marsh property, immediately adjacent to Bracut Industrial Park, was the subject of a recent U.S. EPA Brownfields Phase II Environmental Site Assessment which found elevated dioxins and furans, arsenic, copper, and other metals in soil and groundwater in various locations (Figure 1).[10]

Increased contaminant transport is listed as a potential threat under section 6.1.3 Groundwater Hazards. In addition to an incomplete assessment of contaminated sites within and adjacent to the Area of Potential Effects, there is also a lack of information about how that threat will be addressed.

The CAIP must consider and address the potential for contaminants in soil and groundwater to be remobilized off-site, and how impacts to the aquatic ecosystems will be avoided during construction and as a result of any adaptation projects that are implemented. Contaminant assessment and remediation should be included in Chapter 4 - Constraints and Opportunities. Funding constraints and opportunities for site remediation should be included in the Funding subsection of this chapter.

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[8] Lang. M. 2025. "Technical Memo for the Comprehensive Adaptation and Implementation Plan: Groundwater Hazard Assessment." Cal Poly Humboldt, Arcata, CA. [See p. 21, Contaminated Sites in Project Area.]

[9] California Coastal Commission. 2022. Staff Report for CDP 1-20-0560 (Humboldt County DPW). https://documents.coastal.ca.gov/reports/2022/4/Th17a/Th17a-4-2022-report.pdf

[10] State Water Resources Control Board. 2026. GeoTracker: Bracut Marsh, Regional Board Case # 1NHU1005. https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T10000024381

L4.C13

We support the recommendations made by Cal Poly Humboldt in the vulnerability assessment to monitor the seasonal dynamics of groundwater elevation. Should CalTrans implement this recommendation, we request the resultant data be shared publicly as this could benefit regional sea level rise planning.

Sincerely,

Matt Simmons, Climate Attorney
Environmental Protection Information Center (EPIC)

Jennifer Kalt, Executive Director
Humboldt Waterkeeper

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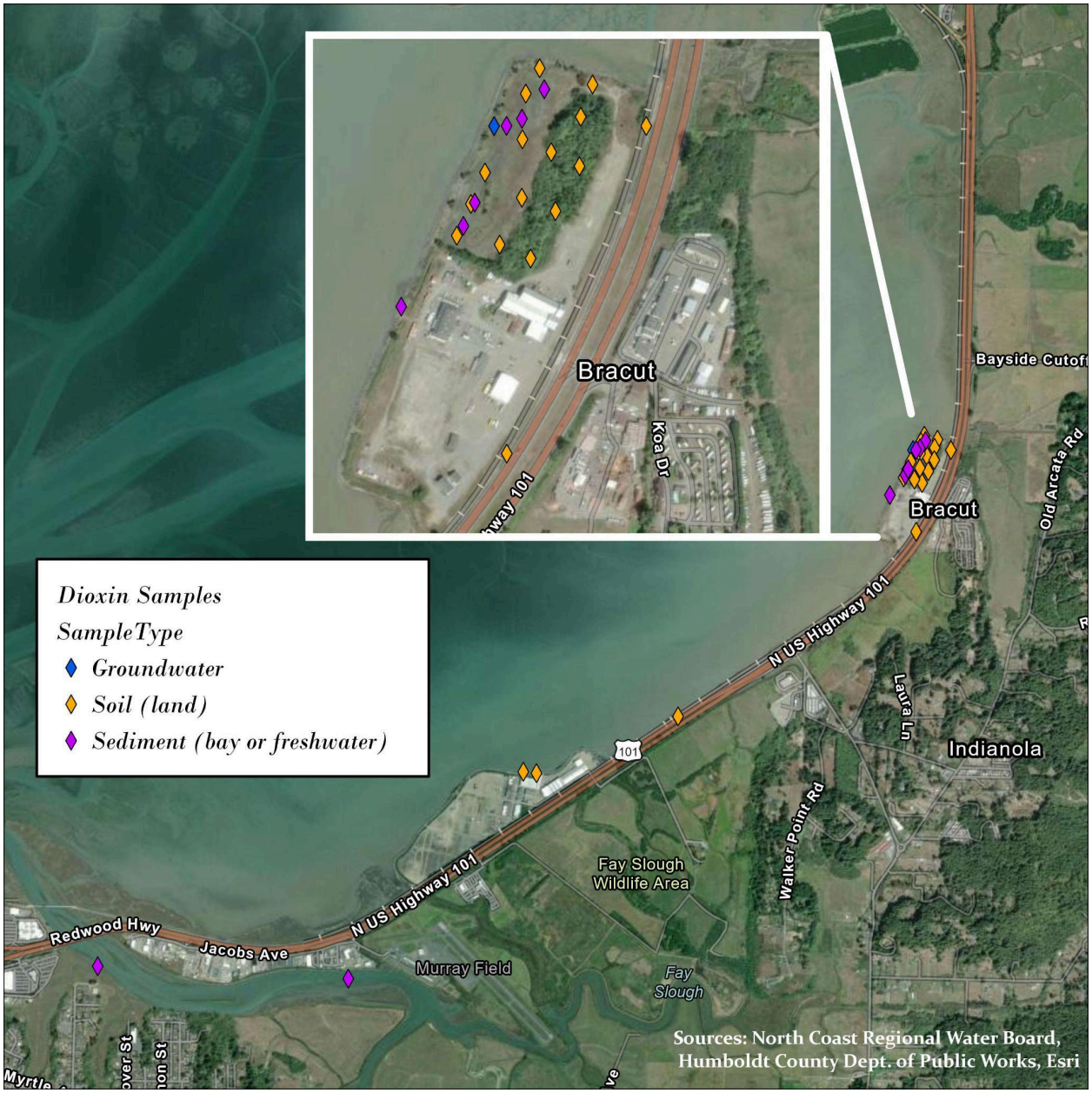
Figure 1. Dioxin contamination in groundwater, soil, and sediment at the Bracut Marsh, Bracut Industrial Park, and Humboldt Bay Trail South. Map by Humboldt Waterkeeper from publicly-available reports (see footnotes 9 and 10).



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Date: June 30, 2026

To: Lorna McFarland, Climate Change Adaptation Branch Supervisor, Caltrans - District 1
Roxanne Roberson, Environmental Scientist, Caltrans - District 1
Kaitlyn Woolling, Environmental Scientist/Hydrologist, Caltrans - District 1

From: Hank Seemann, Public Works Deputy-Director (Environmental Services), Humboldt County

Subject: Comments on May 2026 Draft Eureka-Arcata Route 101 Corridor Comprehensive Adaptation & Implementation Plan (CAIP)

The authors and contributors to the draft CAIP are to be commended for their effort and dedication to creating this document. The following comments are intended to be constructive for the CAIP and to support regional efforts to progressively advance the methods and approaches for flood vulnerability assessment and adaptation planning.

Page 11, Section 1

This section states that the purpose of the CAIP is to develop long-term strategies that address the anticipated impacts of climate change and coastal hazards along the Eureka-Arcata Route 101 Corridor. The first listed objective is to identify a suite of strategies to protect, relocate, or otherwise adapt the Corridor. L5.C1

Caltrans should consider identifying the fundamental elements of a strategy, or further explaining what type of strategies are presented in the draft CAIP. The draft CAIP appears to be limited to general conceptual strategies rather than specific strategies. An example of a report with more specific strategies is the Dumbarton Bridge West Approach + Adjacent Communities Resilience Study (June 2020). This document presents specific implementation strategies for three alternatives, which include strategy narratives, key features, key actions needed to implement the alternative, descriptions of ecosystem services, plan view schematics and typical sections, cost estimates, and project implementation phasing and timelines.

Page 26, Section 3.1

This section states that a Technical Advisory Committee (TAC) was established to provide guidance and feedback throughout development of the CAIP. Caltrans should consider summarizing how the TAC's input was incorporated into the CAIP. L5.C2

Page 32, Section 4.2

This section references the *Sea Level Rise Adaptation Plan for Transportation Infrastructure and Other Critical Resources in the Eureka Slough Hydrographic Area, Humboldt Bay* (March 31, 2021). However, the responsible agencies for the plan are improperly described. The County of Humboldt was the lead agency for this plan and also the grantee for an Adaptation Planning Grant administered by Caltrans. The L5.C3

plan was developed in collaboration with the City of Eureka and Humboldt County Association of Governments (HCAOG) who served as co-sponsors. While GHD, Inc. was one of the professional consultants that helped develop the plan, the plan should be referenced as a Humboldt County plan with the City of Eureka and HCAOG as co-sponsors.

Page 33, Section 4.2

This section mentions that the Humboldt Bay Trail provides protection to the Route 101 Corridor. Caltrans should consider identifying that the City of Eureka, City of Arcata, and County of Humboldt each developed portions of the Bay Trail over the last 15 years. Caltrans should consider describing how portions of the Bay Trail were specifically designed to mitigate immediate flood risks along the shoreline, which benefited the Route 101 Corridor (see also comment below for Section 5.2). Technical information for Humboldt Bay Trail South is available in the *Project Description Report* (September 2020) which describes the basis of design for the elevations of the trail corridor. L5.C4

Pages 37-38, Section 4.5

This section references the U.S. Army Corps of Engineers' National Levee Database and includes a map identifying levees around northern Humboldt Bay. The text states that the levees are "registered" with the Army Corps of Engineers, which is a vague and potentially misleading term because the National Levee Database does not have a registration process and the Army Corps of Engineers has not analyzed the levees with respect to any criteria. The National Levee Database simply identifies certain levees based on historical mapping and readily available documentation. To avoid confusion, Caltrans should consider using the term "identified" rather than "registered." It's important to note that the labeling for certain levees in the database is potentially misleading. Most of the levees identified as "Humboldt County levees" are not owned and maintained by the County as a public agency; the labeling appears to simply refer to their location being situated within the county. L5.C5

Page 52, Section 5.2

This section mentions that flooding on December 31, 2005, caused temporary closure of the Route 101 Corridor between Brainard and Bracut and notes that "Only one storm event has resulted in the closure of the Corridor." Caltrans should consider providing more historical context for flooding along the Corridor, how the flood exposure has changed over time due to interventions, and acknowledge the efforts by other entities to support reduction of flood hazards on the state highway. L5.C4

Prior to construction of the Bay Trail, the lowest elevation along the railroad grade between Brainard and Bracut was 9.6 feet NAVD88. The December 31, 2005 flooding event had a peak water surface elevation of 9.55 feet NAVD88 at the North Spit gage and there was likely at least one foot of wind setup along the eastern shoreline of Arcata Bay. Water from Humboldt Bay spilled over the railroad corridor and flooded Highway 101 because the water surface elevation was at least one foot higher than the railroad prism. The Bay Trail construction in 2024-2025 raised the railroad grade in that area to a minimum elevation of 11.5 feet NAVD88, which was the primary reason why Route 101 avoided any flooding from the bay during the extreme flooding in early January 2026, (which had a peak water surface elevation of 10.37 feet NAVD88. The absence of flooding on the Route 101 Corridor during the series of early January 2026 flood events demonstrated the tangible flood protection benefits to Route 101 from construction of the Bay Trail.

Page 71, Section 6.1.2

The CAIP should clarify the reference year for the sea level rise amounts listed in Table 11. L5.C6

Page 97-99, Section 6.1.5

Figure 41 depicts a conceptual diagram showing the elements of a vulnerability assessment, which includes assessment of risk. The draft CAIP defines risk as the combination of the probability of a hazard and the consequences of that hazard. However, the draft CAIP contains only a limited analysis of the consequences of flood conditions. For example, the draft CAIP establishes impact thresholds for specified parameters including the depth of water on highway travel lanes and shoulders and selects a water depth of 4 inches as the threshold for a severe condition. The document states, "Research indicates 4 inches is the depth at which passage of small vehicles is no longer considered safe (Maghsoodifar et al., 2025)." This statement is overly simplistic and does not, by itself, substantiate the selection of 4 inches of water as the threshold for a "severe condition." Caltrans should provide more relevant supporting evidence and/or justification for setting this threshold at 4 inches. L5.C7

Caltrans should consider performing a more robust risk assessment for flooding on the Corridor to provide thorough and defensible justification for the impact thresholds. Factors to consider include flood duration, water velocity, traffic volumes, typical speeds, options for operational changes such as reducing vehicle speeds, the level of damage to the asset, and the feasibility of repairs. Caltrans should consider adding one or more additional thresholds for higher levels of severity to provide a broader range of conditions for comparison and to provide a more complete risk assessment. For example, Caltrans should consider assessing the risks of 8 inches, 12 inches, and 24 inches of water on the roadway. L5.C8

Page 102, Section 6.1.5

The draft CAIP expresses exceedance probabilities in units of days per year and sets a threshold of 0.01 days per year as the threshold for the probability that constitutes unacceptable risk. This approach to expressing exceedance probabilities may have certain technical merits (by accounting for events occurring multiple times a year), but the units are not intuitive for understanding. It's difficult to understand what a small fraction of a day per year or event per year represents, or to have a sense of the difference between 0.01 days per year, 0.05 days per year, and 0.1 days per year. It would be very helpful to have more explanation of how exceedance probabilities in units of days per year or events per year relate to annual percent-chance. It would be helpful to create a table with columns showing the correspondence between annual percent-chance, days per year, and events per year for a range of frequencies at representative locations along the Corridor. L5.C9

Pages 114-115, Section 7

Caltrans should consider adding "Operational Changes" as a potential adaptation strategy. For example, implementing measures to induce motorists to drive at slower vehicle speeds through the corridor during low-magnitude, short-duration flood conditions. L5.C10

Page 117, Section 7.1

This section states that the "drawbacks" of incorporating soft protection measures along the Corridor are mainly logistical, referencing the need for permits and approvals and the uncertain availability of useable sediment. This description understates the significant challenges of these measures, which include funding, organizational capacity for project delivery, and the likely need for ongoing adaptive management. L5.C11

Page 151, Section 7.6.2

The draft CAIP presents a three-tier rating scale for various criteria to assess adaptation options. This approach is very simplified and the value for comparing options seems limited. L5.C12

Page 156-157, Section 8

This section states that raising the Bay Trail "could be implemented" as an interim measure to enhance short-term resilience for both the trail and the highway, and states that living shorelines "may also serve" as short- to mid-term adaptation strategies. However, the draft CAIP doesn't describe what role Caltrans envisions taking to implement these measures. The CAIP would be significantly improved by describing how Caltrans intends to advance and/or support these concepts and identifying specific actions that Caltrans can take. Without this content, the CAIP is limited to being primarily a repository of information rather than a truly strategic plan. L5.C13

Page 157, Section 8

This section states that the CAIP is a living document and will be updated to reflect the best available science, observed conditions, and funding considerations. The CAIP would be improved by providing more specific information related to future updates and addressing some natural questions, including: L5.C14

- Approximately when does Caltrans anticipate that an update may be needed? (5-10 years? 10-20 years? If certain thresholds are exceeded?)
- Approximately how much time and how much funding would be needed to update the CAIP? Would it be comparable to the original development, or less?

From: Wendy Ring
To: NCCA@DOT
Subject: Comment on CAIP
Date: Tuesday, June 30, 2026 4:47:41 PM

Thank you for the opportunity to comment on the CAIP.

As someone who has been working to promote climate action for the past thirteen years, I am glad to see CalTrans finally planning to address its impacts on our local highway but I am afraid that this planning exercise could turn into a repeat of CalTrans' attempts, as with approval of the Indianola overpass, to just get "a project" done and kick real longterm solutions down the road. While grade elevation and an embankment would be cheaper and more rapidly accomplished than viaducts over the most vulnerable road segments, the questionable benefits don't make sense in the face of the greater costs of delay and escalating construction costs for a real longterm solution.

The CAIP uses 2 points in time for its projections, 2050 and 2100. If the plan's 2050 projection of 0.82 feet RSLR along the corridor is accurate, then we have time, not to delay, but to avoid using stopgap projects to put off longer lasting solutions. In 2050 "The southbound and northbound lanes of the Corridor do not experience significant overtopping in terms of extent, depth or duration. For example, less than 150 ft of highway centerline is inundated at 0.82 ft of SLR even during the most extreme modeled event (i.e. C2 & Q100). Maximum flood depths remain shallow, with neither the northbound or southbound centerlines exceeding 0.16 ft (1.92 in) in any scenario. The duration of flooding last from 0 to 5 hours." (CalTrans, 2026).

Figures 44 and Table 17 provide more specific estimates of projected road surface flooding. Figure 44 shows projected road surface flooding over 4 inches from a 100 year storm on segment W 56 today (current lowest elevation 10.12 feet). With 4 inches stated as CalTrans safety limit requiring highway closure, this represents a risk of closure of 2 hours per year. This level of risk has undoubtedly been true for many years and, since actual road closure from flooding has only happened once in the history of the highway, it has been deemed an acceptable risk not requiring a major highway project. L6.C1

Tables 17 a and b show future projections for segment W 34, which mostly corresponds to Corridor Segment 4 in Chapter 7. This segment's current lowest elevation is 9.28 feet. It is the only segment in the corridor that has actually ever flooded enough to close the highway and it is vulnerable from overtopping both the railroad prism and dikes to its east, causing flooding from both sides of the road. It isn't clear what sea level elevation was used for 2030 in the Table 17 projections, since the most proximal scenario referenced in the document is 2050. Without raising the highway, the projected duration of closure for 4+ inches of flooding on W 34 in 2030 is 29 minutes per year. The projected closure time in 2050 is 2 hours per year, the same amount we already accept for segment W56. L6.C2

While Chapter 5 uses relative sea level rise projections based on hyperlocal measurements of subsidence in the North Bay part of Humboldt Bay (see Table 11) and Chapter 7 rates alternative options based on those projections with viaducts scoring highest even with cost being most heavily weighted, Chapter 8 reverts to the higher OPC relative sea level rise projections, with an intermediate scenario projection of 1.2 feet in 2050 and switches from considering a number of options to a plan for implementation of Project 0M270, which would raise the grade in the corridor's southbound lanes to 12 ft NAVD88. L6.C3

Project 0M270 is labelled in Figure 66 as a "non-CAIP project" and how this grade elevation fits with the earthen embankment alternative in the current planning process is unclear. Does it refer to the earthen embankments presented as one option in CAIP or would those embankments be added on top of the "non CAIP" grade elevation? Either way, the road closure predictions in Chapter 5 reveal no economic reason to go ahead with grade elevation as an interim measure. The cost of closing 101 in Humboldt was cited in CAIP planning documents as $2.7 million per day in 2030 dollars or $112,500 per hour. Using the above projections, the amount saved by raising the grade to prevent temporary highway closures between now and 2070 would be around $4.5 million. This is a very small gain compared with a construction cost of $35 million. L6.C4

CAIP's proposal for this most vulnerable Corridor Segment 4 is to install a salt marsh as living shoreline and wait to see what else might be needed at some undefined point in the future. After reading the design studies for the marsh project and learning more about salt marsh in Humboldt Bay, I believe that relying on a salt marsh built into the bay on top of soft mud, directly up against a rock armored railroad prism which allows no room for upland migration is not an appropriate temporizing measure for the most vulnerable segment of highway. Studies of sediment accretion in other marsh areas around the bay have shown that it is slower than the rate of relative sea level rise (USGS). This would especially be true for marsh between Bracut and Brainerd which is cut off from Fay Slough, its historic source of sediment. L5.C5

Between questionable ability to retain elevation necessary to support marsh plants and the obstruction to upland migration, the marsh's longevity and protective value against erosion would be limited. 0M270 should be set aside for this segment in favor of a viaduct and reconnection of Fay Slough to the bay underneath it, so that a living shoreline, whether newly built along the bay or restored inland on formerly diked tideland, receives adequate sediment and has room to migrate upland before being drowned by rising tides. Bike and pedestrian infrastructure separate from motor vehicles must be included or we are simply exacerbating the problem we're attempting to solve.

Consideration must be given to resilience not only to sea level rise, but also to other disasters. The CAIP affirms that a viaduct would be more resistant than an embankment to powerful storms, floods, earthquake liquefaction and tsunamis. Severing Humboldt from help in the event of these disasters would impair both emergency response and longterm recovery. L6.C6

Delaying a long term solution in favor of raising the grade or installing a short-lived living shoreline means that construction costs for a more definitive solution will increase substantially. From 2003 to 2017, the cost of highway construction in California increased 143% (TS, 2017). According to the FWHA national highway construction costs have rised 70% since 2020 (Pew, 2026). Other costs include the loss of urgency to develop a longterm solution so we are caught with our pants down (or our pant legs rolled up) if we don't act in time and the increasing difficulty of obtaining funding as costs rise and demands on the state to pay for climate disasters and adaptation needs escalate. Another round of planning down the road will also add years of delay. Planning for the Indianola overpass began in 2002 L6.C7

and construction was only completed this year.

Sea level rise is a significant threat but the revised and much lower rate of relative sea level rise in northeastern Humboldt Bay, compared with the more rapid rate at the North Jetty tide gauge, gives us more time than initially thought to do things right. Beginning with a viaduct to protect the corridor's most vulnerable segment should be the preferred approach and CalTrans' first priority for sea level rise adaptation in the Eureka Arcata corridor so that learning can take place as early as possible and be applied to planning for other vulnerable segments. L6. C8

One additional point of concern I have is whether the elevations of sea level which accompany El Nino have been accounted for in modeling. Waves and thermal expansion from a strong El Nino increase sea level elevations along the eastern Pacific by up to 2 feet for months. This was not mentioned in any modeling scenario descriptions. While it has long been thought that there is no connection between ENSO and climate change, recent research found a pattern of stronger El Ninos and La Ninas since 1960 and agreement predicting its continuation using multiple models (Hong, 2026). If El Nino SLR and its potential amplification hasn't been taken into account, then sea level rise projections should be revised to include it. L6.C9

Thanks for this chance to contribute my thoughts.

Sincerely, Wendy Ring

REFERENCES

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