CALIFORNIA COASTAL COMMISSION
455 MARKET STREET, SUITE 300
SAN FRANCISCO, CA 94105-2421
VOICE (415) 904-5200
WEB: WWW.COASTAL.CA.GOV

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Final Draft Nature-Based Adaptation Strategies Guidance

February 24, 2026

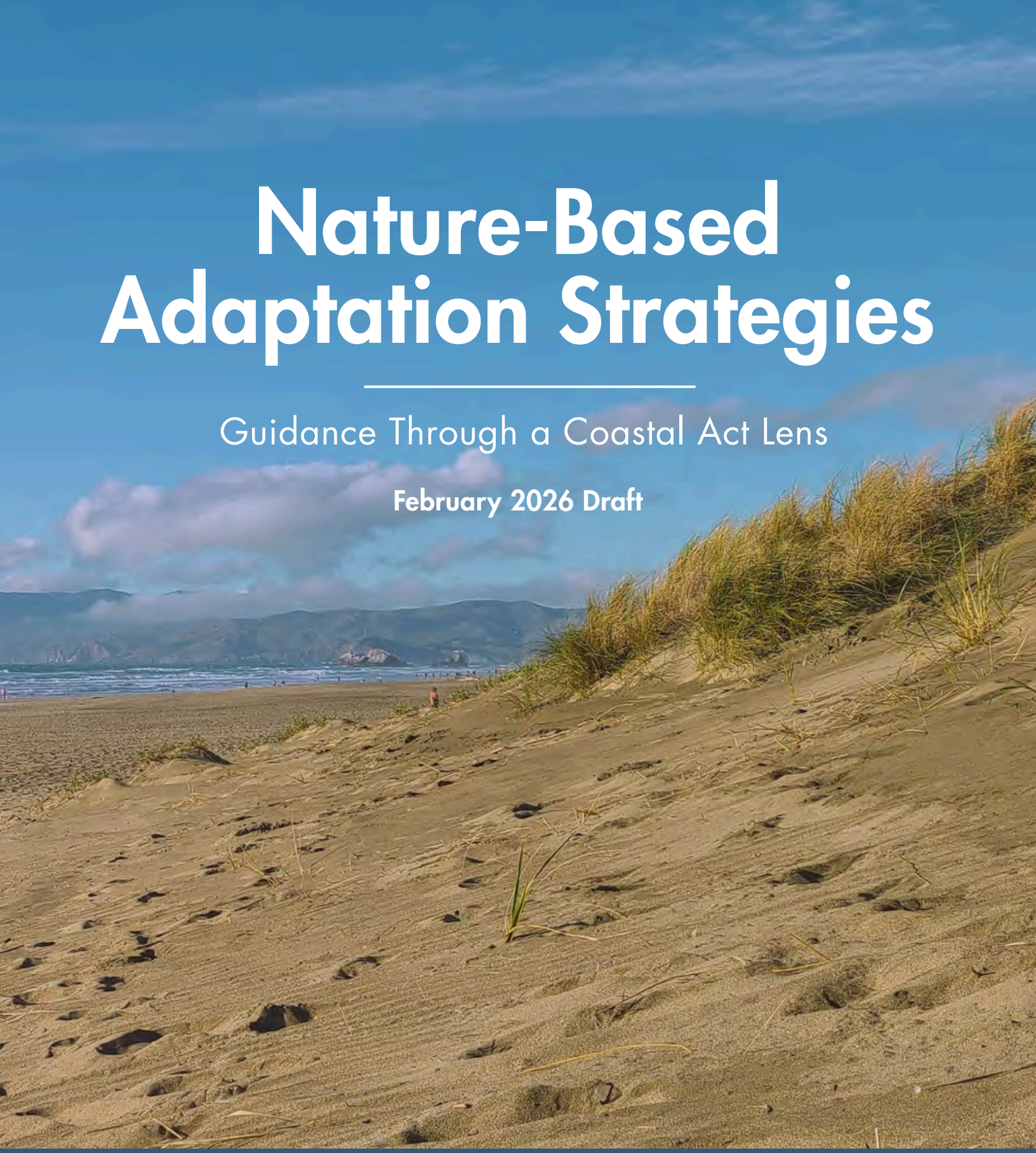
EXHIBITS

Exhibit 1 – Final Draft Nature-Based Adaptation Strategies Guidance

Nature-Based Adaptation Strategies

Guidance Through a Coastal Act Lens

February 2026 Draft



CALIFORNIA COASTAL COMMISSION

Contents

Cover photo: Ocean Beach, San Francisco, Karen Vu

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I. Introduction

The effects of increased global greenhouse gases and associated extreme weather events, including flooding, drought, extreme heat, and wildfires are widely documented and have adversely impacted wildlife, habitats, infrastructure, and people's livelihoods in California. In particular, the impacts of sea level rise are affecting California's coast through more extensive storm surge flooding, tidal flooding, fluvial flooding, groundwater rise, and increased coastal erosion rates (Griggs *et al*., 2017). Further, sea level rise will compound these impacts during extreme storm events. Absent any preparatory action, an increase in sea level may have serious implications for coastal resources, development, and communities.

The Ocean Protection Council's (OPC) 2024 State Sea Level Rise Guidance details the latest sea level rise science for California. The OPC Guidance projects a rise in statewide sea levels of 0.8 feet (under the intermediate scenario) by 2050. By 2100, statewide average sea level rise is expected to be between 1.6 to 3.1 feet (intermediate-low to intermediate scenario) with a potential for upwards of 6.6 feet (high scenario). Further, as described in the National Oceanic and Atmospheric Administration's (NOAA) 2022 Sea Level Rise Technical Report, "moderate" (typically damaging) flooding is expected to occur, on average, more than 10 times as often in 2050 as it does today, which may be intensified by local factors. With a 1,270-mile coastline, adequately planning for sea level rise in California is a challenging and vital task.

Advancing sea level rise adaptation planning is a central goal of the California Coastal Commission in fulfilling its mandate to protect, conserve, restore, and enhance the state's coastal resources under the Coastal Act. The Coastal Commission has long integrated considerations about sea level rise and coastal hazards like erosion, flooding, and wave runup into its regulatory and planning programs. In 2021, the Coastal Act was amended to explicitly require the Coastal Commission to "take into account the effects of sea level rise in coastal resources planning and management policies and activities in order to identify, assess, and, to the extent feasible, avoid and mitigate the adverse effects of sea level rise" (Coastal Act § 30270).

The Commission's Sea Level Rise Policy Guidance (2024) details a variety of adaptation options to consider when planning for sea level rise, including nature-based adaptation strategies. These strategies capitalize on the natural ability of coastal ecosystems to protect coastlines from hazards while also providing benefits such as habitat enhancement, recreation and scenic resource preservation, water quality improvements, and carbon sequestration and storage. Nature-based adaptation strategies are increasingly being recognized as resilient practices to address sea level rise impacts that can respond to, adjust to, and withstand changing conditions while minimizing disruptions to communities and natural resources. To this end, the Commission is encouraging local governments and asset managers to prioritize nature-based adaptation strategies with measurable environmental benefits over strategies that have adverse coastal resource impacts such as traditional shoreline protective devices. **This document provides a set of principles that will guide the Commission on future permitting and planning actions related to nature-based adaptation strategies. It also discusses various permitting**

pathways for nature-based adaptation strategies, how these projects may be analyzed in the context of the Coastal Act, and other key considerations and topics that should be addressed when designing and implementing such projects. This document complements other Commission-adopted guidance and recommendations, including the Commission's Sea Level Rise Policy Guidance, Critical Infrastructure Guidance, and the Public Trust Guiding Principles and Action Plan. It is intended for use by the Commission, local governments, and others subject to the Coastal Act to improve resiliency throughout the coastal zone.

What is a nature-based adaptation strategy?

A variety of agencies and organizations have developed definitions for nature-based adaptation strategies, but in many cases these definitions do not align with or reflect contexts relevant to California's coast. For example, several of these existing definitions refer to nature-based adaptation strategies as a solution mainly for sheltered, lower-energy coastal areas; contain ambiguous explanations of what materials constitute "natural" building elements; or suggest that the ecological importance of a nature-based adaptation strategy is secondary to its role in protection of coastal development. As such, the Commission has developed the following terms and categories to describe nature-based adaptation strategies in various Commission documents. As used here, the term, "nature-based adaptation strategy" is intended to encompass other synonymous terms, including "living shorelines", "green infrastructure", and "nature-based solutions." As used here, "hybrid armoring" also encompasses the term "gray-green infrastructure."

A nature-based adaptation strategy is:

> *A coastal adaptation and/or erosion control method that is comprised of natural or mostly natural elements, which contributes to the persistence and enhancement of coastal processes and ecological benefits while also protecting inshore areas.*

The Commission also recognizes that nature-based adaptation strategies can be further categorized along a spectrum between:

(1) *Soft Strategies, which avoid fixing the shoreline with hard structures and instead use dynamic systems to attenuate coastal hazards, such as dune or wetland restoration, and,*

(2) *Hybrid Armoring, which combines fixing the shoreline, such as with a buried revetment or other shoreline protective device, with a nature-based feature to provide ecological and other benefits.*

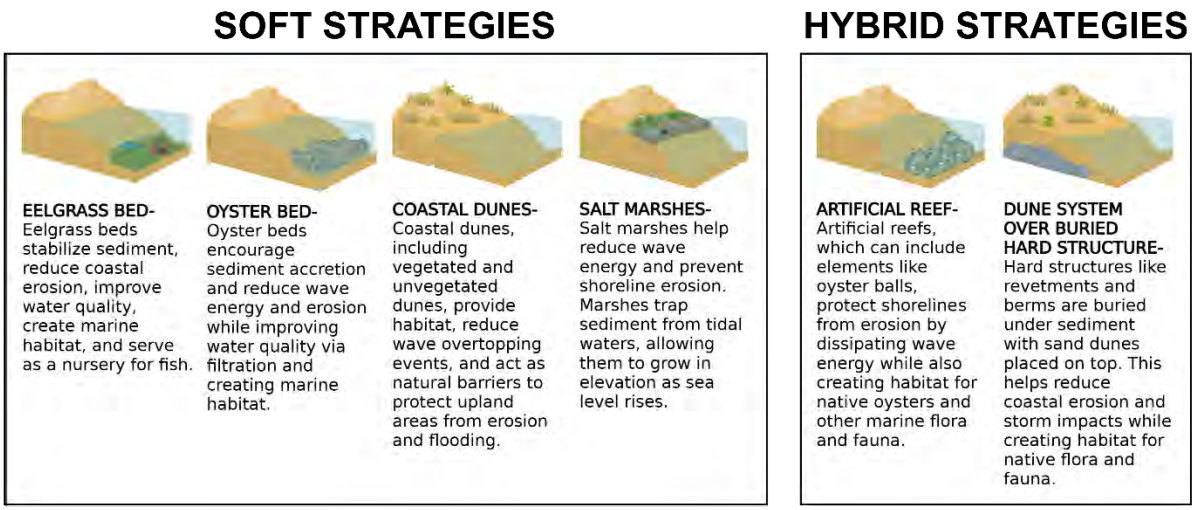

Figure 1. A subset of common types of nature-based adaptation strategies including soft solutions and hybrid armoring structures. (Graphic by Sydney Schmitter)

II. Guiding Principles for Nature-Based Adaptation Strategies

The following statements are intended to provide a set of principles that will guide the Coastal Commission's policy direction and recommendations on carefully designed, context-appropriate nature-based adaptation strategies.

1) The Coastal Commission recognizes that nature-based adaptation strategies can be more resilient to coastal hazards than traditional armoring.

Shoreline protective devices have been implemented as traditional responses to flooding and coastal erosion. Often referred to as "hard" or "gray" armoring techniques, they include seawalls, revetments, breakwaters, groins, retaining walls, and bulkheads which are installed to prevent coastal erosion and protect buildings, other development, and coastal communities (Nordstrom, 2013). However, these structures interfere with sediment transport, interrupt natural bluff erosion and beach formation processes, and redirect wave action. The disruption of these processes can lead to negative effects like habitat loss and decreased coastal access and recreation space. For example, shoreline protective devices can prevent beaches, wetlands, dunes, and other habitats from migrating inland with sea level rise, leading to a "coastal squeeze" in which these habitats become narrower and eventually disappear. Shoreline protective devices can also deflect or concentrate coastal hazard impacts at adjacent, unarmored areas. Further, their effectiveness in protecting onshore resources will likely wane as sea levels rise, and their impacts and maintenance costs are likely to increase.

Nature-based adaptation strategies are among the many important tools to consider in protecting infrastructure and building resilience to coastal hazards, including as may be exacerbated by sea level rise in the future. When thoughtfully planned, designed, and constructed, nature-based adaptation strategies may also have several environmental benefits and support several provisions of the Coastal Act. For instance, they may help in preserving and enhancing coastal habitats, enhancing biodiversity, improving access and recreation, maintaining marine resources and water quality, and sequestering and storing carbon. Given the range of coastal hazards and impacts that currently occur on California's coast, and the uncertainties surrounding the amount of sea level rise expected within this century, the Commission therefore encourages considering a variety of adaptation strategies—including nature based-adaptation—to address these impacts.

2) The Coastal Commission is supportive of the implementation of nature-based adaptation strategies in line with state actions.

Several state actions and initiatives call for the protection, restoration, and stewardship of the State's lands and waters, habitats, and biodiversity, as discussed in more detail below. The Coastal Commission has supported a variety of these efforts. For example, the Commission consulted on the development of Assembly Bill 72 (Petrie-Norris, 2021) that requires the California Natural Resources Agency (CNRA) to establish a coordinated and efficient regulatory review and permitting process between appropriate agencies for coastal adaptation projects that use natural infrastructure. The Commission also reports to the CNRA on agency actions and decisions that help advance the State's 30x30 goal mandated under Executive Order N-82-20 and Senate Bill 337 (Min, 2023), which directs the State to conserve 30% of California's lands and coastal waters by 2030. Further, the Commission continues to participate in CNRA's Cutting Green Tape Initiative, including through efforts to facilitate implementation of nature-based adaptation strategies.

Within the Commission's own work, various guidance materials call for the prioritization and consideration of nature-based adaptation strategies, including Principle 12 of the Sea Level Rise Policy Guidance,[1] Principle 10 of the Public Trust Guiding Principles and Action Plan,[2] and within Chapter 4 of the Critical Infrastructure Guidance.[3] The Commission will continue to support the implementation of nature-based adaptation strategies along the coast consistent with these state actions and as consistent with the Coastal Act.

[1] Principle 12 of the Sea Level Rise Policy Guidance calls for "maximizing natural shoreline values and processes; avoiding expansion and minimize the perpetuation of shoreline armoring."

[2] Principle 10 of the Public Trust Guidance Principles and Action Plan calls for "encouraging the use of nature-based adaptation strategies can better support Public Trust uses and values."

[3] Chapter 4 of the Critical Infrastructure Guidance includes a section detailing how to consider nature-based adaptation strategies in critical infrastructure development projects.

3) Nature-based adaptation strategies can support Coastal Act goals to protect coastal resources.

When carefully planned, nature-based adaptation strategies can support several provisions of the Coastal Act. In many circumstances, these strategies are designed to provide habitat preservation and/or enhancement, access to the shore and waterways, recreational opportunities, and protection of coastal development, consistent with Coastal Act goals. By using natural elements, nature-based adaptation strategies ideally seek to mimic and enhance natural systems and processes to address erosion and other related hazards while at the same time supporting the ecological benefits provided by natural habitats. In encouraging the use of nature-based adaptation solutions, the Coastal Commission can continue to carry out its duty to protect public interests on the coast while helping coastal communities remain resilient to sea level rise.

4) The Coastal Commission is committed to meaningful coordination and consultation with state agency partners, local governments, tribal communities, and members of the public to advance permitting of nature-based adaptation strategies.

Planning and permitting for widespread sea level rise adaptation will require extensive coordination and consultation with various stakeholders throughout the state. The Commission will continue to engage with state agencies including the California State Lands Commission, the State Coastal Conservancy, Caltrans, California State Parks, and the State Water Resources Control Board to discuss specific projects, information gaps, and agency roles as they relate to permitting nature-based adaptation strategies. The Commission will also maintain routine coordination with local governments through both the Local Government Working Group and staff-to-staff coordination to support sea level rise adaptation planning efforts through technical and policy guidance, funding, efficient permit coordination, and other means. The Commission will consult with tribal communities on nature-based adaptation projects in line with the Commission's Tribal Consultation Policy to ensure protection of tribal cultural resources. Lastly, the Commission is committed to engaging with members of the public, including community group representatives, through monthly stakeholder calls with the Commission's Executive Director.

5) The Coastal Commission encourages planning for and implementing nature-based adaptation strategies as part of a holistic, proactive adaptation approach.

Adapting to sea level rise in a manner that ensures protection of coastal resources and communities requires a shift from reacting to coastal hazards events as they occur to proactively identifying and implementing adaptation strategies that reflect varied contexts across the coastline and are able to respond to changing conditions over time. Nature-based adaptation strategies can be an important component of such planning

efforts. Historic parcel-by-parcel hazard responses have led to a mix of coastal hazard protection approaches that make holistic and effective mitigation and protection of coastal resources a challenge for local governments and the Coastal Commission. Identifying adaptation approaches for wider sections of coastline, which the Commission has encouraged as part of recent planning efforts, would support the implementation and effectiveness of nature-based adaptation strategies that would typically be infeasible for a single property owner or project proponent. Nature-based adaptation strategies may also be an important component of phased adaptation approaches, particularly in the short- to medium-term. Phased adaptation should include consideration of how a variety of nature-based adaptation projects can fit in with other site-specific and regional resiliency efforts to employ a more holistic planning approach. The Commission encourages local governments to adopt specific Local Coastal Program (LCP) policies that prioritize implementation of such projects and approaches. Further, this type of adaptation planning and LCP update work is consistent with Senate Bill 272 (Laird, 2023), which requires local governments to develop sea level rise adaptation plans that, among other things, identify adaptation projects as part of new or updated LCPs.

III. Federal and State Initiatives Prioritizing Nature-Based Adaptation Strategies

Several federal agencies and initiatives emphasize the need for and value of nature-based adaptation strategies through their roles as regulators, technical advisors, and funding sources for research and projects. For example, NOAA provides technical assistance on nature-based adaptation project design and siting, funds pilot projects to develop shoreline stabilization techniques, and conducts biological research to evaluate living shoreline types through the Habitat Blueprint program. NOAA's Office for Coastal Management also administers the National Estuarine Research Reserve System (NERRS) Science Collaborative grant program that promotes and funds research science including nature-based adaptation strategies. In 2018, the NERRS Science Collaborative funded research published in A Manual for Re-Engineering Living Shorelines to Halt Erosion and Restore Coastal Habitat in High-Energy Environments that considers the effectiveness of innovative living shoreline designs in high boat wake and wave energy environments; a study of the impacts of large-scale breakwaters on shoreline vegetation; and a study of the efficacy of living shoreline designs that couple breakwaters (referred to as breakwalls in the report) and oyster restoration structures in protecting coastal estuarine ecosystems and their services along energetic shorelines.

In 2018, the Federal Highway Administration (FHWA) published a White Paper: Nature-Based Solutions for Coastal Highway Resilience as an incremental step toward developing an implementation guide for using nature-based solutions to improve the resilience of coastal highways to extreme events and sea level rise. The White Paper notes that nature-based solutions have not often been used within the transportation sector, and encourages their use by providing examples of nature-based solutions and highlighting the research that evaluates

their performance. In 2019, the FHWA followed up on its white paper by publishing the Implementation Guide: Nature-Based Solutions for Coastal Highway Resilience. The Implementation Guide was designed to help transportation practitioners understand how and where nature-based and hybrid solutions can be used to improve the resilience of coastal roads and bridges. It also provides guidance on how to consider nature-based solutions in the planning process, how to conduct a site assessment to determine whether nature-based solutions are appropriate, key engineering and ecological design considerations, permitting approaches, construction considerations, and monitoring and maintenance strategies.

The U.S. Army Corps of Engineers (USACE) adopted Nationwide Permit 54 (NWP 54), which creates a streamlined general permit process for living shoreline projects that are expected to have minimal environmental impacts and meet certain criteria, in 2017. In California, the State Water Resources Control Board has certified NWP 54, which allows it to issue expedited permits for activities covered by NWP 54.[4] And in 2021, USACE issued International Guidelines on Natural and Nature-Based Features for Flood Risk Management. The purpose of the guidelines is to inform and encourage the use of natural systems and functions to support flood risk management. The term "natural and nature-based features" is defined in the guidelines as the use of landscape features to produce flood risk management benefits.

The State of California also recognizes the important value of nature-based adaptation strategies and the variety of benefits that it can provide in addition to shoreline protection. Executive Order N-82-20 outlines a comprehensive and results-oriented agenda to expand nature-based adaptation strategies across California to meet the State's goals. Specifically, it identifies priority nature-based solutions to deliver benefits across all of California's diverse landscapes and guides State programs and investments. The Executive Order also sets a goal of conserving at least 30% of the State's lands and coastal waters by 2030. State agency plans that have been developed in response to Executive Order N-82-20 further prioritize and support the implementation of nature-based strategies as a pathway that can enhance carbon storage and carbon sequestration potential. And similarly, Assembly Bill 1757 (Garcia, 2022) requires state agencies to set carbon sequestration targets on natural and working lands, including through the use of nature-based adaptation strategies such as wetland restoration.

Assembly Bill 72 (Petrie-Norris), signed into law in 2021, requires the CNRA to establish a more coordinated and efficient regulatory review and permitting process for coastal adaptation projects that use natural infrastructure. This bill defines the term "coastal adaptation projects that use natural infrastructure" as "development, as defined in Section 30106 of the Coastal Act, that relies on natural ecological systems or processes to reduce vulnerability […] while increasing the long-term adaptive capacity of coastal and inland areas by perpetuating or restoring ecosystem services." The bill further contains definitions and terminology that are consistent with the Commission's nature-based adaptation strategies terminology described

[4] State Water Resources Control Board. (2021, March 15.) *General Order for Clean Water Act Section 401 Water Quality Certification Action, Order No. 2020-0039-EXEC*. https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/2020/generalorder.pdf.

above, including soft strategies and hybrid armoring. The goals and priorities of these various bills are recorded in the State's statutorily required adaptation strategy framework (Assembly Bill 1482, Gordon, 2015) which documents adaptation solutions that are among California's many resilience programs and efforts.

Lastly, the State's Fourth Climate Change Assessment (2018) includes a number of supporting studies and reports focusing on nature-based adaptation, including Toward Natural Shoreline Infrastructure to Manage Shoreline Change in California, which provides technical guidance on how to implement various types of natural shoreline infrastructure, and Case Studies of Natural Shoreline Infrastructure in Coastal California that describes useful examples to coastal planners and local governments interested in learning more about these strategies. The San Francisco Estuary Institute (SFEI) and the San Francisco Bay Area Planning and Urban Research Association (SPUR) published the San Francisco Bay Shoreline Adaptation Atlas which provides a science-based framework for where different nature-based adaptation strategies are appropriate along different shoreline typologies in the San Francisco Bay. Finally, several State programs and agencies fund research and projects related to nature-based adaptation strategies including the California State Coastal Conservancy and the OPC.

Consistent with the mandates provided by the governor's orders, legislation, and other efforts described above, the Coastal Commission recognizes that nature-based adaptation strategies can generally provide a resilient approach compared to hard shoreline armoring and prioritizes the implementation of such projects along the coast. The Commission's Sea Level Rise Policy Guidance and Critical Infrastructure Guidance both advocate for and encourage the use of nature-based adaptation strategies as a preferred adaptation alternative to traditional shoreline protective devices. In many ways, nature-based adaptation strategies can support Coastal Act goals to protect coastal resources. However, the science on best practices for implementation of nature-based adaptation strategies is evolving, so careful consideration of a project's purpose, design, construction, and monitoring is critical to avoid adverse impacts to coastal resources. The following sections provide information on the Coastal Development Permit and Local Coastal Program processes as well as pathways to prioritizing nature-based adaptation strategies in the context of the Coastal Act and other key considerations.

IV. Nature-Based Adaptation Strategies in a Coastal Commission Context

A. Coastal Commission Permitting Processes

The Commission has a variety of permitting pathways for development projects, including de minimis waivers, administrative Coastal Development Permits (CDPs), and standard CDPs. The section below discusses three main pathways through which nature-based adaptation strategies could be authorized. The goal of this section is to provide project applicants with information

about the Commission's permitting procedures in an effort to inform a more predictable and efficient review process for nature-based adaptation strategies.[5]

Each process begins with the submission of the same CDP application form, but the scope and level of detail provided in the accompanying supporting materials and information (which, along with the application form, make up the application) varies across each pathway. When Commission staff receive and review an application, they will coordinate directly with the applicant regarding the most appropriate and efficient permitting process. Part of this coordination is to help ensure that opportunities for new and innovative nature-based adaptation strategies are thoroughly reviewed and prioritized.

i. De Minimis Waivers

Coastal Act Section 30624.7 allows the Commission's Executive Director to grant de minimis waivers from CDP requirements for development that the Director determines involves no potential for any adverse effect, either individually or cumulatively, on coastal resources and that will be consistent with the policies of Chapter 3 of the Coastal Act.[6] Local governments that have a de minimis waiver provision in their certified LCP may also issue a de minimis waiver for non-appealable development that has no potential for any individual or cumulative adverse effect on coastal resources and that is consistent with all policies and provisions of the certified LCP.[7] The Commission's waiver process provides an opportunity for expedited review for development that does not require any special conditions to bring the project into conformance with the relevant Coastal Act standard.

Waivers may be processed significantly faster than permits because the development is minor in nature, and the project will not be subject to special conditions since there is no potential to adversely impact coastal resources. Issuance of waivers also does not require a public hearing, although waivers do not become effective until after they are reported to the Commission (or relevant local government decision-making body) and the Commission (or local government body) has a chance to object. Additionally, the fee for waivers is significantly lower than for other Commission approvals, and processing a permit as a waiver could significantly streamline nature-based adaptation project approvals.

[5] It is important to note that since nature-based adaptation strategies are an evolving area of study, the Commission has processed relatively few nature-based adaptation projects to date. As more projects come before the Commission, this Guidance may be updated to account for future decisions and other key considerations.

[6] See 14 Cal. Code Regs §§ 13238 - 13238.2 for Commission regulations that provide procedures for processing de minimis waivers.

[7] Because de minimis waivers may not be issued by local governments for projects in the Commission's appeals jurisdiction, including for projects within 300 feet of the inland extent of a beach, the mean high tide line, or the top of the seaward face of a coastal bluff (see Coastal Act § 30603(a)(1), (2)), it is likely that few nature-based adaptation projects along the shoreline will be able to obtain locally-issued waivers.

The Commission has used the de minimis waiver process to authorize a few nature-based adaptation projects to date.[8] These projects were all soft strategies and included beach and dune restoration and creation, and eelgrass habitat restoration. These projects were implemented with the aim to restore habitat, reduce erosion, build resilience, and serve as pilot projects to inform future nature-based adaptation efforts. In the rationale that resulted in the approval of these projects with a waiver, all projects developed a monitoring plan, maintained or improved public access, and focused on native habitat restoration without introducing engineered components. An example of a nature-based project approved via a de minimis waiver is the Upper Newport Bay Living Shoreline Project (9-16-0254-W). The Executive Director granted a waiver for the restoration of 0.4 acres of native oyster and eelgrass habitat in Upper Newport Bay. Among other factors that allowed the application to be processed via a waiver, the project: included monitoring and future removal requirements if unintended consequences occur; was consistent with the NOAA 2014 California Eelgrass Mitigation Policy and Implementing Guidelines; and included guidelines for the type of oyster organisms used and elevations for placement.

Some nature-based adaptation projects and strategies will be relatively complex, involve impacts to or tradeoffs between coastal resources, require robust monitoring and other conditions to assess outcomes, and are thus unlikely to meet the requirements for a waiver, including hybrid armoring projects. However, even though the Commission has authorized relatively few nature-based adaptation projects through waivers thus far, this permitting option could provide a pathway to streamline smaller, less intensive nature-based projects—e.g., categories of smaller restoration projects with appropriate monitoring and removal components built into the project. Applicants are encouraged to contact Commission staff early in the planning process to discuss the scope and scale of the project and whether the project could qualify for the Commission's waiver process.

ii. Administrative Coastal Development Permits

Administrative permits are staff-level CDPs that may be issued for certain types of projects that have the potential to result in adverse impacts to coastal resources but that are limited in scope and size. Specifically, Section 30624 of the Coastal Act allows the Executive Director to issue administrative permits for certain kinds of non-emergency development that has a total project cost of $100,000 or less. Commission regulations allow the Executive Director to impose reasonable terms and conditions to ensure that the development conforms with the policies of the Coastal Act.[9] Similar to waivers, administrative permits require a smaller filing fee and do not require a public hearing, though do not become effective until after reported to the Commission and the Commission has a chance to object. A key difference between administrative permits that are issued by the Executive Director and become effective at a

[8] Nature-based adaptation projects processed through a waiver include the Salinas State Beach Dune Restoration Project (3-20-0396-W), Santa Monica Bay Eelgrass Restoration Project (9-21-0384-W), Upper Newport Bay Living Shoreline (9-16-0254-W), and CA State Parks South Carlsbad State Beach Dune Habitat Pilot Project (6-21-0674-W).

[9] 14 Cal. Code Regs § 13150.

Commission hearing, and regular CDPs that are approved by the Commission and issued after condition compliance, is that administrative permits are not subject to "prior to issuance" special conditions like regular CDPs. If the Commissioners object to issuing the administrative permit, then the administrative permit does not become effective, and the development must be resubmitted as a regular CDP application and undergo the full CDP application process, including payment of all regular fees.

Local governments may also issue administrative CDPs pursuant to Coastal Act Section 30624 where the local government has a certified LCP and an appropriate local official (e.g., planning director) has been granted permitting authority by the local governing body. However, any administrative permit issued by the local official must be scheduled on the agenda of the local governing body at its first scheduled meeting after the permit has been issued. This allows for potential objections by interested persons, including the Executive Director of the Coastal Commission, and/or the local governing body, which may result in the permit subsequently being processed as a regular CDP.

To date, there are no known nature-based adaptation projects that the Commission has authorized using an administrative CDP, potentially in part because nature-based adaptation strategies can be complex projects that exceed the $100,000 cost maximum for administrative permit issuance. However, under the Coastal Act and current regulations, some nature-based adaptation projects could potentially be streamlined with an administrative permit that includes special conditions, such as monitoring. These could include smaller scale or pilot projects of limited size and cost and with, presumably, limited adverse impacts.

iii. Coastal Development Permits

Regular coastal development permits are the standard authorization mechanism by which proposed development activities in the coastal zone are evaluated and brought into compliance with the policies of the Coastal Act and certified LCPs. Generally, all "development" in the coastal zone requires a CDP from the Commission and/or a local government with a certified LCP.[10] Under Coastal Act Section 30106, development is defined to include many activities common to nature-based adaptation projects, such as, "on land, in or under water, the placement or erection of any solid material or structure; ...grading, removing, dredging, mining, or extraction of any materials; change in the density or intensity of use of land…; change in the intensity of use of water, or of access thereto; …and the removal or harvesting of major vegetation other than for agricultural purposes, kelp harvesting, and timber operations…." Thus, nature-based adaptation projects will generally be considered development and require some type of Coastal Act approval from the Coastal Commission or local government, which, in the past, has usually come in the form of a CDP.

As described in Section 13056(b) of the Commission's regulations, Commission staff have up to 30 calendar days after receiving an application to determine whether the application is complete. If a CDP application is found to be incomplete, the applicant is notified and provided

[10] Pub. Res. Code §§ 30600, 30519.

with a list of materials or information needed to complete the application. Once the applicant submits these additional materials, Commission staff have an additional 30 calendar days to again determine if the application is complete and make a filing determination. Once an application is filed as complete, then, per the Permit Streamlining Act, it must be brought before the Commission for a public hearing and vote within 180 days (which, if the applicant agrees, can be extended by an additional 90 days, often to resolve remaining issues).

Once an application is complete, the Commission reviews the development project's consistency with relevant Chapter 3 or LCP policies ; it then provides the consistency analysis in the form of a written staff report and recommendation that is made available to the applicant, Commission, and the general public prior to holding a public hearing on the matter. The staff report includes a detailed project description, an analysis of potential impacts, findings regarding the project's consistency with the requirements of the Coastal Act or LCP, and a staff recommendation of approval, approval with conditions, or denial. Importantly, the staff report includes the text of any conditions that are recommended as being necessary to ensure that development is consistent with Coastal Act Chapter 3 policies or LCP. At the public hearing on the CDP application, the Commission listens to testimony from the applicant, staff, and the public and makes its decision on the CDP.

For jurisdictions with a certified LCP, the local government issues the CDP for development in the coastal zone in most cases. However, the Commission retains permitting authority over tidelands, submerged lands, and Public Trust lands,[11] as well as appeal jurisdiction over certain types of development.[12] It is likely that many nature-based adaptation strategies will fall within the Commission's original permitting jurisdiction. In these cases, the proposed project will be analyzed for consistency with the Coastal Act, and the local jurisdiction's certified LCP (if it has one) will be used as guidance. In cases where a project will be partly in the Commission's CDP jurisdiction and partly in a local government's CDP jurisdiction, the applicant, local government, and Executive Director (or Commission) may consent to consolidate the permit.[13] In such cases, the Commission reviews and acts on a single, consolidated permit, which is reviewed for consistency with the Chapter 3 policies of the Coastal Act.

The CDP process is the most common permitting process for large, complex projects that have a high total development cost and a potential to adversely affect coastal resources. The CDP is the most robust permitting pathway available, but it also requires a lengthier review process, as compared to the waiver and administrative permit, and a public hearing and larger filing fee. However, pursuant to Government Code section 6103, public entities are exempt from the Commission's application fees. Because most nature-based adaptation projects in the coastal zone to date have been proposed by public agencies, application fees have not typically been required. In addition, Section 30620(c)(3) of the Coastal Act allows the Commission to waive CDP filing fees, and further requires the Commission to give extra consideration to requests for

[11] Pub. Res. Code § 306519(b).
[12] Pub. Res. Code § 30603(a).
[13] Pub. Res. Code § 30601.3.

a fee waiver from nonprofit organizations if the permit is required for a habitat restoration project or a project to provide public access to coastal resources. Section 30600.6.1 of the Coastal Act also allows cities and counties to waive or reduce the permit fee for a habitat restoration or public access project at the request of a public agency or nonprofit organization applicant; if the local government rejects the request, the applicant can submit the permit application directly to the Commission.

The majority of nature-based projects permitted by the Commission to date have been authorized through CDPs. The information contained in the subsequent sections of this Guidance aims to inform local governments and project applicants of the various potential Coastal Act issues and key considerations that may need to be addressed. Addressing these matters prior to CDP submission would help streamline the permit review process for nature-based adaptation projects. Applicants are also encouraged to engage with Commission staff early in the application process to help expedite review of these projects.

B. Nature-Based Adaptation Strategies in Local Coastal Programs

After the Commission certifies a local government's Local Coastal Program (LCP), most Coastal Development Permitting authority is delegated to the local government, with CDP applications then reviewed and acted on by the local government pursuant to the certified LCP. While the Commission retains permanent permitting authority as well as appellate authority in certain geographic areas, and retains appellate authority over certain types of developments in coastal counties and over major public works projects and energy facilities, local jurisdictions are encouraged to prioritize and implement nature-based adaptation strategies whenever feasible, including through the development of LCP policies that support, encourage, or require such strategies. Because the nature, location, and method of the nature-based adaptation strategy can vary widely based on the geomorphology and development types among jurisdictions, LCP policies should be tailored to fit the needs of a specific area. Moreover, LCP policies related to nature-based adaptation strategies can cover a broad range of topics such as prioritizing softer solutions over hard shoreline armoring, requiring feasibility studies and pilot projects for nature-based adaptation strategies, and promoting regional and neighborhood-scale adaptation approaches. Finally, nature-based adaptation strategy LCP policies can help address short- and mid-term sea level rise adaptation needs while a jurisdiction continues to evaluate and plan for coastal resilience in the long-term.

A number of LCPs have been updated to include explicit references to nature-based adaptation strategies. For instance, the City of Santa Barbara's LCP includes a policy that requires that avoidance, nonstructural solutions, or other softer solutions "shall first" or "shall be implemented" where feasible.[14] This language makes clear that these types of softer solutions

[14] Policy 5.1-43. Shoreline Hazards Avoidance Preferred. Protection of development at risk from shoreline hazards shall first avoid the hazards, including through demolition, relocation, siting of structures, as well as drainage control and installation of drought-tolerant landscaping. If avoidance is not feasible, other techniques that minimize hazards and avoid use of shoreline protection devices, such as use of vegetative

with fewer impacts must be prioritized over hard shoreline protective devices when feasible and appropriate. In 2023, the City of Manhattan Beach updated its LCP and included a policy that commits the City to developing and implementing a beach dune restoration program and evaluating other nature-based adaptation strategies.[15] Importantly, this policy requires implementation of a specific nature-based adaptation strategy as a citywide program, and exemplifies how local jurisdictions can develop LCP policies that support planning for nature-based adaptation strategies on a region-wide scale.

Through the Commission's LCP Local Assistance Grant Program, the Commission has provided funding to local jurisdictions to assist with development of feasibility and design studies and monitoring programs for nature-based adaptation strategies.[16] For example, the City of San Clemente was awarded grant funding to develop and implement a shoreline monitoring program and conduct a feasibility study for a nature-based pilot project to address coastal erosion. The nature-based adaptation feasibility study will include a focus on critical erosion hot spots and opportunities to develop nature-based pilot project(s) that provide multiple benefits (e.g., sand retention and ecosystem benefits) such as a living shoreline or coastal dune system. The City of Santa Barbara was also awarded grant funding to conduct shoreline master planning for the City's low-lying public Waterfront and Harbor area. The plan will include an analysis of nature-based and hybrid options for adaptation along the Waterfront to retain as much beach area as possible while maintaining access and recreational uses. These grants demonstrate how nature-based strategies can support phased adaptation approaches.

C. California Coastal Act Lens

In reviewing a CDP application, Commission and local government staff are tasked with evaluating the proposed project's consistency with the relevant policies of Chapter 3 of the Coastal Act and/or with any applicable LCP policies. In many cases, nature-based adaptation strategies are intended to advance several Coastal Act goals and policies, but they can also have adverse effects on coastal resources. Because nature-based adaptation strategies can have multiple objectives such as reducing coastal hazards, improving public access, and benefiting ecological resources, project designs may have to balance various tradeoffs between sometimes competing or conflicting design goals. Thus, proposed projects require careful analysis to ensure consistency with the Coastal Act or LCPs. However, with intentional planning and design of a project, multiple objectives can be met while avoiding or minimizing adverse impacts to coastal resources. The Commission also acknowledges that it is important to consider the effects of inaction when reviewing nature-based adaptation strategies, including the potential consequences that could transpire, such as a possible increased need for future hard armoring,

planting, dune creation, dune restoration, and beach nourishment, shall be implemented in conjunction with avoidance techniques, as feasible.

[15] Policy IV.A.2: Develop and implement a citywide beach dune restoration program and evaluate softer solutions such as living shoreline projects. The continued viability of dune and other coastal habitats shall be provided for by planning for inland migration and/or replacement of habitats lost to sea level rise.

[16] Note that the State Coastal Conservancy and the Ocean Protection Council have grant programs that fund similar planning and implementation efforts related to nature-based adaptation strategies.

if adaptation strategies such as nature-based projects were not permitted to be constructed. As such, the Commission has considered and will continue to consider applications for nature-based adaptation projects within the context that significant action and new and innovative solutions are necessary to advance resiliency to coastal hazards. The information provided in this Guidance seeks to help project applicants better understand how to navigate certain potential adverse impacts and conflicts with the Coastal Act that may arise when planning for nature-based adaptation strategies. This section covers the main issues and policies that would most likely be triggered when reviewing a proposed nature-based adaptation project. Note that this section includes some of the most common Chapter 3 policies that would apply to these types of projects, but the applicability of all Coastal Act policies, as well as any applicable LCP policies, must be determined on a case-by-case basis.

The Commission defines a nature-based adaptation strategy as a coastal adaptation or erosion control method that primarily relies on natural elements to enhance coastal processes, provide ecological benefits, and offer protection to inshore areas. These strategies exist along a spectrum, ranging from soft approaches that use dynamic natural systems, such as dune or wetland restoration, to hybrid armoring that integrates structural elements with nature-based features. However, there is no set criteria for determining the extent to which a project qualifies as a nature-based adaptation strategy. **A project's classification as a nature-based adaptation strategy does not change the standard of review, and decisionmakers should look beyond the label assigned by an applicant to ensure that, to the extent feasible consistent with project objectives, nature-based adaptation projects genuinely integrate natural features, contribute to measurable habitat enhancement or restoration, and align with community priorities.**

i. Coastal Hazards

It is important that all development projects avoid or minimize risks from coastal hazards, and several Coastal Act sections govern the ways in which existing and new development must address these risks. Coastal Act Section 30235 specifies the circumstances under which hard armoring and other such construction that alters natural shoreline processes, and which is otherwise inconsistent with other Coastal Act policies, must be permitted. It requires the Commission to approve such structures "when required" to serve coastal-dependent uses or protect existing structures[17] or public beaches in danger from erosion, and "when designed to eliminate or mitigate adverse impacts on local shoreline sand supply." Coastal Act Section 30253 requires that new development minimize risks to life and property in areas of high geologic,

[17] "[T]he phrase 'existing structures' in section 30235 refers to structures that existed prior to January 1, 1977, the Coastal Act's effective date." *Casa Mira Homeowners Association v. California Coastal Commission,* 107 Cal.App.5th 370, 388 (2024), as modified on denial of rehearing (December 30, 2024), Cal. Sup. Ct. review denied (March 12, 2025).)

flood, and fire hazard, and not "in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs," among other requirements. In 2021, the Coastal Act was amended to add Section 30270, which explicitly requires the Commission to take into account the effects of sea level rise in coastal resources planning and management policies and activities in order to identify, assess, and, to the extent feasible, avoid and mitigate the adverse effects of sea level rise.

Hard shoreline protective devices generally fix the back beach, prevent new beach formation in areas where the bluff or shoreline would otherwise naturally erode, and result in the loss of sand-generating bluff and shoreline materials that would have entered the sand supply system absent the protective device. Ultimately, these hard shoreline protection structures form barriers that impede the ability of beaches and coastal habitats to naturally migrate landward over time. When designed properly, nature-based adaptation strategies can carry out the intent of Section 30270 and may offer a less environmentally damaging alternative to hard shoreline armoring. Further, nature-based projects that consist entirely of soft elements might not alter natural shoreline processes and may be consistent with all Coastal Act Chapter 3 policies, in which case they would not need to be reviewed for consistency with Section. Hybrid armoring projects that contain certain hard elements may need to be reviewed for consistency with Section 30235. However, if hybrid projects are designed to avoid, minimize, and mitigate adverse impacts, they might be considered the least environmentally damaging feasible alternative and thus be permitted pursuant to Section 30235. Project applicants should describe the need for hard components in a proposed hybrid armoring project and explain why a fully soft solution is infeasible.

Key Takeaway: While nature-based adaptation strategies are often considered a less environmentally damaging alternative to hard armoring, the project applicant must demonstrate that a proposed project is consistent with all relevant Coastal Act and LCP policies, including that it appropriately minimizes risks to life and property, and is the *least* environmentally damaging feasible alternative. As discussed in the Applicant Checklist in Appendix E, applicants should identify current and future coastal hazards that the proposed project aims to minimize, including with respect to expected sea level rise over the anticipated life of the project. This information will also be relevant to the extent that the proposed project is a component of a longer-term coastal resilience planning effort.

ii. Coastal and Marine Habitats

Nature-based adaptation strategies typically aim to maintain or enhance coastal and marine habitats. To the extent that they preserve and restore habitat, they are likely to be consistent with Coastal Act Section 30230, which requires that marine resources be maintained, enhanced,

and where feasible, restored.[18] Where traditional armoring structures could inhibit or damage the persistence of these habitats, nature-based adaptation strategies provide alternatives that may be capable of maintaining or enhancing them. For example, some strategies include placement of oyster beds, eelgrass beds, and dune systems that aim to restore or maintain certain coastal areas in a more natural state that can provide valuable and complex habitat space. Coastal waters, beaches, and wetlands support biodiversity and perform a variety of important ecosystem services, like buffering wave energy, stabilizing shorelines, storing carbon, filtering water, recycling nutrients, and serving as nursery habitat for fish species that not only fit into larger coastal ecosystems and food chains, but also support commercial and recreational fisheries offshore.

However, some strategies may cause temporary (or even permanent) adverse impacts to coastal and marine resources. In some situations, adaptive actions such as dune creation or wetland restoration can potentially lead to non-native species recruitment or proliferation, or disturb the local food web. As such, existing species assemblages and trophic dynamics may be inadvertently affected. The actual placement of certain project elements may also reduce habitat area and affect other dynamics that adversely impact certain species. In some cases, limited adverse impacts may be considered an appropriate tradeoff in light of ecological goals. Thus, a proposed project should recognize and evaluate such potential impacts, holistically consider various tradeoffs, and include measures to reduce and manage adverse effects. To this end, pilot studies that are meant to test proof of concept for innovative projects may help inform the Commission's understanding of certain nature-based adaptation strategies and provide information for future projects. These types of pilot projects should include metrics to adequately examine performance, allow for adjustments to improve performance, and identify best practices to inform similar efforts in the future. Such metrics may also help reduce monitoring protocols for projects that have demonstrated success as well as future similar projects. Pilot studies should also include clearly identifiable success criteria and conditions for removal at the end of the study period and/or if the project is not performing the way it was intended.

The Surfer's Point Shoreline Management Study (4-05-148 and A-4-SBV-06-037) is an example of a pilot nature-based adaptation project that aimed to test the efficacy of restored vegetated dune system over a buried cobble berm. The project also included managed retreat of a public bike path and parking lot farther inland. Construction for Phase I of this project was completed in 2011 and included a monitoring and maintenance plan that identified baseline conditions, routine monitoring efforts, and maintenance triggers. The planning and monitoring that was undertaken for this project provided valuable information on this type of adaptation strategy

[18] The Commission has historically understood ecological restoration to reference *past* conditions, meaning "bringing back" physical or biological characteristics to an area where they had once existed. Restoration generally involves alleviating stressors from the system that had led to the degradation of the habitat and actively facilitating the return of a suite of self-sustaining ecological functions. Restoration elements should reference the historic design and configuration of the specific habitat and may involve techniques such as manipulating landforms to return to natural processes or eradicating non-native species and revegetating with a variety of appropriate natives.

and has informed additional adaptation efforts and subsequent phases. In 2021, the Commission approved two CDP amendments (4-05-148-A1 and A-4-SBV-06-037-A1) that permitted the construction of Phase II of the project to expand the restored dune-cobble system farther downcoast and relocate the remaining parking lot and bike path.

Key Takeaway: To avoid and minimize adverse impacts to coastal and marine resources, project applicants should describe all alternatives considered and demonstrate that the proposed project will provide ecological value despite minor, temporary, or permanent disturbances to the marine environment. Project applicants will need to provide Commission staff with recent biological resource surveys of the site, explanation of avoidance and minimization measures, and plans for monitoring, mitigation (if necessary), and remedial action, as detailed further below. Recognizing the importance of minimizing adverse impacts to coastal resources, including sandy beach areas, Assembly Bill 1212 (Pavley, 2003) added Section 30607.7 to the Coastal Act, requiring project applicants for sand replenishment projects provide a plan for onsite monitoring and supervision during the implementation of the project.

Environmentally Sensitive Habitat Areas and Wetlands

Section 30240 provides for the protection of environmentally sensitive habitat areas (ESHA) and includes specific requirements for development in and around these locations. Development in ESHA is limited to resource-dependent uses that will not significantly disrupt the habitat values, and development adjacent to ESHA also must not significantly degrade the habitat area. Previous Commission decisions have defined resource-dependent uses to include nature trails, public accessways, research or educational purposes, and restoration or wildlife management. In situations where projects are proposed for areas that contain ESHA, the Commission typically relies on careful consideration of the likelihood and magnitude of adverse impacts to inform its permitting decisions. Additionally, the Commission also carefully evaluates alternative locations, sizes, configurations, or timing, to ensure minimization of adverse impacts.

Section 30233 lists the specific activities and uses for which diking, filling, or dredging of open coastal waters, estuaries, and wetlands is allowed.[19] Some nature-based projects may involve diking, filling, or dredging activities, including sediment augmentation to help restore or create habitat, or dredging of coastal waters to restore tidal inundation. When the Commission analyzes Section 30233 as it relates to a nature-based project, particular attention is paid to identifying whether the project constitutes a restoration project or a nature study intended to inform adaptation design, which may qualify as an allowable use under Section 30233. Further, the Commission also needs to determine whether a proposed activity would involve "fill" by consulting the Coastal Act's definition of that term (see Coastal Act § 30108.2), which

[19] In cases where a proposed project would dredge or fill wetlands or waters that are considered ESHA, the more specific provisions of Section 30233, rather than the more general provisions of Section 30240, apply.

encompasses activities such as the installation of signage, placement of material such as sediment or rock, or creation of new recreation trails through wetlands or other submerged areas. Coastal Act Section 30607.1 provides further requirements for the compensatory mitigation of any diking, filling, or dredging activities in wetlands.

iii. Public Access and Recreation

The Coastal Act contains strong protections for public access and recreation, including Sections 30210, 30211, 30212, 30213, 30214, 30220, and 30221. Certain coastal habitats like beaches directly or indirectly support public access and coastal recreation activities such as surfing, sunbathing, birdwatching, and fishing. Further, many of these areas are generally open to all visitors at no or low cost.[20] Thus, beaches and other coastal recreation areas are an important resource that provides access for all to the coast. Nature-based adaptation strategies can also improve public access and recreational opportunities along the coast. For example, certain strategies seek to create trails, beach access pathways, and bike routes. And beach nourishment projects can help maintain or increase the sandy beach area available for coastal access and recreation space as a short- or mid-term adaptation option.

However, as noted in the Nature-Based Adaptation Strategies memo that Commission staff released in 2021, nature-based adaptation strategies can also have the potential to limit access and recreation, especially during construction. For example, some project components may include restoring or converting areas previously used for recreation and access, partitioning areas off to reduce human disturbance, or implementing elements that may affect wave dynamics. The construction phase of the project may also impact the ability for Tribal communities to access areas important for practices such as subsistence fishing and gathering plant materials. Applicants should outline existing access points, recreation opportunities, and cultural uses in and around the project site to help inform appropriate siting of the project to avoid or minimize disruptions to these coastal resources and uses consistent with Coastal Act requirements.

Key Takeaway: To help prevent adverse impacts that limit or eliminate coastal access and recreation, project applicants should identify access points and recreational and cultural uses to inform appropriate siting of such projects. Proposed long-term or permanent improvements to access and recreation can help offset or mitigate temporary adverse impacts. Project applicants will need to minimize impacts and are encouraged to consider how and where project components for public access could potentially fit into the proposed project.

[20] Note that the Coastal Act (e.g., Sections 30210, 30214) requires that its public access policies be implemented in a manner that considers and protects fragile natural resources and public safety, among other concerns, ensuring that access is balanced with appropriate land use protections .

D. Other Key Considerations and Issues

Beyond specific Coastal Act policy analysis, applicants for nature-based adaptation strategies should consider other factors, including how the project will comply with the Public Trust Doctrine, be monitored and adaptively managed, impact communities, and include phased adaptation. Each of these elements plays a critical role in ensuring that nature-based adaptation strategies are implemented in ways that not only address resilience but also uphold common law rights to public access; protect ecological, recreational, and cultural resources; and support intended outcomes. Together, these considerations will help ensure that nature-based adaptation strategies align with legal mandates and sound planning principles.

i. Public Trust Doctrine

The public trust doctrine is a legal framework that protects public access, use, and enjoyment of certain lands and natural resources. Under the public trust doctrine, the state's tidelands, submerged lands, and navigable lakes, rivers, and streams are held in trust by the state for the benefit of the public. Rooted in common law, the doctrine ensures that coastal and marine environments are protected and enhanced for the benefit of all people rather than being appropriated for private or exclusive use. In addition to the Coastal Commission, several state agencies play key roles in protecting public trust resources and uses, including the California State Lands Commission, California State Parks, the State Water Resources Control Board, and the California Department of Fish and Wildlife.

Public trust principles emphasize the need to balance multiple uses of coastal and marine environments while ensuring long-term sustainability. This includes safeguarding public access to navigable waterways and public trust lands along the shore as well as maintaining ecological integrity. As sea level rise accelerates, proactive planning is necessary to uphold public trust obligations and prevent the erosion of public coastal access due to inundation, privatization, or restrictive development.

As explained in the California State Lands Commission's report, Shoreline Adaptation and the Public Trust, nature-based adaptation strategies provide an opportunity to enhance coastal resilience while upholding public trust protections, including multiple social, environmental, and economic benefits to communities along the shoreline. Historically, shoreline armoring and other structural devices have led to the loss of public beaches and wetlands as these structures take up space on public beach land, prevent continued nourishment of the beach through natural erosion, and prevent the natural migration of public trust lands as sea levels rise. By contrast, nature-based adaptation strategies—such as dune restoration, wetland expansion, and other living shorelines—may offer ways to provide various levels of protection from erosion and flooding while maintaining natural coastal processes, thereby preserving public access and ecological function. While armoring may still be appropriate for public trust uses in harbors and navigation channels, nature-based adaptation strategies offer more sustainable solutions for many shoreline areas where maintaining natural coastal processes is essential for public access and coastal resources. To align nature-based adaptation strategies with public trust protections,

adaptation strategies should be designed to maximize benefits for coastal ecosystems and public access.

Public Trust Supports Nature-Based Adaptation Strategies

Public trust principles support the use of nature-based adaptation strategies, particularly in addressing the impacts of sea level rise. As outlined in Principle 10 of the Coastal Commission's adopted Public Trust Guiding Principles and Action Plan, "encouraging the use of nature-based adaptation strategies can better support public trust uses and values" because nature-based adaptation strategies can play a key role in protecting and maintaining public trust resources by facilitating the natural migration of shorelines and reducing reliance on hard armoring. One of the key concerns is that shoreline armoring can prevent the natural migration of public trust lands, leading to the privatization of land that would otherwise become public. As sea levels rise, beaches and tidelands should naturally migrate inland, but hardened shorelines can trap these resources, leading to the loss of public access and ecological function. In contrast, nature-based adaptation strategies can help public trust lands persist in the face of sea level rise while mitigating the negative effects of hard armoring. For more information, please refer to the Public Trust Guiding Principles and Action Plan.

ii. Monitoring and Adaptative Management

Some coastal nature-based adaptation strategies are still a relatively new and innovative area of study for the State, and the Commission's understanding of these projects in relation to the Coastal Act is evolving. Therefore, monitoring the performance of these projects is critical to evaluating the success of the strategy, ensuring compliance with the Coastal Act, developing adaptive management pathways, and informing future permitting decisions. Nature-based adaptation strategies encompass a broad range of projects, so monitoring needs may vary across project type, and the extent and complexity of a monitoring plan will depend on the type and scale of the project and its potential to impose adverse impacts on sensitive coastal resources. This section identifies key elements that should generally be included in monitoring plans for nature-based adaptation strategies, including goals and objectives, success criteria, monitoring logistics, adaptive management procedures, and information sharing practices. Importantly, applicants are encouraged to think strategically about the monitoring elements below and select appropriate parameters that best fit the specific proposed project.[21] The selection of parameters will depend on the project goals as well as regional and site-specific

[21] There are several existing monitoring programs, such as the Southern California Wetlands Recovery Project Regional Monitoring Program, the California Estuarine Marine Protected Area Monitoring Program, and BeachWatch, that can be used as resources for standardized indicators, metrics, and methods that may aid project applicants in developing their own monitoring plans.

contexts. Applicants are encouraged to engage with Commission staff to discuss project-specific monitoring needs.

1) **Purpose statement, goals, and objectives:** Goals and objectives of the monitoring plan should be informed by a purpose statement as well as a definition of success relative to the project, including both the ecological and shoreline protection aspects.
    - Ecological aspects include laying out the desired habitat types, major vegetation components, hydrological considerations for wetlands, and sensitive aquatic and terrestrial species and wildlife support functions.
    - Protection aspects include identification of structures or uses that are in need of protecting, the current and future hazards that the project is designed to address or minimize, and the anticipated length of time a successful project would provide protection.

2) **Performance criteria and evaluation:** The monitoring plan should identify performance criteria relevant to the project goals and objectives, and specify how they will be assessed. Methods for evaluating performance relative to the success criteria will vary, so a clear rationale that supports the selected methods is important.
    - Assessment methods may include comparisons in time, space, design type, geography, response to disturbance events, and/or consideration of trends, patterns, or trajectories.
    - Data regarding project baselines is important to help document pre-construction and as-built conditions at the project site. In some cases, it will also be important to obtain data from reference sites with similar characteristics that can act as a model for the proposed project and a baseline to develop success criteria. This data can better inform post-construction changes and project performance.

3) **Monitoring logistics:** Logistics for the monitoring plan should include an overall schedule for monitoring, including a graphic schedule and a narrative description to aid in planning, managing, and revising efforts, as necessary, over the course of the monitoring period.
    - All parties responsible for monitoring and maintenance should be listed.
    - A pre- and post-project implementation monitoring schedule should be described as a way to evaluate performance trajectories and identify challenges that may trigger contingency plans or adaptive management activities.

4) **Adaptive management procedures:** Potential changes in future conditions at a project site should be considered under the adaptive management component of a monitoring plan. These include course correction opportunities or requirements that would be triggered if the project does not perform in the originally intended manner.
    - Clearly defined triggers that would necessitate adaptive actions should be described, including as it relates to success criteria of the project. This should include triggers

relating to ecological disturbances (e.g., establishment of invasive species) and physical disturbances (e.g., extreme storm event leading to severe erosion). Other triggers may include absence of a certain ecosystem function or structural component (e.g., failed propagation or establishment of native plants).

- Remedial actions should be described including both intermediary or temporary measures and long-term maintenance and actions.

5) **Information sharing practices:** The monitoring plan should identify how the project applicant will share the results of the monitoring and outcomes of any adaptive management procedures. CDP special conditions may require an annual monitoring report be sent to Coastal Commission staff. However, applicants are encouraged to post and share these reports (e.g., on a project webpage or to a public database like the EcoAtlas) so that other practitioners can access this information. Making the monitoring report publicly available will provide more opportunities for others to learn how to hone various nature-based adaptation strategies.

iii. Community Impacts

Some communities face disproportionate risks due to a history of disinvestment, limited access to decision-making, and systemic barriers that reduce their ability to recover from natural and anthropogenic disasters and impacts (Shonkoff *et al*., 2011). The implementation of nature-based adaptation strategies should recognize these challenges and prioritize planning approaches to ensure that these communities benefit from coastal adaptation efforts. Specifically, their placement, design, and governance can either reinforce existing challenges facing communities or serve as a tool for balanced resilience planning that prioritizes and uplifts these communities. The Ocean Science Trust published a report in 2022, Toward More Equitable Nature-Based Coastal Adaptation in California, that highlights strategies for ensuring that living shorelines and other nature-based adaptation measures center affected communities and avoid exacerbating existing disparities. Without proactive planning, nature-based adaptation strategies projects could contribute to unintended consequences such as displacement, restricted access to public coastal spaces, or uneven distribution of protective infrastructure (Reineman *et al*., 2016).

The Commission's 2024 update to the Sea Level Rise Policy Guidance recognizes the need for coastal adaptation planning to account for community-based considerations.[22] While nature-based adaptation strategies generally offer a more ecologically resilient approach to sea level rise adaptation, they may also present challenges that should be addressed to ensure outcomes that consider community-based needs, impacts, and benefits. To do this, project applicants should seek to avoid exacerbating burdens to affected communities and tribal people and resources. Collaborative planning with tribal groups and community-based organizations can further help refine project designs to maximize social and ecological benefits. Project applicants

[22] For more information on the consequences of sea level rise on affected communities and tribal groups, refer to Chapter 4 of the 2024 Sea Level Rise Policy Guidance.

can address potential burdens to communities that may arise in nature-based adaptation strategies in the following ways:

- Conduct early and meaningful engagement with surrounding communities and tribal organizations. When feasible, outreach efforts should address language, accessibility, and financial constraints, ensuring that community-driven planning informs project design and maximizes community engagement. Adaptative management components should meaningfully incorporate local and traditional ecological knowledge in decision making processes.
- Prioritize project implementation in high-risk hazardous areas with surrounding communities that have experienced adverse environmental impacts. This can include spatial analysis to compare project locations with community impacts and projected environmental risks. Projects should consider design elements that ensure community benefits such as increased access to recreational opportunities. Projects should ensure that benefits and burdens are evenly distributed and do not prioritize wealthier communities while leaving other communities vulnerable to risks.
- When feasible, projects should aim to reverse past environmental harms. This could include supporting indigenous land trusts, co-management with tribal governments that can help with displacement, and restoring culturally significant coastal habitats to promote tribal stewardship and protect locally important coastal resources.
- Establish pre-construction social baselines to assess long-term project performance.
- Implement routine reporting to track project effectiveness, and make data publicly accessible and easily understandable for all communities and tribal groups.
- Align monitoring goals for nature-based adaptation strategies with state and regional coastal resiliency adaptation plans.
- Where possible, consider regional adaptation for larger ecological benefit.

These components support community-driven adaptation strategies that deliver ecological improvement, hazard protection, and social benefits while prioritizing the needs of affected communities. For more details regarding best practices for conducting outreach with affected communities, please refer to Chapter 6 of the Commission's 2024 Sea Level Rise Policy Guidance and other Commission resources on meaningful engagement.

iv. Sea Level Rise Adaptation Planning

Sea level rise adaptation planning has been a priority for the state of California generally and the Coastal Commission in particular for over a decade. Adaptation planning that effectively protects coastal resources and communities requires proactively identifying and implementing a suite of adaptation strategies that both reflect different site- and region-specific contexts and will be able to respond to changing conditions over time. Nature-based strategies can be a key component of a holistic and proactive adaptation approach. As highlighted in the California Climate Adaptation Strategy, the Coastal Commission's Strategic Plan, and many other state and

local documents, priority should be given to adaptation options that protect, enhance, and maximize coastal resources and access, including nature-based adaptation strategies. Further, as described above, adopting LCP policies that encourage nature-based adaptation strategies is another way to support phased adaptation planning. This section discusses how nature-based adaptation strategies can be implemented as part of a holistic adaptation approach that includes both spatial (how strategies might vary across a shoreline) and temporal (how strategies may change over time) considerations.

Spatial Considerations and Scaled Planning

Considerable adaptation planning work has already been initiated across the state, yet more work needs to be done to reach a stage where proactive adaptation strategies are beginning to be implemented. An issue that has become apparent over the last ten years of the Coastal Commission's work with local governments is the need to develop and implement a mix of adaptation strategies across a jurisdiction that reflect the varied nature of California's coastlines. In other words, a City/County will not use just a single or even a few adaptation strategies across its entire jurisdiction. Rather, a variety of strategies will be implemented to reflect different geological and land use considerations, and the different mix of residential, infrastructure, community, tribal, and natural resource needs. This involves identifying and developing adaptation strategies that are specific to defined areas or assets with shared characteristics (e.g., a neighborhood, beach area, site, or asset).

One outcome of this type of adaptation planning approach is that adaptation strategies would be identified and proposed for larger areas, rather than a parcel-by-parcel scale, which could improve the ability to protect coastal resources and to employ a broader range of options rather than merely relying on armoring as a means for protection. This could include, for example, identifying areas (or development types) for which the preferred adaptation strategies include nature-based approaches like beach nourishment or marsh restoration, which typically are less effective on a smaller parcel scale. This planning could also support sediment management programs that include systematic approaches to addressing sediment supply imbalances at a regional scale and promote the potential beneficial reuse of clean sediment in certain nature-based adaptation projects. In this manner, nature-based adaptation strategies could become a more feasible option under the umbrella of scaled or region-wide planning as compared to the type of reactive hazard responses typically undertaken by individual property owners.

Adaptation strategies will need to be designed and implemented at a scale that matches the feasible spatial scale as well as the constraints and opportunities of the natural backshore characteristics. Put another way, stretches of the coastline with shared geological characteristics may lend themselves to different sets of adaptation options, and the overall mix of these constraints and opportunities should be considered when developing a set of adaptation approaches that together maximize coastal resource benefits throughout a jurisdiction or wider region. For example, some stretches of shoreline might have geophysical characteristics conducive to a nature-based adaptation strategy, such as areas with adequate sandy beach space that can support dune restoration. Other shorelines may be able to support multiple nature-based adaptation strategies implemented along an elevation gradient, such as restoring

oyster beds in conjunction with eelgrass beds. There may also be shorelines with insufficient area to use certain nature-based adaptation strategies that require a larger area to be effective. As such, local governments should consider how to use these approaches along different parts of their shorelines to protect development in the way that provides the most coastal resource benefits. The Commission recognizes that this approach would span larger areas and may involve more asset managers and owners, and thus has been working with local governments to identify and support these adaptation planning efforts.[23]

Temporal Considerations and Phased Adaptation

Adaptation strategies will often need to change over time to reflect changing coastal conditions and future resiliency options. Phased adaptation, also called adaptation pathways, are sequences of adaptation actions that can be implemented progressively in response to the unfolding impacts of sea level rise over time (Fazey *et al*., 2015). For example, adaptation phases can start with protection strategies, such as a nature-based adaptation strategy, or accommodation strategies, such as floodproofing and elevation in the short- to mid-term, and lead to eventual retreat and relocation in the longer-term as protection and accommodation strategies become infeasible due to increasing hazards, costs, and coastal resource impacts. Adaptation pathways may include triggers, or thresholds of impacts, after which future phases of adaptation or adaptation planning will be implemented. This approach to adaptation can be especially useful for planning of future coastal hazard conditions given that there is uncertainty regarding the timing and exact magnitude of impacts. Phasing adaptation strategies can also help reduce upfront costs and allow for the planning time needed for development of longer-term adaptation.

Because phased adaptation will implement a variety of strategies over time, nature-based adaptation strategies can be a critical component of a long-term phased adaptation approach. As noted above, the first phases of an adaptation approach may involve protection strategies to respond to existing vulnerabilities. Nature-based adaptation may be an option to provide protection in lieu of hard armoring in some cases, thereby also avoiding the many adverse impacts to coastal resources associated with hard armoring. Such strategies can be designed to provide protection from coastal hazards such as flooding and erosion while also enhancing ecological functions. Furthermore, while the Coastal Act requires that projects minimize coastal hazards risks and address the adverse effects of sea level rise, this does not mean that nature-based adaptation strategies always need to be designed to address extreme hazards or precautionary amounts of sea level rise. Projects should consider the effects of sea level rise and extreme hazard conditions consistent with the Commission's Sea Level Rise Policy Guidance, but it can often be more practical and less damaging to coastal resources when nature-based adaptation strategies are designed for less extreme events, less precautionary amounts of sea level rise, and shorter design lives. This approach can be more conducive to

[23] The Coastal Commission and the Local Government Working Group have been exploring the concept of scaled planning efforts, also referred to as neighborhood-scale adaptation planning. More information on this topic can be found in this draft discussion paper and at the September 2024 Coastal Commission and Local Government Working Group Workshop.

long-term, phased adaptation planning where other strategies are also considered should sea level rise accelerate to more extreme levels.

An example of using a nature-based adaptation strategy as a shorter-term approach to sea level rise hazards is the Cardiff State Beach Living Shoreline Project (6-17-0596) in the City of Encinitas. This project consists of an engineered dune system and cobble toe on top of a buried revetment. The dune system was designed to accrete and erode with the seasons and provide a natural buffer for Highway 101 while preserving coastal views, improving access, and creating habitat. Considering projected sea level rise in this area, this project was designed to provide protection for approximately 30 years until 2050, after which the implementation of a longer-term solution may be needed. Since its completion, the project has proven effective in preventing significant flooding of Highway 101 during winter storms and King Tide events. This type of phased approach using a nature-based adaptation strategy has so far extended the beach habitat to a coastal dune system, and importantly, has allowed time for the City to develop additional adaptation options beyond 2050.

V. Conclusion

Preparing California for the many impacts resulting from sea level rise involves implementing measures that will improve the State's coastal resilience. Nature-based strategies are one category of adaptation options that aims to provide both protection from coastal hazards and enhancement to ecological systems and habitats along the coast. As this is an evolving area of study, this document is intended to provide guidance on nature-based adaptation strategies through a Coastal Act lens and to complement the Commission's related efforts to support coastal resilience. The Commission adopts this Guidance to further its commitment to proactively protect coastal resources, consistent with the Coastal Act.

Nature-based adaptation strategies may include a variety of new and experimental project designs. Therefore, the Commission recommends project applicants engage in early consultation with Commission staff when planning for such projects to allow for improved collaboration and project design that maximizes ecological and protection services, meets the standards of the Coastal Act and applicable LCP policies, and avoids permitting delays. Commission staff are available to answer questions about the application and review process and to provide project-specific guidance, including through pre-application submittal meetings. Additionally, Appendix A provides a checklist of information that an applicant should consider providing, and key questions to address, with their application for a nature-based project. Providing this information during application submittal can reduce the time it takes for Commission staff to review the application for completeness.

Because nature-based adaptation strategies aim to address current and future coastal hazards, including sea level rise, project applicants are also encouraged to review the Commission's 2024 Sea Level Rise Policy Guidance, which provides a detailed process for addressing sea level rise concerns in CDPs. In encouraging the use of nature-based adaptation solutions, the Coastal

Commission can continue to carry out its duty to protect public interests in the coast while helping coastal communities remain resilient to sea level rise.

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Appendix A. Filing Checklist for Nature-Based Adaptation Projects

Purpose

Generally, a nature-based adaptation strategy is recognized as a coastal adaptation and/or erosion control method that is comprised of natural or mostly natural elements, which contributes to the persistence and enhancement of coastal processes and ecological benefits while also offering protection services to inshore areas. Such strategies can be further categorized along a spectrum between soft strategies and hybrid armoring. Soft strategies avoid fixing the shoreline with hard structures and instead rely on the use of dynamic systems to attenuate coastal hazards, such as dune or wetland restoration. Hybrid armoring combines fixing the shoreline, such as with a buried revetment or other shoreline protective device, with a nature-based feature to provide ecological and other benefits. Nature-based adaptation strategies can offer resilient approaches to managing shoreline erosion by incorporating natural elements into shoreline adaptation plans. These strategies typically aim to provide benefits such as habitat enhancement, flood mitigation, and increased coastal resilience, making them a priority in California's sea level rise adaptation efforts.

This document identifies information that the Commission recommends providing in Coastal Development Permit (CDP) applications to assist staff in evaluating proposed nature-based adaptation projects. This document is intended to describe supplemental information that may be needed in addition to the standard information required on a CDP application form; as such, some of the information requested here may already be included in other parts of the CDP application. Note that this information is meant to provide staff with a general understanding of the main project components. Not all of this information will be needed for every project, and more detailed or different information may be requested by Coastal Commission staff, depending on the facts of each proposal, including project scale, scope, and potential adverse impacts. Please provide responses to the information requested below in a separate, standalone document.

Specific Project Information

1) **Location and purpose of the proposed project**

    a. **Project site and characteristics:** Identify the project location and describe the scope of the project in detail, including the objectives of the project, existing site conditions, structures (including any existing armoring) that currently exist on site, and the anticipated life of the project. Identify the existing and/or historic habitat type(s) including any sensitive resources in the project's vicinity (a biological resources report or site-specific habitat maps could support this documentation). Identify and describe the types of materials that will be used in this project (e.g., sand, cobble, rock), how those materials will be acquired, and whether they historically occurred or currently occur at the project site.

b. **Threatened asset(s):** Describe the types of development and/or coastal resources that are threatened and the type of threat (e.g., erosion from wave action, flooding from extreme coastal water levels, flooding from wave overtopping. See also part (2)). This should include information on ownership/management of these assets.

c. **Proposed strategy:** Describe the proposed nature-based adaptation strategy in relation to the identified threat(s), including what natural processes or features are proposed, how they would function to reduce the threats identified, and the magnitude or intensity of an event they are expected to be able to address. This information should include a detailed description of the ecological components of the proposed strategy, including the types of existing habitat(s) and any sensitive resources that would be affected as well as any habitats that the project aims to restore, improve, and/or create at the project site (see also part (3)). For projects that are proposing any "hard" or "gray" components (i.e., riprap, cobbles, seawalls, concrete structures, tiebacks, piles/piers, or other structures that fix the shoreline), please include a plan set with representative cross sections.

d. **Other agency approvals:** Provide other permits, authorizations, or approvals applied for or granted by other agencies, such as the California Department of Fish and Wildlife, U.S. Fish & Wildlife Service, U.S. Army Corps of Engineers, U.S. Coast Guard, or the California State Lands Commission.

2) **Coastal hazards and sea level rise:** The information provided here will aid Commission staff in understanding the current and future hazardous conditions at the site.

a. **Existing coastal hazard(s) identified at the site:** Describe the physical impacts from coastal hazards at the project site to development/structures. Describe current shoreline conditions, including both day-to-day hazards as well as hazards from storms and other extreme events.

b. **Future coastal hazards and projected sea level rise amounts:** Describe the projected future coastal hazards at the site accounting for sea level rise over the anticipated life of the project, including potential coastal hazard and sea level rise impacts to the site with and without the proposed project. This should include anticipated erosion, inland extent of flooding, wave run-up or overtopping associated with both storm and non-storm conditions, and potential future groundwater rise. Identify whether the proposed project aims to function as a short-term solution as part of an ongoing, phased adaptation approach or if the project is planned to be a medium- to longer-term solution.

3) **Description of potential impacts to coastal resources**: Although nature-based adaptation strategies are generally meant to enhance or restore coastal habitats and provide related resource benefits, such projects may still result in adverse impacts to coastal resources, particularly if not carefully designed. The following section describes

examples of such impacts. Provide information describing both potential adverse impacts and improvements to coastal resources resulting from the proposed project, as well as potentially feasible alternatives that could avoid adverse impacts, or, where unavoidable, minimize and appropriately mitigate impacts.

a. **Coastal and marine habitats:** Describe what types of coastal and marine habitats may be affected by the proposed project. At their core, nature-based projects should aim to provide ecological value and support ongoing coastal functions and processes in a sustainable manner. However, the implementation of various nature-based projects may impose habitat conversions, impact native species assemblages, alter the flows of energy, water, and productivity, introduce potential for non-native and invasive species recruitment, and cause other significant changes to existing ecosystems that need to be considered.

b. **Public access and recreation:** Project components that may limit access include closing off areas of the project to reduce human disturbance and restoring or converting areas previously used for recreation or access in a manner that precludes continued access. Recreation may be impacted if a project changes wave dynamics, creates habitat that conflicts with mooring and boating activities, or changes biological resources in an area that may impact nearby fishing activities, diver experiences, or bird-watching opportunities. Describe whether the project may cause such adverse impacts or if it will be designed to create or improve access and recreation opportunities.

c. **Water quality:** Identify project components that may alter water quality at the project site. Certain types of nature-based projects, such as beach nourishment, wetland sediment augmentation, and the creation or restoration of habitat may result in increased turbidity, altered water flows, nutrient inputs, and disturbances to soft bottom habitat that contain legacy pollutants. However, other projects may aim to specifically improve water quality in the surrounding area.

d. **Visual resources:** Describe temporary and permanent visual resource impacts such as the placement of fences, increased dune heights, and exposed hard armoring structures. Including visual simulations here can be helpful.

e. **Effects on communities and tribes:** Describe how the project's effects on coastal resources will benefit surrounding communities. If the project's coastal resource effects may have negative implications to nearby communities, describe how that will be addressed. Identify how and when surrounding communities will be notified and engaged before, during, and after construction of the project. Please use the list of mapping tools described in Chapters 5 and 6 of the Commission's Sea Level Rise Policy Guidance to identify surrounding communities that are important to consider. For engagement with tribal communities, refer to the Commission's Tribal Consultation Policy for more information.

f. **Alternative strategies considered:** Identify and describe any potentially feasible alternatives to the project or its location that may be capable of avoiding or substantially lessening any significant adverse effects of the project. The alternative that will best minimize risks from coastal hazards and avoid or minimize impacts to coastal resources should be identified. This should include consideration and characterization of any tradeoffs to various coastal resources between the alternative strategies.

g. **Mitigation Plan:** As stated earlier, the proposed project may have adverse impacts to coastal resources that cannot be fully avoided or minimized, and therefore may require compensating mitigation. Describe how the proposed project plans to mitigate for unavoidable impacts, including via submission of a thorough mitigation plan that identifies a clear rationale, objectives, implementation processes, and monitoring provisions. Early coordination and consultation with Commission staff is encouraged for such compensatory mitigation to avoid delays during the permit review process.

4) Adaptive management components

a. **Proposed monitoring schedule:** Monitoring plans are necessary components of nature-based adaptation projects to ensure compliance with the Coastal Act, evaluate the project's performance, and enable adaptive management. Monitoring plans for nature-based projects should generally include information to validate and adaptively manage for both the ecological and protection benefits that the project is expected to deliver. While each project's monitoring needs will be tailored to the project and may necessitate refinement through consultation and revisions during application review, or potentially via permit conditions, a plan for monitoring of the proposed project, including pre-construction conditions and reference sites, appropriate indicators and assessment methods to evaluate project performance, monitoring schedules, and triggers that may result in adaptative management needs should be provided with the application package.

Additional Resources

For more information on nature-based adaptation strategies, please review the following resources:

- Nature-Based Adaptation Strategies Memo: Describes various types of nature-based adaptation strategies that may be implemented along California's coast, common issues to consider when developing and evaluating a nature-based project, and key Coastal Act policies that need to be analyzed.
- Nature-Based Adaptation Strategies in the Coastal Zone Story Map: General explainer on nature-based adaptation strategies and their benefits, presents examples of permitted projects, and encourages their use when and where appropriate.

- Sea Level Rise Policy Guidance: Supports and encourages the use of nature-based adaptation strategies as a preferred alternative to harder shoreline armoring.
- Critical Infrastructure Guidance: Provides information on the consideration of nature-based adaptation strategies in water and transportation infrastructure projects.