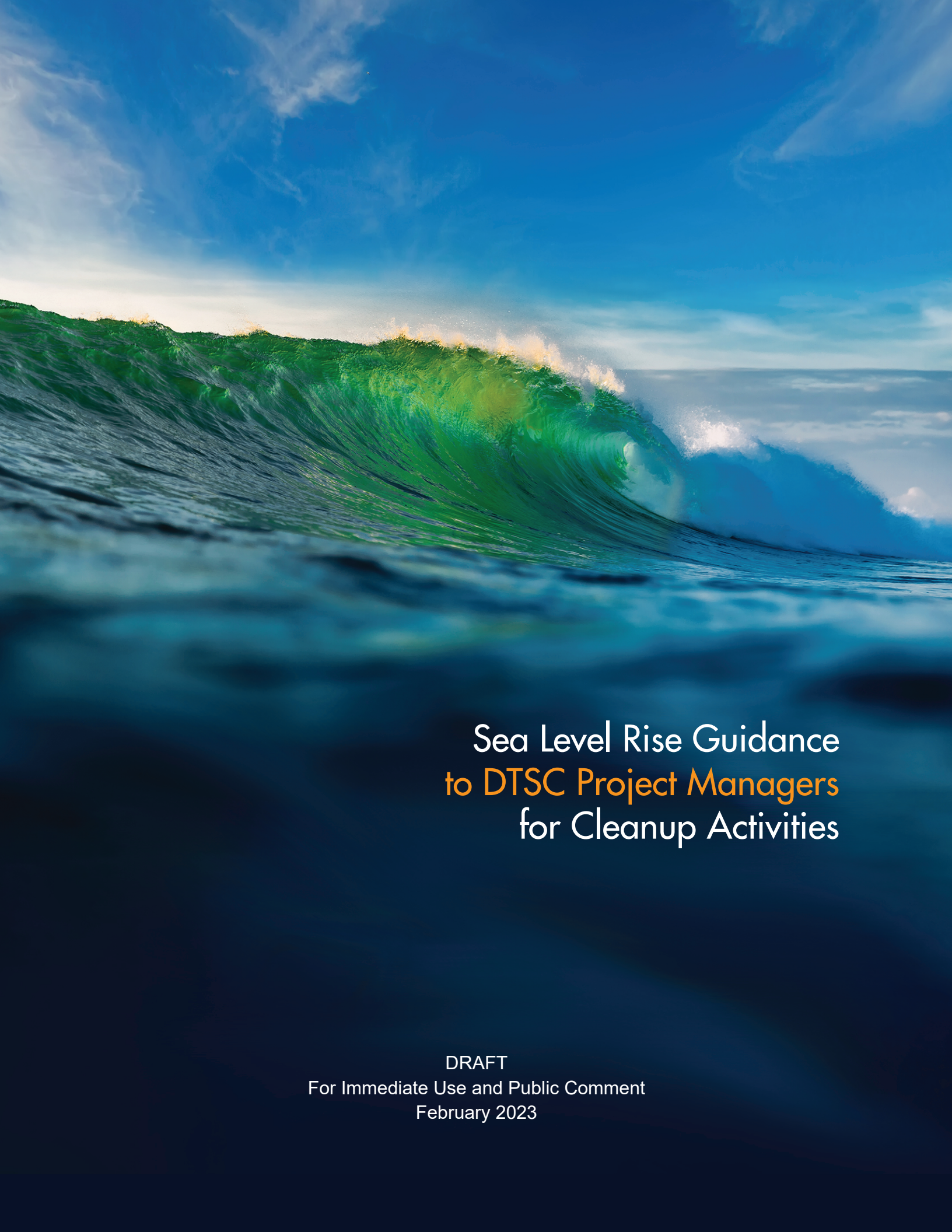

Sea Level Rise Guidance to DTSC Project Managers for Cleanup Activities

DRAFT
For Immediate Use and Public Comment
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PURPOSE

This document establishes guidance for DTSC Project Managers to evaluate sea level rise (SLR) during hazardous substance and hazardous waste cleanup pursuant to existing authority.

DTSC has been identified as the state lead agency for several key actions to prepare for and mitigate climate change impacts including SLR on contaminated sites. With climate changes occurring rapidly, DTSC is compelled to act to protect public health and the environment from possible detrimental effects of climate change on the protectiveness of cleanup decisions at contaminated sites. DTSC is charged with monitoring the best available science to address SLR as it relates to known or anticipated impacts on contaminated sites regulated by DTSC's Site Mitigation and Restoration Program (SMRP), and update or adjust based on new science as necessary.

Without proper protections and remedy resilience, SLR may adversely affect public health and degrade the environment through an increased presence or release of uncontrolled hazardous substances in surface water, ground water, air, soil, and sediment. This protection is at the core of DTSC's mission to protect California's people, communities, and environment from toxic substances, to enhance economic vitality by restoring contaminated land, and to compel manufacturers to make safer consumer products.

Climate change is causing SLR across California. SLR is an increase in the ocean's elevation, resulting from the thermal expansion of ocean water and melting of land ice. SLR is an ongoing phenomenon and is expected to continue for hundreds to thousands of years even with strong climate actions. SLR threatens human health and the environment because it can significantly alter hydraulic, geologic, hydrogeologic, and chemical conditions, exacerbate releases of hazardous substances and wastes, and affect the protectiveness of cleanup remedies. Therefore, continually SLR at varying rates are the new standard to which projects should be assessed particularly when considering projects with long lifespans such as remediation projects that must consider future conditions. This guidance: 1) provides information on sea level rise and related phenomena which can result in damage to remedies; 2) identifies DTSC's authority to address SLR during cleanup; and 3) mandates that project managers consider SLR and related phenomena in the remediation process. (List of Key Terms/Definitions is included at the end of the Guidance.)

SEA LEVEL RISE AND RELATED PHENOMENA

The *California Sea Level Rise Mitigation and Adaptation Act of 2021* (Act) requires state and regional agencies to identify, assess, and, to the extent feasible and consistent with their statutory authorities, avoid, minimize, and mitigate impacts of sea level rise. The Act created

the *California Sea Level Rise State and Regional Support Collaborative* within the Ocean Protection Council (OPC).

The OPC is implementing the Act through the Statewide Sea Level Rise Leadership Team (SLR Team), which comprises 17 state agencies, including DTSC. The SLR Team, which is led by OPC, developed the February 2022 *State Agency Sea-Level Rise Action Plan for California* (California SLR Action Plan)[1]. OPC released the California SLR Action Plan for public review on February 22, 2022 and finalized it on August 18, 2022. The California SLR Action Plan indicates:

> "SLR adaptation planning should include pathways to resiliency to 3.5' by 2050 and 6.0' by 2100. These numbers represent a set of consistent targets for the minimum of SLR planning and preparation. They demonstrate an elevated risk scenario that should be considered for long-term and large-scale planning but may not be applicable for every localized planning or project design. Best available science, such as the State Sea-Level Rise Guidance[2], should be consulted to determine which sea-level rise scenarios are most appropriate, which is context dependent. While the 3.5' and 6.0' targets may not be feasible for all situations, planners should consider adaptation pathways to this level of resiliency, as a way to prepare for all predicted SLR impacts. Critical infrastructure (highways, bridges, water treatment plants, etc.) should consider higher SLR scenarios, as appropriate, based on State Guidance. New and re-development in the coastal zone should utilize these targets as consistent minimum criteria for planning for the impacts of SLR. For clarification, the Delta is not considered part of the coastal zone because it is inland, and the Delta's hydrology is extremely complex."

The OPC is the state-recognized authority providing a science-based methodology for state and local governments to analyze and assess the risks associated with sea-level rise, and to incorporate sea-level rise into state decisions; DTSC relies on the guidance provided by OPC.

AUTHORITY TO ADDRESS SEA LEVEL RISE DURING CLEANUP PROCESS

DTSC has full authority under existing federal and state law to require sea level rise be addressed on cleanup projects. This section describes DTSC's authority to require consideration of sea level rise in the cleanup process, including during the five-year review. Consult with the DTSC Office of Legal Counsel for support in responding to any questions regarding authority.

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[1] State Agency Sea-Level Rise Action Plan for California, https://www.opc.ca.gov/webmaster/_media_library/2022/08/SLR-Action-Plan-2022-508.pdf

[2] State of California Sea-Level Rise Guidance, Ocean Protection Council, 2018 Update https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf

DTSC responds to and corrects releases or threatened releases of hazardous substances, hazardous wastes, and hazardous waste constituents to the environment in accordance with both state and federal law. DTSC typically addresses releases under two frameworks: 1) corrective action pursuant to the Hazardous Waste Control Act (HWCA, H.S.C. 25100 et seq.); and 2) response action pursuant to the Hazardous Substance Account Act (HSAA; H.S.C. 25300 et seq.). DTSC has authority under both frameworks to require corrective, remedial, or removal actions if there is a release and/or threatened release.

Federal law requires that corrective actions under the HWCA be no less protective than those under the federal Resource Conservation and Recovery Act (RCRA, 42 U.S.C. 6901 et seq.).

State law expressly requires that response actions under HSAA be based upon, and no less stringent than, those under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 U.S.C. 300.400 et seq.), among other areas of law.

Federal guidance notes that corrective or response action "substantively satisfy the requirements of both" CERCLA and hazardous waste frameworks.[3]

Regarding screening, the NCP explicitly describes criteria for use in screening of alternatives in Section 40 CFR 300.430 (e) (7). This paragraph states that "As appropriate, and to the extent sufficient information is available, the short- and long-term aspects of the following three criteria shall be used to guide the development and screening of remedial alternatives:" (i) Effectiveness, (ii) Implementability, and (iii) Cost.

Regarding selection of remedies, in 40 CFR 300.430 (e)(9), the NCP provides the nine criteria (e.g., permanence, protectiveness) for fully evaluating remedies.

Note that these statutes, regulations, and guidance provide the context, bases, and authority for determinations that each remedial decision is protective under both current and anticipated future site conditions[4]. This includes the consideration of future site conditions due to sea level rise.

The NCP requires five-year reviews (FYRs) per 40 CFR 300.430(f)(4)(ii). The FYRs apply to sites for which a remedy has already been selected. The FYR would apply to SLR. The FYR needs to

[3] U.S. EPA memorandum regarding Coordination between RCRA Corrective Action and Closure and CERCLA Site Activities (#EC-G-2002-008), https://www.epa.gov/sites/default/files/2013-10/documents/rcracorraction-mem.pdf#page=6&zoom=100,0,76, page 2.

[4] Future site conditions include those conditions anticipated due to sea level rise.

assess the impacts of SLR on the remedy to determine whether the remedy remains protective based on impacts to the remedy and habitat changes due to SLR.

USEPA presents a similar analysis of the applicability of the statutory authorities in its memorandum dated June 30, 2021, *Consideration of Climate Resilience in the Superfund Cleanup Process for Non- Federal National Priorities List Sites*. USEPA concludes "Consideration of climate resilience should not be treated as a new criterion under 40 CFR 300.430(e)(9)(iii))." It is clear that DTSC has the authority to require sea level rise be addressed in the cleanup process.

CONSIDERING SEA-LEVEL RISE DURING CLEANUP PROJECT LIFECYCLE

SLR Vulnerability Assessment

SLR has the potential to significantly impact wastes at a site by causing groundwater levels to rise, by inundation, and by the subsequent deterioration of the remedy and mobilization of contaminants. For all projects, SLR should be addressed[5]. A SLR Vulnerability Assessment (SLRVA) should be conducted at each stage of the remediation process to specifically evaluate the resilience of the wastes and remedy at the site to future SLR impacts.

The SLRVA may be a standalone document or be incorporated into other submittals, as determined by the DTSC Project Manager. The degree of complexity of the SLRVA may vary, depending on the circumstances. For example, a simple and focused analysis would be performed for a site where it is unclear whether SLR is an impact. Progressively more robust analyses may be required based on results of the evaluation.

The SLRVA may include consideration of community resilience infrastructure and plans.

Adaptation Plan

Based on the SLRVA, an adaptation plan may be required. For purposes of adaptation planning, the remedy or action should be evaluated to determine adaptive capacity.

[5] For projects that are clearly not affected by SLR, the applicability and impact of SLR can be a statement to that effect in the relevant document submitted for DTSC review.

While DTSC prefers full action taken now to address future impacts, DTSC will consider a phased adaptation approach on a case-by-case basis[6]. Any phased construction of a remedy must include 30 years of protection against SLR.

The adaptation plan may be a standalone document or be incorporated into other submittals, as determined by the DTSC Project Manager.

SLR Evaluation Through the Remedial Process

For all projects, SLR should be addressed[7]. The SLR evaluation for each remedy phase includes[8]:

- Up through Remedial Investigation: Integrate current and projected SLR and shallow groundwater rise impacts into risk assessments and the conceptual site model.
- Feasibility Study: Identify and analyze resilience for each remedial alternative based on current and projected SLR impacts. Note that alternatives which include land use restrictions should ensure the restrictions take into consideration SLR impacts.
- Remedy Selection: The remedy should be protective under current conditions and future impacts due to SLR.
- Remedial Design: Incorporate engineered resilience measures into the remedy design. The design should incorporate the latest science and reflect the salient information regarding SLR at the site.
- Remedial Action: Ensure the remedial action implementation incorporates design elements to address SLR.
- Cost Estimate: Include a cost estimate in each SLRVA submittal describing the estimated cost of the proposed remedial actions in a manner consistent with Section 22CCR 66264.142.
- Determination that Remedy is Operational and Functional: Prior to determining that the remedy is Operational and Functional, evaluate the remedy performance under current and future SLR conditions. In some cases, this may require evaluation to ensure modifications are identified and implemented at sites before determining the remedy is Operational and Functional.
- Operation Maintenance & Monitoring (OM&M): SLR should be addressed when establishing the requirements for remedy OM&M, and within any OM&M agreement

[6] Any future phased work requires financial assurance as described later in this document.
[7] For projects that are clearly not affected by SLR, the applicability and impact of SLR can be a statement to that effect, in the salient document submitted for DTSC review.
[8] The scope of SLRVA analyses by remedy phase are discussed in more detail later in this policy. Key definitions are provided at the end of the document.

(#EO-93-036-MM)[9]. During OM&M, evaluate remedy performance and monitoring systems under current and future SLR conditions, and any necessary modifications.

- Five Year Review (FYR): If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above those levels required for unlimited use and unrestricted exposure, DTSC reviews the remedial action no less often than every five years after initiation of the selected remedial action. This will include a review of updates to SLR modeling and projections provided in OPC SLR Guidance in a 5-year cycle to evaluate the potential impact to project design.
- Other Protectiveness Determination: When new information arises that appears to affect the protectiveness of the remedy due to SLR, regardless of whether five years have elapsed since remediation began or since the prior FYR, a Protectiveness Determination should be initiated which includes an updated SLRVA. The Protectiveness Determination is equivalent to a FYR.

Note that FYRs and other protectiveness determinations should include updates to the SLRVA, where needed.

Should a remedy be determined to no longer be protective given the current or future SLR scenarios, DTSC should take necessary action to protect public health and the environment (e.g., Remedial Action Plan Amendment, Removal Action Workplan Amendment, Explanation of Significant Differences, OM&M plan modification, minor changes documented appropriately, etc.).

Financial Assurance

Financial assurance (H.S.C. 25355.2 and 22 C.C.R. 66265.140 et seq.) needs to reflect the net present worth of the full scope of the remedy, including anticipated changes in remedy infrastructure and changes in remedy operations and maintenance[10]. Pursuant to State law and federal guidance, financial assurance is calculated on a minimum of 30 years. SLR may result in significant expenses well beyond 30 years; when calculating costs, sites should use a time horizon from remedy implementation through Completion Certification of Site Remediation, or equivalent, and revise these cost estimates periodically at the time of the 5-year review.

[9] Operation and Maintenance Enforceable Agreement, https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/07/eo-93-036-mm.pdf

[10] Note that there is a preference for full action to address SLR at the time of initial remedy implementation, rather than adaptation plans that accommodate future significant actions.

DTSC Review of Sea Level Rise Vulnerability Analyses (SLRVAs)

Upon receipt of a SLRVA, the PM submits work requests to Engineering Services (ES), Geological Services Branch (GSB) and the Human and Ecological Risk Office (HERO). Initially, the SLRVA is anticipated to be a high-level review of site components to determine vulnerabilities and a screening of possible SLR scenarios using publicly available tools to identify specific SLR threats. The initial SLRVA should be based on the California SLR Work Plan recommendation to assess pathways to resiliency to 3.5 feet of SLR by 2050 and 6.0 feet by 2100. Technical support staff advise whether a more robust SLRVA is warranted. If so, the PM should inform the RP, project proponent, or contractor (for orphan sites) that a more robust SLRVA is required. SLRVAs should be signed and stamped by the appropriately registered professional as applicable.

Accepted SLRVAs are to be placed in the site file and made accessible to the public on EnviroStor immediately upon finalization.

The SLRVA includes a detailed review of site components and site-level SLR impacts, including SLR modeling when appropriate. Variations from the 3.5 feet in 2050 and 6.0 feet in 2100 are appropriate in cases where more intense (higher) SLR may occur during the period when waste or contamination remains at the site (See Figure 1). Variations may be appropriate in other circumstances also. The SLRVA should consider current or planned site and community infrastructure, the extent to which site and remedy analyses incorporated SLR prediction, the type of contamination, the structure of the waste at the site, and the remedy phase.

Transparency/Public Engagement

Effective planning for SLR involves collaboration among various agencies within coastal city and county governing bodies, special districts, state agencies, federal agencies, climate researchers, non-governmental organizations, business owners and other stakeholders. For DTSC sites identified as vulnerable to SLR, DTSC PMs should work with relevant state and local government agencies and communities to transparently develop pathways of adaptation that will help maintain the protectiveness of contaminated sites in their communities. DTSC plans to prioritize vulnerable communities for assessing potential SLR-impacts, as well as, developing and implementing plans and strategies to mitigate site-specific impacts.

Project managers will ensure transparency and public engagement for SLR issues. Project managers should work to assure that SLR is addressed appropriately in all technical reports, remedy selection documents, and fact sheets. All approved SLRVAs should be posted promptly to the publicly available EnviroStor database to assure public access to the analysis and underlying information.

Equity

DTSC aims to prioritize the allocation of resources to address contaminated sites vulnerable to SLR in communities overburdened with pollution. DTSC will integrate planning requirements, priorities, and standards from tribal and local SLR adaptation and resilience plans within contaminated site-specific cleanup decisions for sites vulnerable to SLR.

SLRVAs and adaptation plans are integral to preparing for SLR. Plans should: highlight the vulnerabilities of natural and human resources and the impacts of SLR; adequately consider the priority and phasing of actions and strategies; develop project implementation strategies and ensure active community engagement processes that strive for equity across racial/social lines by implementing appropriate, targeted strategies[11].

APPLYING BEST AVAILABLE SCIENCE TO SEA LEVEL RISE EVALUATIONS

The California Ocean Protection Council (OPC) is the State's recognized authority for sea level rise projections. Consistent with the California Sea Level Rise Mitigation and Adaptation Act of 2021 (P.R.C. 30970 et seq.), DTSC relies on the 2018 OPC and California Natural Resources Agency's "State of California Sea-Level Rise Guidance Document," as updated (the "OPC Guidance"), or other OPC guidance and information as it comes available. DTSC considers OPC guidance the "best available science" for procedural matters related to sea level rise evaluation.[12] The flowchart provided at the end of this guidance (Figure 1) will aid PMs in deciding how to complete SLRVAs.

OPC's California SLR Work Plan provides that, statewide, "SLR adaptation planning should include pathways to resiliency to 3.5 feet by 2050 and 6.0 feet by 2100." To ensure remedy resilience, SLRVAs should, at a minimum, evaluate projects based on sea level rise of 3.5 feet by 2050, and 6.0 feet by 2100. These consistent targets, identified by OPC, may be revised as climate change science evolves.

For sites that appear to be negatively impacted given the target SLR estimates, a more refined analysis may be appropriate. Responsible Parties can refine an initial SLRVA to more precisely model the impacts of SLR on their remedy, and the impacts of the remaining contamination on the environment in the predicted SLR conditions.

[11] State Agency Sea-Level Rise Action Plan for California, https://www.opc.ca.gov/webmaster/_media_library/2022/08/SLR-Action-Plan-2022-508.pdf

[12] 2018 OPC Guidance - https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf

The OPC Guidance presents multiple potential sea level rise risk aversion projection tables for each of 12 locations along the coast, from San Diego to Crescent City. Each table presents three possible projections for each near-term decade through 2050. For the decades from 2060 to 2150, each table presents five possible projections. Responsible Parties can refine an initial SLRVA to more precisely model the impacts of SLR on their remedy, and the impacts of the remaining contamination on the environment in the predicted SLR conditions. For that purpose, RPs can rely on the Medium-High Risk Aversion/High Emissions probabilistic projections[7] for the timeframe appropriate to the remedy. Note that the analysis should continue to use the OPC consistent targets, unless the probabilistic projection is more impactful (e.g., the probabilistic projection of SLR is more than 3.5 feet in 2050 or 6 feet in 2100)[13].

OPC Guidance can be supplemented by other available site-specific information (e.g., on-site groundwater monitoring well or surface water monitoring data representing current conditions) or regional guidance (e.g., regional inundation models endorsed by local, State, or federal agencies). As currently written, OPC Guidance provides a five-step process to evaluate SLR risk and decisions. This policy recommends that a refined SLRVA follow this process, or any updated OPC Guidance process, to the extent practicable:

Step 1: Identify the nearest tide gauge. See Appendix 2 of the OPC Guidance, which currently references 12 tide gauges along the California coast from Crescent City (northernmost) to San Diego (southernmost). Select the nearest tidal gauge to the site and proceed to Step 2.

Step 2: Evaluate the project lifespan. Existing time horizons of SLR projections are to year 2150. Cleanup remedy lifespans range from a limited number of years to perpetuity, based on site-specific OM&M requirements. As such, at this step, DTSC staff should screen out sites where, within 100 years from the time of the evaluation, the maximum available predicted sea level rise projection in OPC Guidance, irrespective of probability/risk-aversion, is unlikely to result in any observable SLR-caused hydrogeologic changes to the site[14]. However, at sites that are expected to experience any observable SLR-caused hydrogeologic change within 100 years at the maximum available projection, select a project lifespan that is consistent with the projected timeframe for remedy completion but no less than 30 years from the end of implementation[15].

[13] The selection of time frame would be based on factors such as time anticipated to achieve site cleanup goals.
[14] Note that DTSC is adhering to the consistent targets established by OPC in the statewide work plan of 3.5 feet in 2050 and 6 feet in 2100. Any site where contamination will remain in place at those timeframes should consider the impacts of these levels of SLR at a minimum, regardless of the predicted SLR from OPC Guidance or other scientific resources.
[15] Note that the time horizon, SLR projections, and the projected lifespan of the cleanup project are updated at each FYR to assure use of best available science at the time of the protectiveness determination.

<u>Step 3</u>: For the nearest tide gauge and lifespan, identify the appropriate table of relevant SLR projections. See Appendix 3 of the OPC Guidance.

DTSC is taking the position that all sites with contamination left in place above residential standards, should be resilient to the targets established in the OPC Work Plan (3.5 feet in 2050 and 6.0 feet in 2100) OR to the medium-high risk aversion scientifically predicted SLR. Note that the higher of these alternatives should be used in the analysis. For sites where there are extreme consequences should the contamination left in place come into contact with sea level rise (e.g., reactive waste presence), the analysis should utilize the extreme risk aversion (H++) predicted SLR. Again, the higher of these predictions and the targets established in the OPC Work Plan should be used to determine appropriate resiliency measures.

<u>Step 4</u>: Evaluate potential impacts and adaptive capacity across a range of SLR projections and emissions scenarios. The available SLR projections correspond with four different probabilities, one non-probabilistic scenario, and three categories of risk-aversion (low, medium-high, and extreme). As part of this step, SLR projections should consider a baseline scenario using a maximum probability of 1-in-200 chance (medium-high risk aversion) and minimum time horizons of 30 years[16].[17] DTSC will not be considering a range of SLR projections and emissions scenarios, other than to use the higher of the consistent targets and the medium-high risk aversion scenario. PMs are to use the extreme risk aversion (H++) predicted SLR for those sites with uniquely problematic contamination remaining in place (e.g., water-reactive waste) or "critical infrastructure" as defined by California OPC.

Evaluation of "potential impacts" and "adaptive capacity," both before and after remedy selection, should consider, for example, king tides, storm surge, expected community-wide

[16] Note that the SLR projections used for site planning should, at a minimum, meet the consistent targets for the minimum of SLR planning and preparation provided in the California SLR Work Plan using the timeframes appropriate for the site. The consistent targets from the California SLR Work Plan are 3.5 feet by 2050 and 6.0 feet by 2100.

[17] Note that the approach of allowing for selection of a broader variety of risk aversion scenarios was considered. By using one risk aversion scenario (and ensuring conformance with the California SLR Work Plan "consistent targets"), the variable characteristics of the site can then be considered in the vulnerability assessment. For example, the mobility of contaminants, presence/ absence of receptors, degree of hazard/ risk posed by contaminants, are evaluated in the context of sea level rise impacts, rather than being potentially prematurely discounted in the selection of the risk aversion scenario. This approach provides a more robust analysis of otherwise low-risk sites, providing DTSC and the public a more thorough understanding of the site risk from SLR. Attempting to adjust the risk aversion scenario based on the site conditions in advance of such an analysis, precludes the scientific approach necessary to understand the risk posed by the site. This is not intended to preclude DTSC from requiring analysis of a site in the highest risk aversion scenario, however. For example, sites with highly hazardous contamination that remains in place permanently, may warrant evaluation in that scenario. The DTSC Project Manager in coordination with ES, GSB, and HERO, would make the determination regarding whether the more conservation risk aversion scenario is warranted.

infrastructure, changes to site hydrogeology, implications for administrative controls, and impacts to exposure pathways.

Existing community-wide infrastructure might include a third-party levee, or a community-wide climate adaptation plan that includes future infrastructure investments. Where remedies would rely on existing infrastructure, responsible parties (RPs) should demonstrate that this existing infrastructure would be adequately planned, funded, and maintained, indefinitely.

Expected changes to site hydrogeology might include impacts such as remobilization of residual contamination based on SLR-induced changes to a site's hydrogeologic regime.

Expected implications for site administrative controls might include the need to amend land use covenants to accommodate future remedial features, land use changes, groundwater use, ownership changes, and OM&M and financial assurance burdens.

Expected impacts to exposure pathways evaluated in human health and ecological risk assessments might include new/future exposure scenarios for human and ecological receptors owing to new environmental media and contaminant behavior. Risk assessors might consider such phenomena as changes to groundwater geochemistry and hydraulics including the likelihood of saltwater intrusion; surface water inundation; groundwater surface expression; and increased contaminant transport by diffusion and advection; as well as indirect risks, such as exacerbation of vapor intrusion potential.

Step 5: Select SLR projections based on risk tolerance and, if necessary, develop adaptation pathways that increase resiliency to SLR and include contingency plans if projections are exceeded. Unless otherwise indicated[18], sites requiring full SLRVAs should be evaluated based on the Medium-High Risk Aversion/High Emissions probabilistic projections through 2150, or for a shorter or longer time if appropriate. Note that remedies are intended to remain protective of human health and the environment under all foreseeable conditions.

For sites where the remedy has not yet been selected:

If the SLRVA identifies any potential material threat to the remedy, then the remedy selection, design, and OM&M should include mitigative measures to entirely avoid impacts. It is DTSC's preference for mitigative measures to be incorporated into the remedy. DTSC may consider the option of adaptive management measures (to allow for iterative changes in the face of

[18] Indications that would influence the selection of the SLR projection include community-wide infrastructure plans and associated land-use and SLR assumptions utilized for those plans. Also, note that the SLR projection should, at a minimum, meet the consistent targets for the minimum of SLR planning and preparation provided in the California SLR Work Plan – 3.5 feet by 2050 and 6.0 feet by 2100.

uncertainty) in limited circumstances. Note that Financial Assurance is required for all actions pending at a site, including potential future adaptations.

Mitigative measures might be as simple as installing riprap to protect against erosion or be as intensive as glassification of hazardous substances to reduce their toxicity and mobility or installation of sea walls, levees, or caps. Adaptive measures would need to be consistent with land use designations. The reliance of any contingent remedies on existing infrastructure (e.g., levee, sea wall), should be accounted for in remedy selection, design, OM&M, and financial assurance.

The vulnerability of remedial system components including associated site infrastructure must be assessed to identify whether the long-term integrity of a selected remedy may be impaired by adverse effects of SLR. Based on any potential vulnerability identified, methods should be incorporated to increase the systems resilience to SLR and its associated phenomena and ensure continued protectiveness of human health and environment.

For sites where the remedy has already been selected:

The remedy may require revision upon completion of the five-year review or upon introduction of new information that raises significant questions regarding protectiveness. Any changes to remedial decision documents will occur through the post remedy decision document modification process such as outlined in the NCP, which may warrant or require public involvement. Depending on the scale and scope of change needed, the change may be documented by way of a Technical Memorandum of Non-significant Change to File, Explanation of Significant Differences (ESD), or Amendment to the remedial decision document.

Key terms/definition:

Adaptation: adjustment or preparation of natural or human systems to a new or changing environment which moderates harm or exploits beneficial opportunities.

Adaptive capacity: the ability of a system to adjust to SLR to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

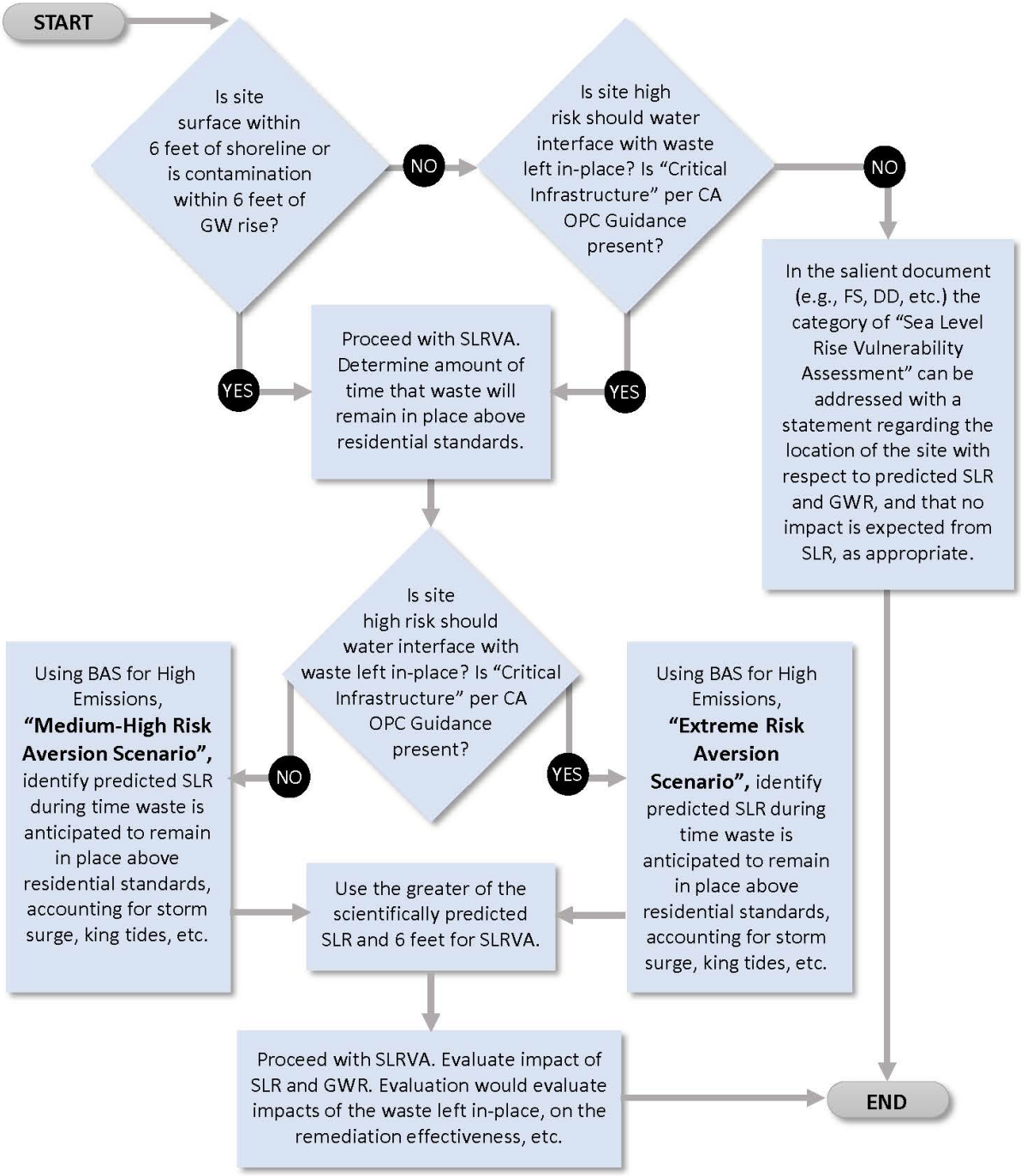
Resilience: a capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to human health and the environment.

Vulnerability: the degree to which a system is susceptible to, or unable to cope with, adverse effects of SLR; it is a function of the character, magnitude, and rate of climate variation to which a system is exposed; its sensitivity; and its adaptive capacity.

GUIDANCE UPDATE

This draft final guidance will be updated in response to public input, and for purposes of process improvement at approximately one year after initial release. The guidance will be updated periodically as the science and OPC guidance evolves.

DTSC SEA LEVEL RISE GUIDANCE, ATTACHMENT 1



Notes:

1) This flowchart applies to projects at the stages of feasibility study, proposed remedial alternatives, remedy selection, and protectiveness determination.
2) DTSC has a preference for removal of contamination for sites in locations likely to be impacted by SLR. Mitigating factors include immobile contaminants, low risk contaminants, lack of completed exposure pathway should SLR inundate or groundwater rise to interface with contamination, etc.

Acronyms:

BAS	Best Available Science
DD	Decision Document
FS	Feasibility Study
GWR	Groundwater Rise
SLR	Sea Level Rise
SLRVA	Sea Level Rise Vulnerability Assessment