California Coastal Commission
Residential Adaptation Policy Guidance

Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs

Photo Credit: Mary Matella

March 2018

Revised

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CALIFORNIA COASTAL COMMISSION

45 FREMONT STREET, SUITE 2000
SAN FRANCISCO, CA 94105- 2219
VOICE (415) 904- 5200
FAX (415) 904- 5400
TDD (415) 597-5885

DRAFT RESIDENTIAL ADAPTATION POLICY GUIDANCE

March 2018

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How to Use this Document

Use this document as:	This document is NOT:
Interpretive Guidelines	**Regulations**
This Guidance is advisory. It provides the Commission's direction on how local governments can address sea level rise issues in Local Coastal Programs consistent with the Coastal Act. The guidance is not a regulatory document or legal standard of review for the actions that the Commission or local governments may take under the Coastal Act. Such actions are subject to the applicable requirements of the Coastal Act, the federal Coastal Zone Management Act, certified Local Coastal Programs, and other applicable laws and regulations as applied in the context of the evidence in the record for that action.	
Examples to modify	**A substitute for consultation with CCC staff**
This Guidance contains model policies that may need to be customized before they can be incorporated into individual LCPs. In addition, not all policies are applicable in every jurisdiction. Commission staff can assist local governments with using the Guidance to develop policies that help prepare for sea level rise impacts in their communities.	
Policy options for consideration	**A checklist**
Not all of the content will be applicable to all jurisdictions. Jurisdictions should consider the policy options that are relevant to their specific situation, rather than view the options as a checklist of requirements.	

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Summary

This Residential Adaptation Policy Guidance (Guidance), which will be presented to the Coastal Commission for consideration and formal adoption as interpretive guidelines,[1] is intended to assist local governments in planning for sea level rise adaptation. The Guidance follows up on, and is meant as a companion document to~~,~~ the Commission's 2015 Sea Level Rise Policy Guidance, which set forth broad principles related to planning for sea level rise.

Since the adoption of the 2015 Sea Level Rise Policy Guidance, science has revealed growing sea level rise threats resulting from thermal expansion of ocean waters and melting ice sheets.[2] While the magnitude and timing of sea level rise impacts (e.g., coastal erosion, flooding, saltwater intrusion) are not precisely known, the trend is clear, and the need to incorporate sea level rise in planning, permitting and investment decisions is increasingly evident. Thus, while erosion and flooding are not new hazards to shoreline development, accelerating sea level rise will create greater risks for development in many shoreline areas.

Residential development is the foundation of many of California's coastal communities. However, as sea levels rise, and beaches and bluffs migrate inland, maintaining residential development adjacent to the shoreline will in many cases cause the narrowing and eventual loss of beaches, dunes and other shoreline habitats as well as the loss of offshore recreational areas. This narrowing, often referred to as 'coastal squeeze,' can occur when shoreline protection or other fixed development prevents the landward migration of the beach that would have otherwise occurred, and it can also occur when the beach migrates up to and underneath elevated structures.[3] Failure to address impacts related to coastal squeeze has the potential to result in significant conflicts with the Coastal Act, which was enacted for the purpose of protecting California's coastal resources. It also presents challenges for carrying out the public trust doctrine. Furthermore, coastal squeeze presents a significant environmental justice issue if private residents adjacent to the shoreline continue to enjoy shoreline access, while the general public is blocked from accessing the shore.

Given the severity of impacts that could occur as a result of sea level rise, and the uncertainties surrounding projections of sea level rise over the expected life of many coastal projects, communities, planners, coastal managers and project applicants will need to use adaptation strategies to effectively address coastal hazard risks and protect coastal resources over time. In California, Local Coastal Programs (LCPs) provide the planning mechanism for implementing sea level rise adaptation strategies. Local governments structure their LCPs (through their Land Use Plans and Implementation Plans) in a variety of ways, with some local governments including significant policy detail in the LUP, and some reserving such detail for the IP. Because the degree of specificity in the model policies presented in this Guidance vary, local governments should customize the model policies to align with their community's approach and work with Commission staff to facilitate timely development of adaptation strategies. Additionally, maximizing public participation in the adaptation planning process is critical and will help local

[1] Pursuant to Public Resources Code Section 30620. All references to Coastal Act sections are to the Public Resources Code.

[2] Griggs, G, Árvai, J, Cayan, D, DeConto, R, Fox, J, Fricker, HA, Kopp, RE, Tebaldi, C, Whiteman, EA (California Ocean Protection Council Science Advisory Team Working Group). Rising Seas in California: An Update on Sea-Level Rise Science. California Ocean Science Trust, April 2017.

[3] In areas with relatively hard geologic features, sea level rise may occur faster than erosion, resulting in a loss of beach area, regardless of the presence of shoreline development.

governments understand how adaptation policies may have disproportionate impacts on different populations. Public participation in the process also serves to educate residents, visitors and other stakeholders about sea level rise vulnerability, and can help ensure adaptation planning reflects the community's vision, objectives and goals.

This Guidance provides an in-depth discussion of sea level rise adaptation strategies specifically related to residential development, and it provides examples of policies that cities and counties should consider when drafting LCP policies and reviewing individual permit decisions within their communities. The specific local and regional context and existing development patterns must be considered when developing a long-term strategy that appropriately avoids risk, minimizes hazards, and protects coastal resources. Not all model policies will apply in each community, and local governments may want to consider modifications to the language provided herein, depending on the specific community and geologic contexts of the area. Decisions on individual permits prior to adoption of a comprehensive plan for a region should not preclude or prejudice implementation of long-term adaptation strategies that protect coastal resources over time. Commission staff is available to assist with understanding and applying the Guidance in specific communities. An overview of this Guidance document is as follows:

In Section 1, the Guidance explains how Local Coastal Program (LCP) planning for sea level rise can provide for resilient shoreline residential development while protecting coastal resources. Section 1 also presents background on LCP planning, residential development, and the challenges that sea level rise presents for different types of hazards and development.

Section 2 identifies LCP policies that address sea level rise hazards appropriate for all hazardous areas, while Section 3 details considerations for developing adaptation strategies in specific areas and contexts. As described in Section 4, these adaptation strategies will need to be evaluated, identified and implemented within a relevant set of laws, including the Coastal Act, public trust doctrine, and takings law. Section 5 on Implementation presents a summation of how LCP Planning Steps interact with specific adaptation policies (identified in Section 6). The Implementation Section also presents ways of phasing in adaptation strategies over time as sea levels rise.

Finally, Section 6 presents model policies for cities and counties to consider for use in different community and geologic contexts. There are a number of options for how to address the risks and impacts associated with sea level rise in the shorter term, through evaluation of coastal development permit applications, and in the longer term, through development of management plans and LCP updates. In most cases, the strategies for addressing sea level rise hazards will require proactive planning to ensure protection of coastal resources and development. Such proactive adaptation strategies generally fall into the following categories, though some strategies combine elements of more than one:

1) Avoid Siting Development in Hazard Areas;
2) Design for the Hazard (accommodation);
3) Move Development Away from Hazards (managed realignment/retreat);
4) Move Hazards Away from Development (soft or natural protection)
5) Build Barriers to Protect from Hazards (hard protection)

The LCP model policy language is organized according to these general adaptation approaches, and many policies provide language that local governments may incorporate into conditions of approval for development they approve through the coastal development permit process. Additionally, a section on community scale planning presents multiple adaptation approaches within individual policies.

The Guidance is advisory and not a regulatory document or legal standard of review for the actions that the Commission or local governments may take under the Coastal Act. The Guidance is a tool to be used to help achieve the development of LCP policies that are consistent with the Coastal Act, in light of sea level rise. The Guidance is provided pursuant to Public Resources Code Section 30620(a)(3), which allows the Commission to adopt "[i]nterpretive guidelines designed to assist local governments, the commission, and persons subject to this chapter in determining how the policies of this division shall be applied in the coastal zone prior to the certification, and through the preparation and amendment, of local coastal programs. However, the guidelines do not supersede, enlarge, or diminish the powers or authority of the Commission or any other public agency." Thus, the Guidance is not a regulation or a mandate; however, it does provide the Commission's direction to local governments and other interested parties on how LCPs could address sea level rise.

It is worth noting that some elements of the Guidance closely track existing statutory and regulatory requirements that must be adhered to in order to achieve Coastal Act consistency. Other elements of the Guidance provide the Commission's direction on policy approaches that can be used to ensure Coastal Act consistency. And finally, some elements are suggestions to be considered and utilized where appropriate. Model policies are provided as a tool to assist local governments in developing their own LCP policies that will be subject to public review through the local planning process before being finalized. Using the model policies, where relevant, can help achieve Coastal Act consistency, but jurisdictions remain free to modify the policies or develop different policies, so long as they are consistent with the Coastal Act.

Note: The model policies presented in these interpretive guidelines are intended to provide guidance for the development of LCP policies, with an emphasis on applicability to residential development. **Not all approaches listed here will be appropriate for every jurisdiction, nor is this an exhaustive list of options**. In addition, looking at a single policy does not indicate how the entire LCP achieves compliance with the Coastal Act. Similarly, in this Policy Guidance, many of the model policies work together. For example, policies on setbacks rely on a policy requiring the site-specific hazard report that is needed to calculate the setback. Therefore, users of the model policies should consult all sections of this Guidance for assistance in understanding how the policies work together.

1. Background

Accelerating sea level rise will create greater risks for development and coastal resources in many of California's shoreline areas. While the Coastal Act requires minimizing risks to life and property from coastal hazards, it also mandates the protection of coastal habitats and other sensitive resources, maximization of public access and recreation along the coast, as well as the provision of priority visitor-serving and coastal-dependent or coastal-related development. The Coastal Act also calls for maximum public participation in the coastal planning process. The Coastal Commission's Sea Level Rise Policy Guidance, adopted in August 2015, can help planners, decision makers, project applicants, and other interested parties continue to achieve these goals in the face of sea level rise by addressing its effects in Local Coastal Programs and Coastal Development Permits. The intent of this Guidance is to build on the 2015 Sea Level Rise Policy Guidance to provide more specific details on how a community can address sea level rise impacts in Local Coastal Programs (LCPs), which are essential planning tools for fully implementing sea level rise adaptation efforts.[4] Careful planning is crucial to ensure that sea level rise adaptation actions such as hard armoring do not adversely impact coastal resources along the shoreline.

The Coastal Commission has made it a high priority to support LCP updates that address climate change, as demonstrated by the numerous goals, objectives and specific actions in the Commission's 2013 - 2018 Strategic Plan and in the agency's investment in the LCP Grant Program. The content of this Guidance is also aligned with other state-wide climate change and adaptation directives and efforts. For example, *Safeguarding California*[5] recommends hazard avoidance for new development, calls for protection of coastal resources, supports innovative designs and adaptation strategies for structures in areas vulnerable to sea level rise hazards, and encourages addressing climate impacts in Local Coastal Programs and General Plan updates. *Safeguarding California* also identifies the need for state agencies to produce guidance documents—such as this one—addressing climate adaptation.

The State of California, led by the Ocean Protection Council (OPC), is also in the process of updating the *State of California Sea-Level Rise Guidance*[6] to reflect recent advances in sea level rise science and to assist state agencies and local governments in incorporating sea level rise into their planning, permitting, and investment decisions. As such, the updated *State of California Sea-Level Rise Guidance* should be considered a resource for users of this Guidance for information on best available science and opportunities for coastal adaptation.

This Guidance reflects the input of public commenters, local governments, and state agencies. To solicit and encourage comments on the Draft Guidance, Commission staff conducted three public webinars, three conference calls with local governments, and multiple meetings with Commission district staff. Over a 2-month public comment period, 27 comment letters were received from private citizens, non-governmental agencies, local governments, state agencies, and others.

[4] The California Climate Adaptation Strategy (CNRA 2009) and Safeguarding California (CNRA 2014) specifically identify LCPs as a mechanism for adaptation planning along the California coast.

[5] http://resources.ca.gov/climate/safeguarding/

[6] http://www.opc.ca.gov/

Coastal Commission staff coordinated directly with State Lands Commission and OPC staff on their review of the Guidance as well.

Coastal Resources at Risk

Sea level rise has a number of effects, including increasing the risk of flooding, coastal erosion, and saltwater intrusion into freshwater supplies, which have the potential to threaten many of the resources[7] found along the California coast, including coastal access and recreation areas, habitats (e.g., wetlands, coastal bluffs, dunes, and beaches), coastal agricultural lands, water quality and supply, cultural resources, community character, and scenic quality. In addition, some sea level rise adaptation strategies, such as construction of barriers or armoring, can have adverse impacts on coastal resources. When hard structures are used to protect backshore development, they become barriers that impede the ability of beaches and habitats to naturally migrate inland over time and reduce sources of sand supply created by erosion that contribute to beach accretion. This process is commonly referred to as "coastal squeeze" and leads to the narrowing of beaches or shoreline coastal habitats. As sea level rises, coastal squeeze will eventually result in the loss of vulnerable intertidal and low-lying habitats, recreational beach areas and surfing resources if hardened shorelines are constructed and allowed to remain in the future as a way to protect existing development (See Figure 1).

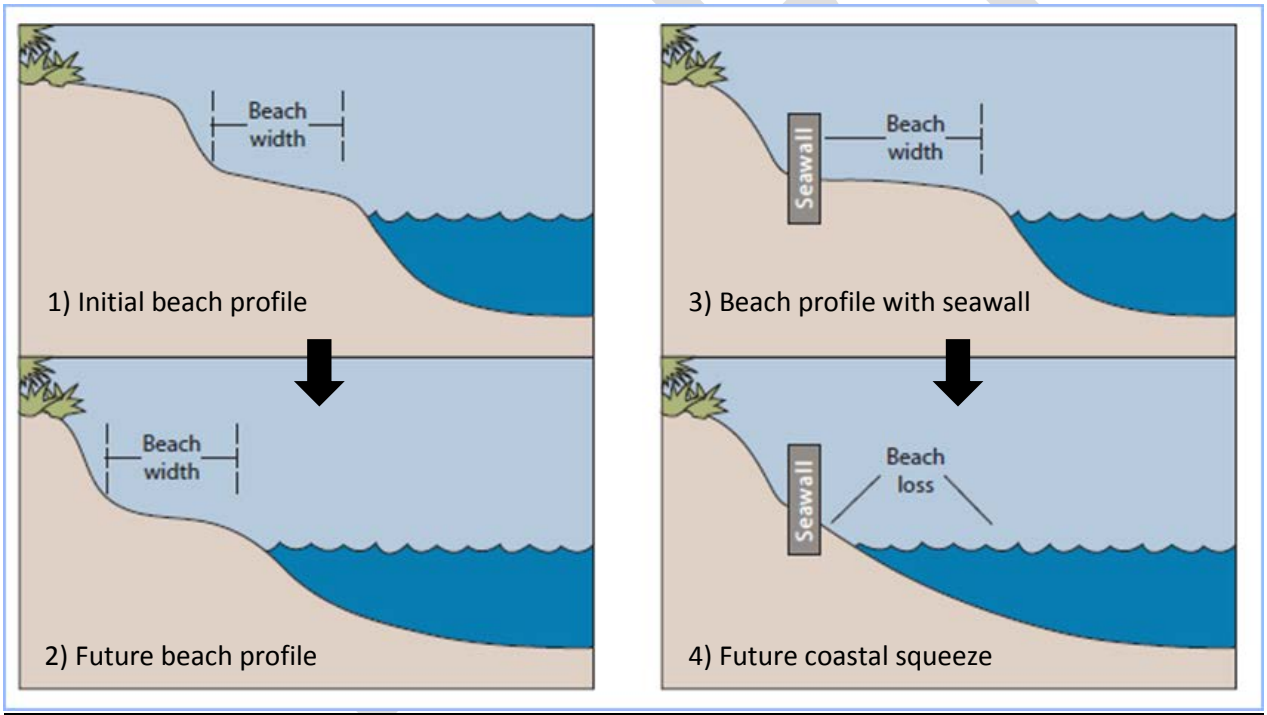


Figure 1. Coastal squeeze process resulting in beach loss due to future erosion and shoreline armoring[8]

Large scale impacts from sea level rise have only just begun, but the potential for future habitat loss is considerable. A recent USGS study found that 31-67% of beaches in southern California

[7] These resources are generally referred to in this Guidance as "coastal resources."

[8] Adapted using U.S. Army Corps of Engineers, 1991. Beach response to the presence of a seawall: Comparison of field observations. Technical Report CERC-91-1, 63 pp.

could be completely lost by the year 2100 without new management actions.[9] In addition to habitat loss, coastal squeeze could also result in the loss of coastal wildlife, including special status, rare and endangered species. As sea levels rise, any blocked migration of natural low-lying shoreline that supports special status species or protected habitats[10] could result in local species loss and have far reaching effects on wildlife populations[11]. For example, the California least tern, the Western snowy plover, and Ridgway's rail are just a few of the threatened and endangered species–already limited by resource extraction and development along the coast–that will be impacted by loss of habitat areas.

The loss or alteration of wetlands, which provide an array of ecosystem services and serve as important reservoirs of species diversity, is of particular concern. In addition to buffering the shoreline against wave action, many species only exist in these unique gradients of tidal inundation, salinity, flow velocity and elevation. Wetlands are also economically important in that they provide nurseries for commercial fish species, and habitat for special status pelagic fish, such as tidewater goby and steelhead. As with beach habitat, if wetland areas are unable to migrate inland as sea levels rise, due to barriers like armoring or development, this important habitat area will eventually be inundated, resulting in the loss of these associated benefits.

Furthermore, the consequences associated with coastal squeeze present a significant environmental justice issue. As described above, if private property owners armor their property to prevent damage associated with sea level rise, the armoring and perpetuation of development will result in the eventual loss of beach area in many places. In such cases, these actions will benefit a few private citizens at the cost of the larger beach-going public.

[9] Vitousek, S., Barnard, P.L, Limber, P., Erikson, L., Cole, B., 2017. *A model integrating longshore and cross-shore processes for predicting long-term shoreline response to climate change*. J. Geophysical Research Earth Surface, 122, 25pp.

[10] Under the Coastal Act, many coastal wetlands and all dune habitats are considered environmentally sensitive habitat areas (ESHA).

[11] See more information at Pacific Americas Shorebird Conservation Strategy, Audubon, (December 2016), available at: https://www.fws.gov/migratorybirds/pdf/management/PASCS_final_medres_dec2016.pdf .

Importance of LCPs

Addressing anticipated impacts of sea level rise in California falls directly within state and local governments' planning and regulatory responsibilities under the Coastal Act. State and local jurisdictions also have a responsibility to protect public trust resources (e.g., protection of public trust lands for public trust purposes, including maritime commerce, navigation, fishing, boating, water-oriented recreation, visitor-serving facilities and environmental preservation and restoration). Shoreline protection, especially when coupled with impacts of sea level rise, can

Sandpipers forage for food in the sand in Bodega Bay. Photo Credit: Kathleen Scavone

threaten public access and coastal resources in a manner that conflicts with the Coastal Act. Enacting policies to preserve and enhance California's beaches, public access, shoreline ecology, and other shorefront resources is especially important because these resources might be threatened by impacts of sea level rise sooner than development located behind shoreline armoring or located further inland. Thus, planning for sea level rise will require an array of adaptation strategies that can be implemented in different contexts and over different timescales.

LCPs contain the standards that govern future development and protect resources in the coastal zone, and development located between the first public road and the sea must also be consistent with the public access and recreation policies of the Coastal Act. Each LCP includes a Land Use Plan (LUP) and an Implementation Plan (IP). The LUP specifies the kinds, locations, and intensity of uses, and contains a required public access component to ensure that maximum recreational opportunities and public access to the coast are provided. The IP includes measures to implement the LUP, such as zoning ordinances. LCPs are prepared by local governments and submitted to the Coastal Commission for review and certification for consistency with Coastal Act requirements.[12]

To be consistent with the Coastal Act hazard and resource protection policies, it is critical that local governments with coastal resources at risk from sea level rise certify or update Local Coastal Programs to provide a means to prepare for and address these impacts. Although the

[12] In addition, there are other areas of the coast where other plans may be certified by the Commission, including Port Master Plans for ports governed by Chapter 8 of the Coastal Act, Long Range Development Plans for state universities or colleges, and Public Works Plans for public infrastructure and facilities. Following certification of these types of plans by the Commission, some permitting may be delegated pursuant to the Coastal Act provisions governing the specific type of plan.

existing LCP certification and update processes are still the same, sea level rise calls for new regional planning approaches, new strategies, and enhanced community participation. Accordingly, the impacts of accelerated sea level rise should be addressed in LCP chapters pertaining to hazard and coastal resource analyses, public access, community outreach, public involvement, and regional coordination. This Guidance is designed to assist jurisdictions in creating or updating their LCPs by providing model policy language and recommendations pertaining to residential shoreline development.

While the document is intended to guide LCP planning and development decisions to ensure effective coastal management actions, **it is advisory and does not alter or supersede existing legal requirements, such as the policies of the Coastal Act and certified LCPs**. Since many existing LCPs were certified in the 1980s and 1990s, it is important that future amendments of the LCPs consider sea level rise and adaptation planning at the project and community level, as appropriate. One of the Commission's top priorities is to coordinate with local governments to complete and update LCPs in a manner that adequately addresses sea level rise.

Shoreline Residential Development Types/Patterns

This Guidance focuses on residential development because it is one of the most prevalent community development patterns along California's coast, and thus poses one of the more frequent hazards management challenges. Much of this challenge results from the overall pattern of residential development along California's coast that, for the most part, was established before the Coastal Act. Within many of these residential areas there is typically a mixture of structures built before and after enactment of the Coastal Act. In addition, many of California's urban coastal areas were built out during the post-WWII development boom that also coincided with a relatively "calmer" coastal period that had fewer, less intense storms. Thus, when the Coastal Act was passed in 1976, the State inherited many fixed development patterns in inherently hazardous coastal locations, perhaps due to an artificially low appreciation of the inherent risks in these locations at the time they were developed. The El Niños of 1977-78 and 1982-83 marked the end of the "calm" period and caused enormous amounts of property damage, shoreline erosion, and also often led to emergency shoreline armoring.

Policymakers seeking effective responses to sea level rise in California must confront the inherent complexity of the challenge: California has more than 1271 miles of main coastline, with a diversity of physical environments, ranging from high cliffs to low river mouths; rocky substrates to sandy dunes; high wave energy exposed beaches to lower energy estuarine and bay environments.[13] The vulnerability of urban infrastructure that supports residential development further complicates sea level rise planning challenges. In many cases, local jurisdictions will need to consider adaptation strategies for infrastructure, including roads, as they develop their community vision for addressing impacts of sea level rise on their shorelines. While outside the scope of this Guidance, the Commission plans to provide future guidance on sea level rise planning for infrastructure.

Categorizing California's residentially-developed areas in a typology can help organize approaches for sea level rise adaptation. Typologies are systematic classifications of groups that have characteristics in common. Many fields use typologies to facilitate ordering of information for communication and outreach, from linguistics to natural resource management to climate

[13] *See generally,* LIVING WITH THE CHANGING CALIFORNIA COAST (Gary Griggs et al. eds., 2005).

adaptation.[14] In the case of hazards management, using a typology to describe residential development on the California coastline affirms the diversity of development contexts in California, and thus the complexity of the planning challenge, but it can also help frame the variety of key planning issues important for addressing sea level rise in particular places. Table 1 describes a conceptual grouping of shoreline residential development types.

Table 1. Shore development typology groups with associated subtypes

Shore Development Type		Subtype			Example (See Box 1)
1	Urban blufftop	a) Low	b) High		Solana Beach
2	Urban beachfront	a) Beach	b) Dune		Broad Beach
3	Low density blufftop	a) Low	b) High		Big Lagoon
4	Low density beachfront	a) Beach	b) Dune		Stinson Beach
5	Urban estuary	a) Bay	b) River	c) Marsh	Newport Beach
6	Low density estuary	a) Bay	b) River	c) Marsh	Bodega Bay

Considering the shoreline, backshore landscape and residential intensity patterns, this conceptual typology can describe the most common settings that bound the diverse development patterns along the California shoreline. Subtypes represent the geomorphic landscape for developed neighborhoods that are located on the beachfront, blufftop, or in other low-lying environments. The estuary type broadly covers low-lying shorelines characterized by some mixing of freshwater and saltwater, as seen at river mouths, lagoons, bays, and saltmarsh. The shore development type in combination with subtype gives a more useful level of detail to planners who are identifying the policies and ordinances to apply to development in their communities.

The variations of residential development patterns along California's coast affirm the importance of understanding context when developing policy. The presence of armoring to protect existing structures signifies a hazardous condition already exists that may be exacerbated over time. It also illustrates it may be difficult to generalize how to implement "adaptation" along the shoreline in specific places. In fact, multiple shoreline types and existing development patterns, with and without armoring, are often found within single jurisdictions (Figure 2). Box 1 presents examples of how current and future coastal hazards in California are being addressed for the shore development types presented in Table 1.

Communities will need to consider more than just geomorphic types when planning for sea level rise. For example, the presence of public accessways, critical infrastructure like roads and sewer lines, sensitive habitat, and socioeconomic factors are also important considerations when adaptation strategies are being identified for any stretch of vulnerable shoreline. Depending on the presence of these factors, adaptation planning might engage different stakeholders or adjust outreach strategies. Moreover, planning for sea level rise in an LCP context will require multiple policies and phased approaches. In some cases, a near term strategy might involve shoreline protection for existing structures, while in others new development and redevelopment should be set back from the shoreline to avoid armoring entirely. A list of model policies a community might consider for different shoreline types follows in Table 2. While not exhaustive, and while not every solution will fit each local context, jurisdictions should consider these policies as they

[14] Y. T. Maru, J. Langridge & B. B. Lin, *Current and Potential Applications of Typologies in Vulnerability Assessments and Adaptation Science* (CSIRO Climate Adaptation Flagship, Working Paper No. 7, 2011), https://research.csiro.au/climate/wp-content/uploads/sites/54/2016/03/7_Typologies-Adaptation_CAF_pdf-Standard.pdf.

begin their LCP planning process for insight and ideas on how to address sea level rise in their own communities in a manner that is consistent with the Coastal Act.

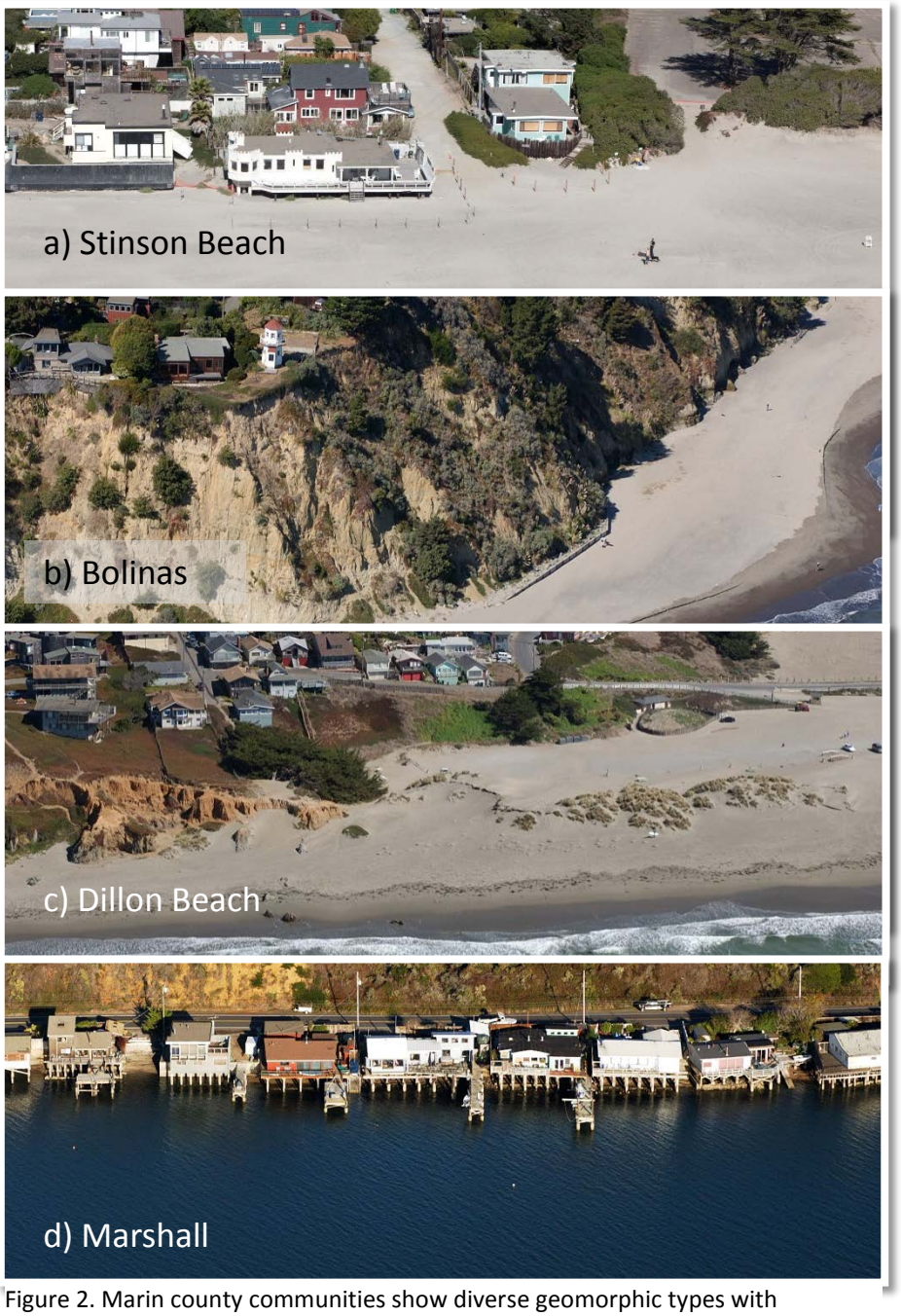


Figure 2. Marin county communities show diverse geomorphic types with residential development – a) beach, b) bluff, c) dune, and d) estuary. (Photos from Coastal Records Project)

Box 1. Examples of typology groups

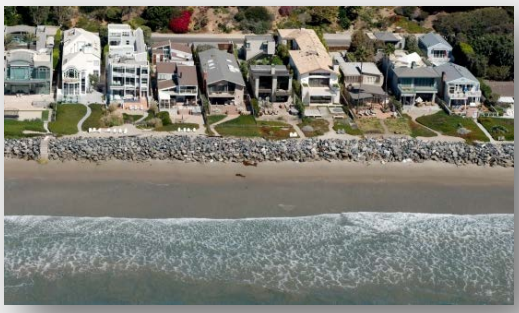
1. URBAN BLUFFTOP: SOLANA BEACH, SAN DIEGO COUNTY

The Solana Beach community is built out along the shoreline, and the beaches below the existing blufftop residential development are highly valued public access and recreational resources. They are also subject to constant wave attack and long-term erosional trends. The cliffs themselves are high and do not provide stable development sites without reliance on measures such as significant setback distances (with the 100-year geologic setback located in the street for some lots), or structural options such as substantial foundation development such as deep caissons (subterranean concrete piers), or beach-level seawalls and mid- and upper-bluff retention structures. The primary adaptation challenge in Solana Beach has been how to protect existing blufftop development while not losing the beach below or the aesthetic of the natural cliff form. Much of this development is now protected by seawalls and upper bluff retention structures that prevent natural retreat of the beach and result in loss of beach resources. However, maintaining the existing development pattern will likely lead to long-term loss of beach resources without significant retreat of blufftop development or measures such as sand replenishment. Given the current extent of shoreline armoring in Solana Beach, mitigation strategies for the impacts of shoreline protective devices, and limitations on redevelopment in non-conforming locations, will be critical to effective long-term protection of the beach environment. The Cities of Solana Beach and Encinitas also are hoping to benefit from a federally-sponsored, 50-year beach replenishment effort slated to begin sometime in 2018-19.

Solana Beach, Coastal Records Project.

2. URBAN BEACHFRONT: BROAD BEACH, LOS ANGELES COUNTY

More than 100 homes first constructed in the 1930's and redeveloped over the decades sit along Broad Beach just inland of the ocean. Over the last several decades, Broad Beach has eroded significantly and this has placed the homes, backyards and septic systems in danger. A 0.8 mile-long emergency rock revetment was constructed to protect the homes, resulting in the loss of significant beach area and covering many existing public lateral access dedications previously required by the Coastal Commission and now held by the State Lands Commission. The homeowners formed a Geological Hazard Abatement District (GHAD) to address the shoreline erosion and beach management problem collectively. The GHAD is a type of local assessment district that can enable communities to pool resources to conduct hazards studies and fund adaptation measures. Among other strategies, the Broad Beach GHAD proposes a 20-year beach replenishment program to maintain the beach in front of the revetment, which would be buried under a restored coastal dune complex. The Broad Beach project raises significant issues about the long-term impacts of the beach homes and associated revetment on the beach; public access and recreation; and ecological value of the dune and beach complex, which will



Broad Beach, Coastal Records Project.

likely require frequent maintenance. Concerns also exist about the potential impacts of the proposed sand replenishment on beach and marine habitats, including sensitive offshore habitats in the Point Dume State Marine Conservation Area. Therefore, adaptive management relying on a series of monitoring thresholds has been proposed to ensure resources are being adequately protected.

3. LOW DENSITY BLUFFTOP: BIG LAGOON, HUMBOLDT COUNTY

Big Lagoon, Coastal Records Project.

The Big Lagoon area illustrates how a relatively less dense, more rural development context allows for the use of managed retreat and relocation for both existing and new development. Big Lagoon is in the northern part of Humboldt County, composed of an uplifted marine terrace approximately 40-90 feet above mean sea level. Many of the parcels in the area are used for commercial timber harvesting and rural residences. Bluff erosion and geologic instability currently pose risks to many existing structures located on bluff edges, and sea level rise will increase erosion rates in the future. Sudden catastrophic bluff failure events have already led to emergency relocations of homes (starting in the 1940s) along the bluffs between Big Lagoon and Patrick's Point. One recent example of planning for retreat and relocation occurred in 2015 when Humboldt County submitted an LCP amendment to reconfigure the boundary lines between existing Residential Estates (RE) and Coastal Commercial Timberland (TC) land use and zoning designations to allow relocation of 14 existing cabins away from the bluffs. The proactive planned relocation of development in Big Lagoon was also mirrored in a case of proposed new development in a hazardous blufftop area of Humboldt County. At the parcel-scale, just downcoast of the Big Lagoon cabin development on the same high eroding bluff formation, the Coastal Commission relied on a "takings override" finding to approve a new house in February 2014 (Winget project). The agency used the best available scientific projections for sea level rise and erosion rates to determine that the proposed house would last about 50 years before it needed to be removed to avoid falling to the beach below. Rather than deny the project entirely, the Commission conditioned it to incorporate adaptive measures that allow for an economic use of the site as long as possible, by requiring the property owners to monitor the bluff edge as erosion continues to encroach on the development until bluff retreat reaches a point at which the authorized structure must be removed. In this way, the property owners can maximize the amount of time they can safely stay in their residence, while ensuring that new development will minimize hazards and remain structurally stable for its useful life.

4. LOW/MEDIUM DENSITY BEACHFRONT: STINSON BEACH, MARIN COUNTY

There is significant residential development along the shoreline of Marin County's Stinson Beach community that is subject to long term erosion, wave run-up, coastal flooding, septic failure, and water distribution pipe failure. Calle del Arroyo, a principal access road to the Calles, Patios, and Seadrift neighborhoods of Stinson Beach, may also experience increased flooding and eventual permanent inundation, severely limiting access and utility infrastructure to portions of the community. Flooding from Bolinas Lagoon and Easkoot Creek already occurs and will likely worsen with future rising sea levels. In the past, Marin County has generally allowed redevelopment of beach homes if they comply with FEMA flood elevation rules, but this has resulted in some elevated structures that raise concerns about visual resources and community character, as well as beach access and recreation. The county is currently recommending a policy of requiring structures to be raised 3 feet above FEMA's Base Flood Elevation to account for sea level rise. Over the longer-run there is a concern that the mean high tide line, and thus public trust lands, will migrate to and eventually under elevated homes on the beach. This eventuality demonstrates the need to more comprehensively address the potential conflict between coastal hazard mitigation and coastal resource protection, including protection of the public trust interest in tidelands.

Stinson Beach, M. Matella

5. DEVELOPED ESTUARY: NEWPORT BEACH, ORANGE COUNTY

Estuarine environments present a different set of sea level rise policy concerns compared to developed bluffs or beaches. The development of Newport Bay Harbor was authorized in 1934 and carried out by the Army Corps of Engineers. Islands within Newport Bay were built-up using dredged sediments within the estuary, and now residences and small piers are common in the bay. Increased erosion, loss of coastal wetlands, permanent or periodic inundation of low-lying areas, increases in coastal flooding, and salt water intrusion are all expected sea level rise impacts facing Newport Beach. Structures on islands within Newport Bay and the bayside of Balboa Peninsula typically rely on bulkheads (retaining wall structures similar to seawalls but typically not designed for wave impacts) to ensure protection against coastal flooding and shoreline retreat. Most immediate sea level rise adaptation measures in Newport Bay will be to reinforce and elevate those existing bulkheads. However, protection of the public tidelands for public use is a primary concern and must be addressed on a comprehensive basis.

Newport Beach, Coastal Records Project.

6. LOW DENSITY ESTUARY: BODEGA BAY, SONOMA COUNTY

The Sonoma County coast supports agricultural lands, timber preserves, open space areas, recreational lands, and low-density community development. In contrast to Newport Bay, Bodega Harbor is a small shallow natural harbor in Sonoma County, protected from the larger expanse of Bodega Bay to the south by a narrow spit of land. The area has relatively low density residential development, and large expanses of natural habitat, both in tidal mudflats and salt marsh, presenting different policy questions than the highly urbanized context of Newport Bay. For example, in one recent coastal permit application, the Coastal Commission found that there was a policy conflict and applied the conflict resolution provision of the Coastal Act to provide protection of wetlands (considered environmentally sensitive habitat area [ESHA]) in Bodega Bay while allowing redevelopment of the existing Lundberg residence. The residence was moved out of ESHA and special conditions put in place to mitigate the impacts from the development. These conditions included a revised habitat restoration and monitoring plan; restrictions on future development, including a prohibition on development within sensitive habitat areas; and a restriction on future shoreline protective devices.

Bodega Bay, Coastal Records Project.

Table 2. List of model policy options (see Section 6 for full model policy language). Note, this list is not exhaustive and selected policies should be customized for each local context.

UNDERSTANDING SEA LEVEL RISE HAZARDS
A.1 Identifying and Using Best Available Science
A.2 Identifying Planning Horizons
A.3 Mapping Coastal Hazards
A.4 Site-specific Coastal Hazards Report Required
A.5 Coastal Hazards Report Contents
A.6 Assumption of Risk
A.7 Real Estate Disclosure of Hazards
AVOID SITING NEW DEVELOPMENT OR PERPETUATING REDEVELOPMENT IN HAZARD AREAS
B.1 Siting to Protect Coastal Resources and Minimize Hazards
B.2 Removal Plan Conditions for New Development in Hazardous Areas
B.3 Reliance on Shoreline Armoring
B.4 Bluff Face Development
B.5 Determining Bluff Setback Line
B.6 Minor Development in Hazardous Areas
B.7 Definition of Redevelopment
B.8 Nonconforming Structures in Areas Subject to Coastal Hazards
B.9 Restrict Land Division in Hazardous Areas
B.10 Takings Analysis
DESIGN FOR THE HAZARD
C.1 Adaptive Design
C.2 Design Guidelines to Reduce Greenhouse Gas Emissions
MOVING DEVELOPMENT AWAY FROM HAZARDS
D.1 Removal Conditions/Development Duration
D.2 Contingency Funds
D.3 Mean High Tide Line Survey Conditions
MOVING HAZARDS AWAY FROM DEVELOPMENT
E.1 Habitat Buffers
E.2 Non-structural Shoreline Armoring
E.3 Avoid Adverse Impacts from Stormwater and Dry Weather Discharges
E.4 Flood Hazard Mitigation
BUILDING BARRIERS TO PROTECT FROM HAZARDS
F.1 Shoreline and Bluff Protective Devices
F.2 Prioritization of Types of Shoreline Protection
F.3 Siting and Design to Avoid and to Mitigate Impacts
F.4 Repair and Maintenance of Shoreline Armoring
F.5 Evaluation of Existing Shoreline Armoring
F.6 Shoreline Armoring Duration
F.7 Shoreline Armoring Mitigation Period
F.8 Shoreline Armoring Monitoring

F.9 Limits on Future Shoreline Armoring
F.10 Bulkheads for Waterfront Development
F.11 Emergency Permits
COMMUNITY SCALE ADAPTATION PLANNING
G.1 Management of Sea Level Rise Hazards
G.2 Adaptation Plan
G.3 Adaptation Plan for Highly Vulnerable Areas
G.4 Sea Level Rise Hazard Overlay Zone
G.5 Beach Open Space Zone
G.6 Beach Nourishment
G.7 Improve Drainage on Bluffs to Reduce Erosion
G.8 Repetitive Loss
G.9 Beach Management Plan
G.10 Managed Retreat Program
G.11 Transfer of Development Rights Program
G.12 Geologic Hazard Abatement Districts (GHADs) and County Service Areas (CSAs)
G.13 Aligning LCPs with Local Hazard Mitigation Plans (LHMPs)

2. Policy Recommendations for All Hazardous Areas

Broadly, communities planning for sea level rise will need to embark on a process to learn about 1) the increasing hazards that threaten their communities and its coastal resources, 2) what options exist for protecting their threatened built and natural assets, and 3) what adaptation pathway choices are suitable given social, economic, legal, coastal resource, and environmental justice concerns. This planning process includes identifying how and where to apply different adaptation mechanisms based on Coastal Act requirements, other relevant laws and policies, acceptable levels of risk, and community priorities. The list of model policies above (Table 2) and the discussion below is not exhaustive, but provides an introduction to a variety of options that are potentially applicable in most communities.

By planning ahead, communities can reduce the risk of costly damage from coastal hazards, can ensure the coastal economy continues to thrive, and can protect coastal habitats, public access and recreation, and other coastal resources for current and future generations. While adaptation strategies should be chosen based on the specific risks and vulnerabilities of a particular region or project site, in the context of applicable Coastal Act and LCP requirements, there are some policy concepts that are likely needed to ensure compliance with the Coastal Act in all hazardous areas. These policy concepts include:

- using the best available science to evaluate and understand sea level rise hazards and adaptation responses;
- requiring risks to be disclosed;
- avoiding and minimizing hazards through siting and design;
- planning for removal of threatened development in some circumstances;
- regulating redevelopment;
- preparing for emergency permits; and
- developing adaptation plans.

These policy concepts are presented in the model policies. As described above, utilizing the model policies can help ensure Coastal Act consistency, but jurisdictions remain free to modify the policies or develop different policies, so long as they are consistent with the Coastal Act and other applicable laws and regulations.

Evaluate and Communicate Risks Using Best Available Science

The Coastal Act requires new development to minimize hazards and protect coastal resources. In addition, the Coastal Act calls for the use of sound science to guide its decision making and to support public understanding and participation in coastal planning.[15] To ensure development of policies that are consistent with these Coastal Act requirements in the local context, it is important that all local governments undertake vulnerability assessments and begin the adaptation planning process. These steps will provide the information needed to allow local governments to develop policies that can ensure that new development is safe, and that coastal resources and public access are protected consistent with the Coastal Act as the sea level rises. As a general matter, all communities should embrace the best available science and analyze a range from moderate to high projections of sea level rise in their planning for coastal hazards. Vulnerability assessments and hazards maps should be regularly updated as best available science develops. If detailed local

[15] See for example Coastal Act Sections 30006.5 and 30335.5.

vulnerability assessments have not been completed, the planning and project design process can rely on increasingly available mapping tools.[16] Model Policies A.1 – A.5 demonstrate model options for integrating best available science on sea level rise into LCP planning through use of sea level rise scenarios, mapping, and technical reports.

Ongoing monitoring of conditions on the ground will also be important for implementing adaptation strategies at the appropriate time; thus, communities should consider developing monitoring programs. Monitoring can occur on a site-specific basis (e.g., Model Policy F.8 – Shoreline Armoring Monitoring) or on a community scale, through adaptation programs that rely on specific thresholds to trigger implementation of adaptation phases (e.g., Model Policy G.9 – Beach Management Plan). Since regional, state and federal monitoring is being done in some locations throughout California, there may be existing monitoring with which this site-specific or community scale monitoring could coordinate.

Disclose Risks and Require Property Owners to Assume Risks

The Coastal Act requires hazards to be minimized. It also calls for the "orderly, balanced utilization and conservation of coastal zone resources taking into account the social and economic needs of the people of the state."[17] It further requires maximum public participation in decision-making, including through the support of public education and understanding of coastal resource issues. Thus, all communities should be considering planning horizons and phased approaches that inform property owners and the public about foreseeable hazard and planned adaptation through such mechanisms as hazard overlay zones, deed restrictions, real estate disclosures, and assurances or waivers of rights based on defined triggers sensitive to the specific planning context. Local governments should consider LCP updates that account for the intent of Model Policies A.1 – A.7 and G.1 – G.2 when addressing sea level rise. Disclosing risks to current and future property owners helps ensure that property owners will plan with these hazards in mind and will help set reasonable economic expectations for future development. Similarly, requiring property owners to assume the risks of developing in hazardous locations will help avoid the need to spend public funds on disaster recovery for private development and will ensure future owners are aware of limits on the use of shoreline armoring that harms coastal resources.

Avoid and Minimize Hazard Risks through Siting and Design

The Coastal Act requires development to be resilient and safe, while assuring the protection of shoreline recreational resources and ecological values. Avoiding and minimizing flooding risk and erosion impacts through setbacks, siting, and design decisions that locate development at safe distances from potential hazards should be the first consideration for all types of new development. Greater setback distances can provide safer locations for new development as sea levels rise in the future, so these types of policies are important planning tools to accompany the use of best available science for understanding future hazards. Restricting land division in hazard zones can also help avoid increasing hazard risks to coastal development.

The long-term effectiveness of avoidance strategies depends on the level of vulnerability a property experiences and whether existing development patterns (densities, lot sizes, etc.) allow for siting to avoid hazards. These strategies are low cost compared to armoring solutions or other

[16] For a list of available mapping tools, see CCC Sea Level Rise Policy Guidance, Appendix C.
[17] See Section 30001.5

adaptation strategies. Model Policies B.1 – B.6 and E.4 should be considered to promote the safe location of new development.

Plan for Future Removal of Threatened Development

Although siting and design measures should minimize risks, ensure the stability of development, ensure the provision of adequate services (e.g., roads, water and sewer), and protect coastal resources over the expected life of the development, coastal hazards are not entirely predictable. Thus, to address residual uncertainty and risks, it will sometimes be necessary to plan for future adaptation or removal of development in order to achieve consistency with the Coastal Act. Model Policy D.1 suggests language that would ensure future removal when needed, including when development is threatened, or becomes located on public trust property and impairs public trust resources at the site.[18]

Regulate Redevelopment

Communities updating their LCPs to address sea level rise must require new development, including redevelopment, to meet standards to assure safety and structural stability and protect coastal resources under expected future conditions. However, because redevelopment often occurs incrementally, it can be hard to distinguish redevelopment from repair and maintenance, and from improvements to an existing structure that fall short of redevelopment. The Commission's regulations indicate that the replacement of 50% or more of a structure constitutes a new replacement structure (CCR Section 13252(b)). Thus, LCP policies must, at a minimum, define development that exceeds this 50% threshold as redevelopment that must meet all relevant, current LCP standards.

Generally, routine repair and maintenance of, and improvements to, residential structures are exempt from coastal development permitting requirements unless the structures are located in sensitive areas or include certain components, as specified in the Commission's regulations.[19] Repairs or improvements that are not exempt, and that do not constitute redevelopment, generally may be allowed if the new development is consistent with relevant LCP and Coastal Act policies and does not increase the non-conformity of the existing structure. However, at a certain point, substantial alterations to a home can no longer be considered repair and maintenance, but instead must be evaluated as new development. Including redevelopment standards in LCPs is crucial to ensure that existing, non-conforming structures in hazardous locations are not allowed to be replaced—either all at once or piece by piece—unless the new structures are brought into conformity with LCP policies, including policies that address coastal hazards.

At a minimum, redevelopment should be defined as work that includes replacement of 50% or more of the major structural components of the building. Local governments may also use additional definitions, such as limits based on improvements costing more than 50% of the assessed or appraised value of the existing structure. Under these definitions, cosmetic repairs, interior renovations, and routine external repairs such as re-shingling a roof or replacing worn siding, generally do not constitute redevelopment.

[18] See section 4, Legal Considerations, below, for additional discussion related to the issue of removing residential development that becomes located on public trust lands.

[19] See Coastal Act § 30610(a), (d), 14 Cal Code Regs §§ 13250, 13252, 13253, and corresponding LCP provisions. Some jurisdictions may also have categorical exemptions that have been certified by the Commission that exempt other types of development from permitting requirements.

Redevelopment definitions can be used to provide a foundation for implementing additional adaptation strategies in vulnerable areas and to ensure that new development is built in safer locations. Rebuilding and redevelopment restriction strategies could be used to limit the ways a property owner can rebuild or renovate a structure located in a sea level rise hazard zone or non-conforming location subject to risk. If the site allows, a structure, or portions of it, could be set back from the coastal hazard as it redevelops. Other more design-based approaches (such as elevation) that attempt to maintain development in such areas while still minimizing hazards risks in conformity with the LCP and Coastal Act, may also be appropriate in certain circumstances. Redevelopment policies should be coupled with real estate disclosures (Model Policy A.7) to inform buyers of the sea level rise hazards and future development restrictions.

These strategies are generally low cost compared to armoring solutions, and they allow property owners to continue use of their property until rebuilding restrictions, insurance cost, or safety concerns might phase out high-risk and high-impact development over time.[20] Model Policies B.7 – B.8 offer examples of redevelopment and nonconforming structure policies.

Prepare for Emergency Permits

When known hazards are avoided, the need for shoreline protective devices and emergency action should diminish. Nevertheless, as sea level rise exacerbates or creates new hazards along the shoreline, there may be increasing requests for emergency permits to construct shoreline protection or other development to abate an emergency. An emergency is defined as a sudden, unexpected occurrence demanding immediate action to prevent or mitigate loss or damage to life, health, property, or essential public services. If the local government finds that such a situation exists and the proposed development is the minimum necessary to abate the emergency, it may issue an emergency permit. Property owners who file for emergency permits should propose emergency measures that are temporary in nature, the minimum required to address the imminent threat, and the least environmentally damaging feasible alternative for addressing the immediate emergency episode. For example, emergency development should be easily removable, if feasible. Emergency permits must include several conditions, including an expiration date for the permit and the requirement to apply for a follow up regular coastal development permit. A model policy with procedures for granting emergency permits is included as policy F.11.

Develop Adaptation Plan

The Coastal Act requires protection of coastal resources, including provision of maximum public access, prioritizes coastal-dependent and coastal-related development over residential and other uses, and calls for maximum public participation in decision-making. A community visioning process and development of an adaptation plan are key to scoping the appropriate strategies a community will implement over time to address sea level rise hazards consistent with the Coastal Act. By using Model Policies such as G.1-G.3, communities can assess vulnerabilities and explore adaptation options before threats become imminent. In preparing an adaptation plan, communities should consider a range of adaptation approaches (see below, "Developing Adaptation Approaches for Specific Areas") and evaluate them according to their impact on coastal resources, effectiveness at reducing risk, costs, and feasibility (technical, legal, social and political).

[20] McGuire, C. J. Adapting to sea level rise in the coastal zone: Law and policy considerations. CRC Press, 2013.

A challenge that local governments face in convening public forums to discuss adaptation is engaging all stakeholder groups in the public process, including capturing the input of both inland residents who recreate at local beaches as well as local shoreline property owners. It is important to coordinate with partners and include all relevant stakeholders in these processes, particularly those who are typically isolated, such as residents of low-income or underserved communities. Sustained education and outreach with information on sea level rise science and potential consequences may motivate stakeholders to take an active role in updating the LCP for sea level rise adaptation. Additionally, education efforts regarding the risks of sea level rise as well as possible adaptation strategies may encourage people to take proactive steps to retrofit their homes to be more resilient or to choose to build in less hazardous areas.

An adult Western Snowy Plover and its chick nest on the beach at Coal Oil Point in Santa Barbara County. Western Snowy Plovers are threatened due to loss of habitat. Photo Credit: Chuck Graham

3. Developing Adaptation Strategies for Specific Areas

After evaluating vulnerability and establishing policies to be used throughout hazardous areas, communities can begin the process of identifying and evaluating adaptation strategies for specific areas. In most cases, especially for LCP land use and implementation plans, multiple adaptation strategies will be needed and every community will need to assess their risks and their potential options. In some cases, there will be more than one option for how to address the risks and impacts associated with sea level rise consistent with the Coastal Act. However, choosing to "do nothing" or following a policy of "non-intervention" will likely lead to unacceptable exposure to hazards and impacts to coastal resources, and can place a strain on community resources following a major storm or other disaster. Many strategies for addressing sea level rise hazards will require proactive planning to ensure protection of coastal resources and development. Adaptation strategies generally fall into three main categories: protect, accommodate, and retreat (Figure 3).

Protect: Protection strategies refer to those strategies that employ some sort of engineered structure or other measure to defend development (or other resources) in its current location, oftentimes without changes to the development itself. Protection strategies can be further divided into "hard" and "soft" defensive measures or armoring. "Hard" armoring refers to engineered structures such as seawalls, revetments, caissons[21], and bulkheads that defend against coastal hazards like wave impacts, erosion, and flooding. "Soft" alternatives refer to the creation or enhancement of natural or "green" infrastructure like beaches, dune systems, wetlands, and other systems to buffer coastal areas. Strategies like beach nourishment, dune enhancement, or the construction of "living shorelines" capitalize on the natural ability of these systems to protect coastlines from coastal hazards while also providing benefits such as habitat, recreation area, more natural aesthetics, and the continuation or enhancement of ecosystem services.

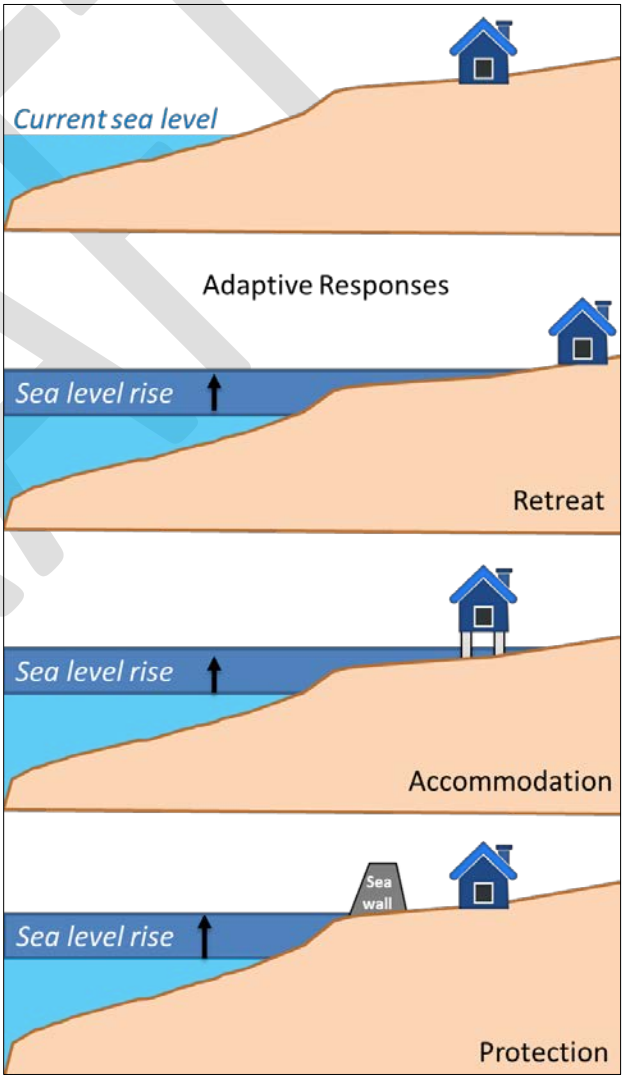


Figure 3. Strategies for adaptation to sea level rise.

Accommodate: Accommodation strategies refer to those strategies that employ methods that modify existing developments or design new developments to decrease hazard risks and thus increase the resiliency of development to

[21] The Commission has often found caissons and other simila bluff tops and shorelines to be a form of shoreline armoring.

the impacts of sea level rise. On an individual project scale, these accommodation strategies include actions such as floodproofing retrofits and/or the use of materials meant to increase the strength of development, building structures that can easily be moved and relocated, elevating structures, or using larger setbacks. On a community-scale, accommodation strategies include any of the land use designations, zoning ordinances, or other measures that require the above types of actions, as well as strategies such as clustering development in less vulnerable areas or requiring mitigation actions to provide for protection of natural areas even as development is protected. Many accommodation options might also be considered protection (i.e., caissons and elevation).

Retreat: Retreat strategies are those strategies that relocate or remove existing development out of hazard areas and limit the construction of new development in vulnerable areas. These strategies include land use designations and zoning ordinances that encourage building in more resilient areas or gradually removing and relocating existing development. Acquisition and buy-out programs, transfer of development rights programs, and conditioning the approval of new development to be removed upon the occurrence of future triggers are examples of strategies designed to encourage managed retreat.

For purposes of implementing the Coastal Act statewide, no single category or even specific strategy should be considered the "best" option as a general rule. Different types of strategies will be appropriate in different locations and for different hazard management and resource protection goals. In addition, the effectiveness of different adaptation strategies will vary across both spatial and temporal scales. In some cases, a hybrid approach that uses strategies from multiple categories will be necessary. Also, the suite of strategies chosen may need to change over time to address increased sea level rise and associated increased exposure to hazards as sea level rise exacerbates storm surge and high waves. The legal context of various options will also need to be considered in each situation and ultimately, adaptive responses will need to be consistent with the Coastal Act and other legal principles. Figure 4 shows the basic conceptual stages that communities can step through when developing an adaptation plan: 1) Evaluate hazards and vulnerable areas; 2) Identify the assets at risk (built and natural environments); 3) Analyze alternative adaptation strategies; 4) Apply a legal framework to inform feasible adaptation strategies (*See* Section 4. Legal Considerations); and 5) Identify feasible, preferred adaptation strategies. Determination and selection of feasible, preferred adaptation options should also include an analysis of costs, benefits, and other factors such as how adaptation strategies will impact socially vulnerable groups of people both in and outside the community. Analyzing adaptation strategy alternatives is discussed in more detail below.

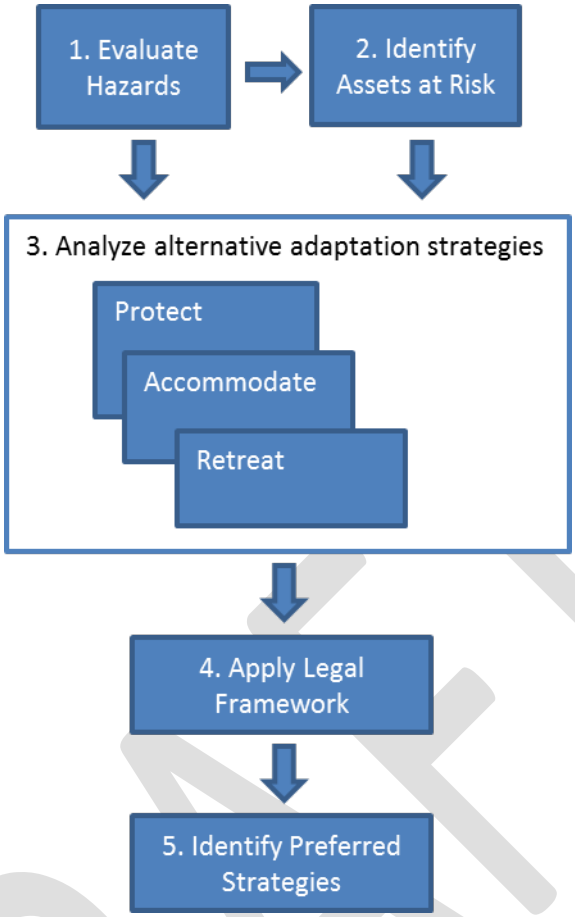


Figure 4. Planning Framework

Analyzing Alternative Adaptation Strategies

The Coastal Act requires maximum public participation in coastal planning, including in Section 30006, which states:

> *The Legislature further finds and declares that the public has a right to fully participate in decisions affecting coastal planning, conservation, and development; that achievement of sound coastal conservation and development is dependent upon public understanding and support; and that the continuing planning and implementation of programs for coastal conservation and development should include the widest opportunity for public participation.*

To comprehensively address sea level rise, communities must effectively communicate future vulnerabilities to the public, property owners, local governments, and other stakeholders. This can be done by involving the public and decision makers in early discussions regarding coastal hazards, assets at risk, and potential cost estimates of various adaptation options, and conducting a visioning process to plan for the future shoreline using short- and long-term adaptation goals. This process can educate stakeholders and help decision makers prioritize certain actions that are quickly identified as advantageous. From an economic perspective, understanding the costs and benefits of adaptation strategies will help communities identify and prioritize LCP policy approaches that will address sea level rise impacts. In addition, existing statutory and regulatory requirements will inform the selection of options, and any LCP policies ultimately must conform

to the goals and objectives of the Coastal Act.

When adaptation can address a large risk of near term harm immediately, and still provide benefits in the future, the economics can provide incentives for action. [22] In some cases, beach replenishment, wetland protection, or even elevating structures might provide these benefits. By addressing risk with adaptation strategies that protect ecosystems, ensure public access, and avoid hazards, communities can work to enhance their coastal resources before resource loss occurs. Additionally, strategies that have a small cost to reduce risk should be a part of a community's adaptation framework. Some of these policies might include setback requirements, designing structures so they can be moved, and requiring larger storm drainage systems. Investments for the community and property owners that reduce risk in the present and still provide immediate value are a first tier of adaptation policy considerations.

In the case of expensive or complex adaptation strategies, another approach that community scale adaptation policies offer is one of reserving expenditure until certain triggers are met. Policies that apportion risk over time allow for the use of adaptation options closer to the time they are needed, rather than building now for the worst case future condition. When on-site or regional conditions cross a threshold (such as a designated beach width reduction or occurrence of flooding), policies could call for specified actions (such as sediment management activities). Other triggers, such as repetitive loss of properties or mean high tide line encroachment, might be used to shift risk to property owners through higher insurance rates, prohibiting hard armoring, or implementing rolling easements that specify how development must adapt as the public trust boundary moves inland.

Siting New Development (Avoid)

The Coastal Act requires new development to be sited to avoid and minimize hazards, including from future flooding and erosion. This can be achieved for all types of residential development through setbacks, siting, and design decisions that minimize risks from potential hazards. However, the details for determining setback distances and trigger conditions will need customization to local conditions. Local governments can plan for protection of coastal resources without a total loss of economic use of a residential property by providing for exceptions where there is a need to permit some form of new development in a hazardous area in order to avoid an unconstitutional taking of private property. Model Policies B.1 – B.10 provide examples of relevant siting and takings policies.

Hard Shoreline Armoring (Protect)

The Coastal Act requires new development to minimize risks from flooding and other hazards and to assure structural stability without reliance on shoreline protective devices that alter natural landforms. It allows shoreline protection for existing structures or coastal-dependent uses that are in danger of erosion only if certain conditions are met[23]. Nevertheless, traditional approaches to managing coastal erosion and flood risk have often relied on hard armoring of the shoreline. The type of armoring chosen (e.g., revetments or seawalls) depends on geomorphic context. In addition, different types of armoring structures have varying costs and environmental impacts. "Holding the line" strategies using various types of hard armoring are often implemented on a parcel by parcel basis, but in some cases neighborhood scale implementation could be proposed.

[22] McGuire, C. J. Adapting to sea level rise in the coastal zone: Law and policy considerations. CRC Press, 2013.

[23] See Section 4 (Legal Considerations) for more discussion about shoreline protection for existing structures.

Shoreline armoring can serve to protect critical infrastructure and public access, and maintain community services for some period of time, after which it may be appropriate to begin planning for the orderly relocation of development. However, while shoreline armoring can protect built assets and an associated property tax base, it can also cause adverse impacts to coastal resources, including beaches, and sand supply, which will need to be mitigated.

California beaches, both wide sandy beaches and pocket beaches, as well nearshore coastal areas, are significant financial assets to coastal communities and the state.[24] Beaches and other shoreline areas also provide remarkable ecological value, including unique and important ecological services such as filtering water, recycling nutrients, buffering the coast from storm waves, and providing critical habitats for hundreds of species. When habitats backed by fixed or permanent development are not able to migrate inland as sea level rises, they will become permanently inundated over time, which presents serious concerns for future public access and habitat protection. The process of "coastal squeeze" caused by hardened shorelines will eventually result in the "drowning" of intertidal and low-lying habitats, and potential loss of certain surfing resources, if this adaptation strategy is perpetuated into the future.

Hard armoring can also result in nuisance conditions for neighbors who suffer increased flooding or erosion as a result of nearby armoring, as well as reduced public access along the shoreline. Other detrimental impacts may include negative visual impacts, recreation impacts (e.g., surfing limitations, reduced beach access), and interference with ecosystem service functions. The effectiveness of hard armoring to protect development will also be reduced as sea level rises and storm intensity and frequencies increase. Relatedly, shoreline armoring costs will increase over time as coastal hazards and storms cause elevated levels of damage and increasing need for repair and maintenance. Model Policies F.1 – F.11 provide examples of policies that comply with the statutory and regulatory requirements of the Coastal Act that can be used to define the appropriate circumstances for hard armoring and that promote transition from hard protection strategies to others that are more protective of coastal resources.

Soft Shoreline Protection (Protect)

The Coastal Act allows shoreline protective devices only if they are the least environmentally damaging feasible alternative to protect a structure that is threatened with erosion. In some cases, "soft shoreline protection" is a feasible alternative that can reduce impacts on coastal resources. Design of shoreline protection using "soft" measures or nature based solutions can protect both development and coastal resources such as beaches. Strategies like beach nourishment, dune enhancement, or the construction of "living shorelines" capitalize on the natural ability of these systems to protect coastlines from coastal hazards while also providing benefits such as habitat, recreation areas, more pleasing aesthetics, and the continuation or enhancement of ecosystem services. These approaches are often considered a way of extending the useful life of existing development. However, some of the living shoreline options involve somewhat newer concepts in high energy wave environments, and many soft shoreline projects are in the early phases of implementation, so their effectiveness and impacts will need additional monitoring. The cost of many nature based solutions can be high, and the longevity of engineered habitats with sea level

[24] In recent years, California tourism and recreation in the shore adjacent zip codes accounts for 39 percent of the ocean economy's GDP ($17.6 billion), 75 percent of its employment (368,000) and 46 percent of its wages paid ($8.7 billion) in 2012. (NOAA Report on the National Significance of California's Ocean Economy. 2015. https://coast.noaa.gov/data/digitalcoast/pdf/california-ocean-economy.pdf)

rise remains to be observed.

In addition, it should be noted that the term "soft" protection can refer to shoreline restoration projects or to shoreline armoring that includes an engineered component, such as a revetment that could form the core of a vegetated dune. While the former may be a permissible restoration project in many circumstances, the latter constitutes shoreline armoring that can generally be approved only if it is necessary to protect an existing structure or coastal dependent use and is the least environmentally damaging feasible alternative, as required by the Coastal Act.

Model Policies E.2 (Soft Shoreline Protection), F.2 (Prioritization of Types of Shoreline Armoring), and G.6 (Beach Nourishment) provide examples relevant to soft shoreline protection.

Adaptive Design (Accommodate)

Building codes and adaptive home designs can provide resiliency when development in hazardous areas cannot be avoided. Design requirements related to building type and hazard zone type are common in Federal Emergency Management Agency (FEMA) flood zones. Local governments could adopt similar policies in LCPs to require elevating structures, floodproofing designs, or siting structures in ways that accommodate flooding and erosion. Adaptive design can add to the cost of building in a hazardous area, but can extend the time that the building can avoid or minimize damages due to sea level rise impacts. Implementing adaptive design that is in sync with FEMA risk reduction criteria also offers adaptation incentives for property owners in FEMA flood zones who might reduce their flood insurance rates.[25]

Although these accommodation strategies can minimize risk and help to ensure the safety and stability of new development, they can also lead to adverse impacts on coastal resources. For example, elevation of homes can cause visual impacts by blocking coastal views or detracting from community character. Elevation can lead to a circumstance where houses are safe but utilities, including roads, water and sewer services may be compromised. Pile-supported structures may, through erosion, develop into a form of shore protection that interferes with coastal processes and access, and, at the extreme, results in structures looming over or directly on top of the beach. Finally, elevation, floodproofing, and other accommodation measures can also lead to a scenario where the beach and public trust lands migrate up and underneath or around the structure, thus impeding public access, the migration of habitat, and the use of public trust lands.

The strategy of using adaptive design to protect coastal resources and enable new development may require coupling with restrictions on hard armoring and the imposition of future removal conditions in order to minimize the coastal squeeze and other coastal resource impacts, consistent with the Coastal Act. In the short term, design accommodation might prevent structural damages, but in the long term these structures might have impacts on migrating habitats and public access and/or be damaged by storms. In these cases, eventual structural relocation or removal may be needed to protect coastal resources, life and safety.

Model Policies C.1 (Adaptive Design) and E.4 (Flood Hazard Mitigation) provide examples of adaptive design policies.

[25] Communities that participate in the Community Rating System, a voluntary incentive program for FEMA's National Flood Insurance Program (NFIP) communities, can receive flood insurance discounts for adopting flood protection measures stricter than the minimum NFIP requirements.

Managed Retreat (Relocation/Realignment)

An alternative to holding the line, protecting shorelines with armoring, or adaptive design is a retreat-based approach. Managed retreat refers to varying approaches to respond to coastal hazard risk by relocating structures and/or abandonment of development.[26] These strategies can result in a landward redevelopment pattern and a managed realignment of development along the coast so that natural erosion and other coastal processes, including beach formation/creation and habitat migration, can continue.

Support for implementation of retreat-based approaches is embodied in the application of the Coastal Act policies on ensuring development is safe from hazards. Coastal Act Section 30235 permits shoreline protection when necessary to protect existing residential structures in danger from erosion and when designed to mitigate adverse impacts on local shoreline sand supply. But Section 30253 requires new and redeveloped residential structures to minimize risk from flooding and coastal hazards, and to assure structural stability, without the need for shoreline protection that substantially alters natural landforms. Thus, as sea levels rise and hazardous areas migrate inland, the Coastal Act will require new development to be located further inland, essentially resulting in managed retreat on a parcel scale. On a neighborhood or community scale, there may also be cases where a managed retreat program may be the best and most feasible way to comply with Coastal Act policies that require minimizing hazards, protecting coastal resources and maximizing public access.

It should be noted that although in most cases managed retreat will be the best strategy available to protect beaches, habitat and public access, in some cases, relocation of development alone will not ensure that beach or wetland formation will occur in its wake. These processes might require time and additional management strategies, such as dam removal, thin layer sediment augmentation, or beach nourishment, to ensure preservation of coastal habitats in the longer term.

Benefits of managed retreat strategies include allowing for the natural landward migration of the beach, dunes and wetlands as sea levels rise; decreasing hazard risk to structures; protecting coastal resources on the water's edge; maintaining public access; and potential cost savings on construction, maintenance, and repair of shoreline protective devices. In England, for example, managed retreat strategies for adapting to sea level rise have been found to be more cost-effective than maintaining armoring over timescales greater than 25 years. [27] Further, while the cost-effectiveness to the community of hard armoring will depend on the beneficial value of protected development to the local property tax base, and who is paying (private versus public entity), the costs of maintaining hard armoring strategies will increase over time. Local governments might also need to use public funds to protect infrastructure that serves adjacent residential development, such as roads, bridges or sewer lines. This then places a financial burden on an entire community for maintaining protection of that development over time.

The effectiveness of managed retreat and realignment strategies depends on a number of factors,[28] and retreat may not be feasible in all areas. The willingness of a community/local government to consider this approach and the costs of buyout programs also pose significant challenges for

[26] Hino, M., Field, C.B. and Mach, K.J., 2017. Managed retreat as a response to natural hazard risk. *Nature Climate Change*.

[27] Turner, R.K., Burgess, D., Hadley, D., Coombes, E. and Jackson, N., 2007. A cost–benefit appraisal of coastal managed realignment policy. *Global Environmental Change*, 17(3), pp. 397-407.

[28] Some factors influencing feasibility for managed retreat include shoreline development density, projected short- and long-term financial impacts on the jurisdiction, displacement of residents, and environmental justice concerns.

implementation. Managed retreat strategies could result in temporary or permanent local economic loss and displacement of residents.

To build support for consideration of the retreat and realignment approach, communities may need to engage in such actions as community visioning, economic analysis and comparison of multiple adaptation options, and offering incentives for participation in voluntary programs. Communities and planners could explore new and innovative solutions to make retreat strategies more feasible, such as finding safe areas to relocate residents within the community out of hazardous areas and creating new parks, open space areas and recreational assets[29] along vulnerable shoreline areas.

Selecting, financing, and implementing a managed retreat program will likely require a community scale approach to managing coastal hazards (Model Policy G.1) and creation of an Adaptation Plan (Model Policies G.2-G.3). Managed retreat programs (Model Policy G.10) can be structured using a variety of triggers and mechanisms. Acquisition and buyout programs, transfer of development rights programs, repetitive loss triggers (Model Policy G.8), and beach width triggers nested within a Beach Management Plan (Model Policy G.9) are some examples of potential managed retreat program components. Again, a community visioning process is the first step for communities to take in order to explore the potential for such an adaptation approach. In addition, communities might want to consider coordination and implementation of these adaptation strategies across multiple jurisdictions or on a region-wide or watershed scale as a way to maximize the efficacy of a retreat-based approach.

A key part of retreat-based adaptation strategies is that advanced planning is needed to ensure consideration of this option before opportunities for implementation are lost. For example, as a part of the process for developing a comprehensive adaptation strategy to managing sea level rise vulnerabilities conducted through an LCP planning exercise, communities could also consider changing land use designations to support future implementation of a retreat-based strategy. In addition, advanced planning for retreat-based approaches might provide the opportunity to take advantage of certain funding opportunities for communities already doing LCP development to address sea level rise. See Section 5 on Funding Opportunities for more information on potential funding sources.

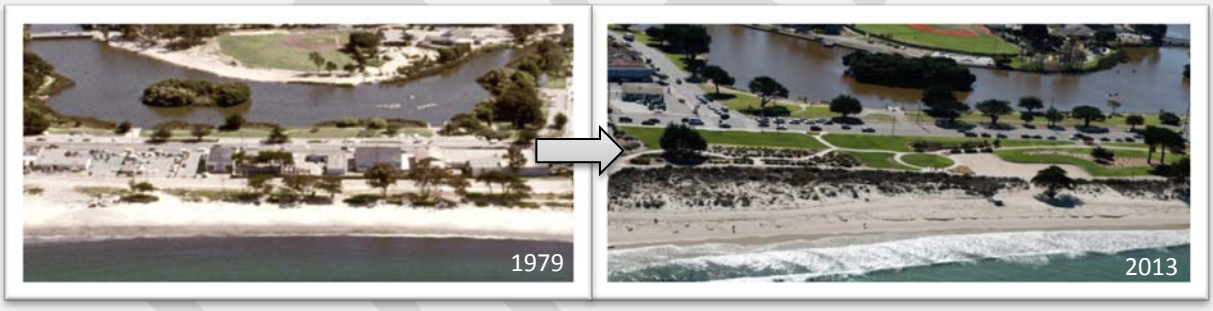
[29] For example, see San Francisco Ocean Beach Master Plan. http://www.spur.org/featured-project/ocean-beach-master-plan and *Floodplain Buyouts: An Action Guide for Local Governments on How to Maximize Community Benefits, Habitat Connectivity, and Resilience*. https://www.eli.org/research-report/action-guide-floodplain-buyouts

Box 2. Example of retreat, City of Monterey

Historically, large storms have flooded the City of Monterey's waterfront planning area along Del Monte Avenue. Significant wave events in 1943, 1958, 1982–83, 1997–98 and 2002 caused substantial flood damage. The City's 2016 Vulnerability Assessment[30] found a minor escalation of coastal flooding vulnerabilities for this area by 2030, then in 2060 and 2100 risks to both the commercial and residential sectors increase substantially. As a result, the city proposed a program to develop a multi-phased mitigation plan for sea level rise and coastal erosion relying on short- and long-term adaptation measures in its 2016 Waterfront Master Plan[31].

The city's Waterfront Master Plan acknowledges a long history of planning efforts that have emphasized development of the area as a fishing community and tourist destination. What started as a city beautification effort in the Waterfront area in 1983 is today recognized as managed retreat. By using fee simple acquisition in the 1980s, 1990s, and 2000s from willing sellers, the city removed a number of structures to open up views to the ocean and to develop Monterey Bay Park (also known as Window on the Bay Park) for public use. More recently, the city has prioritized a second area to the east of the park for fee simple purchase of parcels to expand the open space and support additional recreational uses (Waterfront Master Plan, 2016).

This adaptation strategy serves multiple purposes for the City of Monterey—by expanding its shoreline access and recreation, improving the visual quality of the waterfront, and preserving natural resources, the city can also reduce coastal hazard risks to life and structures. The city has used various funding partnerships with the state, county, Packard Foundation, Coastal Conservancy, Regional Park District, and Regional Transportation Agency, as well as private citizen donations, to accomplish this work.



Waterfront area in City of Monterey, Coastal Records Project

[30] In 2014 the City of Monterey received a grant from the California Coastal Commission and Ocean Protection Council to explore its sea level rise vulnerability and update its Local Coastal Program (LCP). (2016 City of Monterey Final Sea Level Rise and Vulnerability Analyses, Existing Conditions and Issues Report. Submitted to City of Monterey by Revell Coastal, LLC. March 10, 2016.)

[31] As a part of its planning process for the LCP, the city developed the Waterfront Master Plan to serve as an implementation tool for the General Plan and Local Coastal Land Use Plan to address the waterfront area. https://monterey.org/Portals/0/Policies-Procedures/Planning/WorkProgram/WFMP/16_0216_Final_Waterfront_Master_Plan.pdf

4. Legal Considerations

As part of fully evaluating available adaptation strategies, communities should analyze their ability to implement those strategies consistent with applicable legal constraints. The most relevant legal considerations in coastal California include the Coastal Act, the public trust doctrine, and potential takings of private property interests.

Relevant Coastal Act Policies

A variety of Coastal Act policies related to sea level rise adaptation strategies need to be considered when evaluating LCP policy options. For example, in addition to other Coastal Act Chapter 3 policies, Sections 30210 through 30224 protect public access and recreational opportunities; Sections 30230 and 30231 protect marine habitats and water quality; Section 30233 regulates and restricts the placement of fill or other materials in waterways, including open coastal waters; Section 30250 requires development to have adequate public services; and Section 30251 protects visual resources. In addition, Sections 30235, 30253, and 30240(b) relate to ensuring safe development that limits impacts to coastal resources, as discussed below. Certified local coastal programs should have policies that implement these Coastal Act requirements.

Section 30233 states in part:

> *(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> . . .
>
> *(6) Restoration purposes.*
>
> *(7) Nature study, aquaculture, or similar resource dependent activities.*

Section 30235 states:

> *Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fishkills should be phased out or upgraded where feasible.*

Section 30253 states in part:

> *New development shall do all of the following:*
>
> *(a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
>
> *(b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any*

> *way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs...*

Section 30240(b) states:

> *(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

Section 30253 requires new development to minimize risks from hazards, to avoid creating or contributing significantly to erosion and geologic instability, and to not in any way require construction of armoring that substantially alters natural landforms along bluffs and cliffs. A common way to achieve these requirements is through establishing bluff-top and shoreline setbacks. Despite this strict limitation on shoreline armoring for new development, Section 30235 allows armoring that alters natural shoreline processes when it is needed to protect existing development, coastal dependent uses, or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. However, such protection is only allowed if it is *required* – i.e., if the existing structure is in fact in danger, and the proposed shoreline protection is the least environmentally-damaging alternative to abate the danger.

As described in the Commission's 2015 Sea Level Rise Policy Guidance, the Commission interprets the term "existing structures" in Section 30235 as meaning structures that were in existence on January 1, 1977—the effective date of the Coastal Act. In other words, Section 30235's directive to permit shoreline armoring in certain circumstances applies to development that existed as of January 1, 1977. This interpretation is the most reasonable way to construe and harmonize Sections 30235 and 30253, which together evince a broad legislative intent to allow armoring for development that existed when the Coastal Act was passed, when such development is in danger from erosion, but avoid such armoring for new development now subject to the Act. This interpretation, which essentially "grandfathers" protection for development that predates the Coastal Act, is also supported by the Commission's duty to protect public trust resources and interpret the Coastal Act in a liberal manner to accomplish its purposes.

In cases where development is subject to Section 30235, the Commission has generally permitted shoreline armoring that meets the criteria specified in that provision, though imposed conditions to address impacts to coastal resources protected by other Coastal Act provisions. For residential development that does not qualify as an "existing" structure, shoreline armoring is generally disallowed because it is normally inconsistent with Section 30253 and/or other Chapter 3 policies of the Coastal Act.

Section 30240(b) requires the siting and design of development to prevent significant degradation of adjacent sensitive habitats and recreation areas and to allow the continuance of those areas in the future. New residential development relying on long-term accommodation through elevation or floodproofing could foreseeably lead to a circumstance in which the residence is located on pilings above, or in the middle of, the migrated public sandy beach or public trust lands. Such development would likely degrade that recreational area and be incompatible with the continuance of the public recreational area as it migrates inland. It could also prevent continuance

of the habitat as that area migrates inland. Shoreline armoring is also often inconsistent with Section 30240(b). Thus, to achieve Coastal Act consistency when accommodation measures are used, jurisdictions may need to adopt policies or impose conditions to protect coastal resources, such as provisions requiring soft shoreline protection, such as dune restoration or beach nourishment, as well as future removal of development when impacts reach a certain threshold, or certain triggers are met.

Section 30233 disallows the filling of coastal waters unless there is no feasible less environmentally damaging alterative, mitigation measures are provided, and the fill is for one of seven enumerated purposes – e.g., for certain coastal-dependent structures, restoration purposes, or aquaculture or other resource dependent activities. Placement of rock or other fill material for revetments or most shoreline armoring is not a resource dependent use, and would therefore generally be disallowed. However, dune restoration and some beach nourishment/restoration projects might qualify as permitted restoration activities. In addition, notwithstanding Section 30233, fill may also be allowed in narrow circumstances when required in order to protect "existing" development or coastal dependent uses under Section 30235. Permits for shoreline armoring should also include conditions to address compliance with other applicable Coastal Act or LCP requirements.

These policies, and LCP policies based on them, will limit the allowable adaptation strategies in certain cases. For example, new residential development generally may not rely on existing or new shoreline armoring to address coastal erosion, sea level rise, and related coastal hazards. This is because such shoreline armoring generally has negative impacts on natural shoreline processes, public access, visual resources, recreational resources, and intertidal and other important habitat, and is therefore not allowed pursuant to various Chapter 3 policies of the Coastal Act.

Adaptation Strategies for Development Constructed after January 1, 1977

For development that does not qualify as "existing," jurisdictions should take steps to evaluate a range of adaptation strategies to address sea level rise before development becomes threatened by coastal hazards. For example, appropriate strategies might include non-structural protective methods, such as beach nourishment and dune restoration, as well as accommodation and retreat. For development already subject to a coastal development permit, jurisdictions should also determine whether conditions of that permit already limit or describe the manner in which hazards should be addressed.

In some cases, it might be possible to permit shoreline protection for new development (i.e., development built after January 1, 1977). For example, it may be appropriate for new development in developed urban areas that are protected by preexisting bulkheads to rely on retention and/or expansion of those bulkheads for an appropriate period of time if such retention/expansion is technically feasible (including considering rising groundwater levels), will provide adequate protection for the anticipated life of the project, and will not: (1) alter natural shoreline processes along bluffs or cliffs, (2) impair public access or impede public trust uses,[32] (3) cause significant adverse visual impacts, (4) negatively impact marine habitat, or (5) otherwise

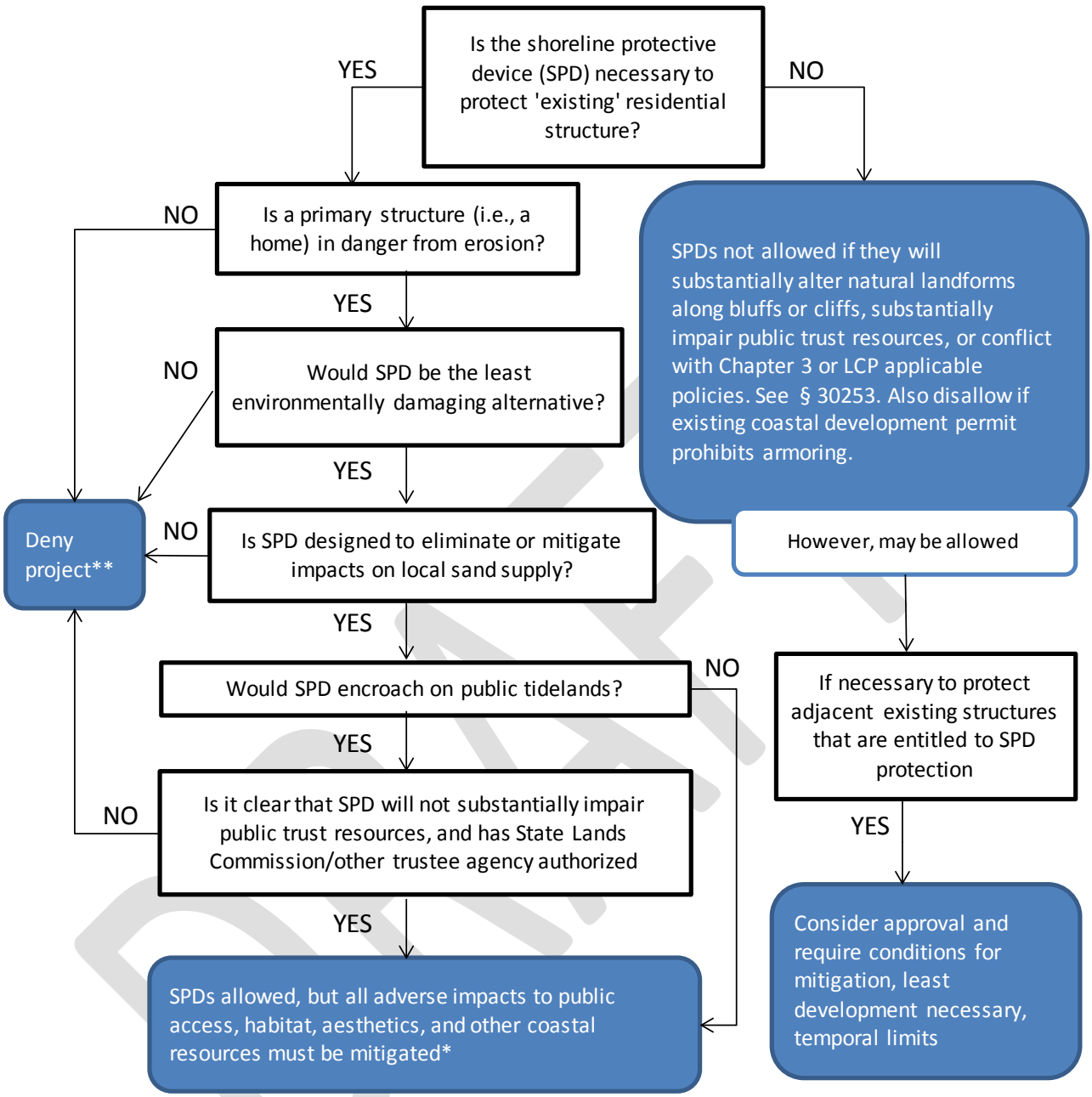
[32] In some cases, maintaining bulkheads may benefit public access by helping to maintain publicly accessible, navigable waterways, or public paths on top of the bulkheads. However, in general, any seaward expansion or encroachment by a bulkhead on shoreline area used by the public would constitute a negative impact to public access.

conflict with Chapter 3 resource protection policies. Figure 5 presents a flow chart of some of the criteria to consider when determining whether shoreline armoring is a feasible adaption strategy for residential areas.

In addition, shoreline armoring may be an allowable adaptation strategy, at least in the short-term, in order to protect areas where new and existing (i.e., pre-Coastal Act) residential development are intermingled and it is not feasible to have the shoreline armoring only protect the existing development. Likewise, it may be permissible in some cases to allow new development to rely on existing or new armoring if disallowing such development would constitute an unconstitutional taking of private property without just compensation (see section on Addressing Takings Concerns, below).[33] However, local governments should consider whether any existing structure or use on the property already provides a reasonable economic use, and therefore permitting new development or redevelopment may not be necessary to avoid a taking. As described in Chapter 8 of the Commission's Sea Level Rise Policy Guidance, local jurisdictions will need to consider the specific legal context and circumstances that apply to each area or case when undertaking shoreline armoring-related LCP updates or approving individual development projects that include shoreline armoring.

Although coastal armoring generally has significant adverse impacts on coastal resources, there are situations—as described above—where armoring may be lawfully allowed and may represent a reasonable short- to mid-term adaptation strategy at a street/neighborhood-level or community-scale. This may be especially true in urbanized areas where existing residential development and/or critical infrastructure exist, where development is already protected by armoring, where the impacts of armoring on natural shoreline processes will be minimal due to the geology of the area and where the armoring is the least environmentally damaging alternative for adaptation. However, to the extent that LCP policies—or projects approved pursuant to them— allow for shoreline armoring, local governments must ensure that such policies and projects safeguard coastal access, mitigate for all impacts to coastal resources affected by armoring, protect public trust resources, and ensure equitable access to and benefits from coastal resources. Again, as described in Chapter 8 of the Commission's Sea Level Rise Policy Guidance, local jurisdictions will need to consider the specific legal context and circumstances that apply to each area or case when undertaking shoreline protection-related LCP updates or approving individual development projects that include shoreline protection. When deciding on and developing policies to support an adaptation strategy that may include armoring in an LCP, local governments should consider working closely with Coastal Commission staff in crafting such land use policy language to address this unique and special circumstance and to be consistent with Coastal Act policies.

[33] Pub. Res. Code § 30010.



* For SPD on publicly owned land other than tidelands, the landowner's permission is also needed, and the landowning agency is not obligated to give permission.

** In rare circumstances, agencies may need to consider whether denial of armoring would constitute a taking of property. However, denial of SPD should not be a taking if SPD impairs public trust or would constitute a nuisance.

Figure 5. Analytical steps for considering shoreline armoring to protect residential structures (note, this flow chart simplifies the analytical process for illustrative purposes. Planners should consult their legal staff for definitions or case specific questions.)

Public Trust Doctrine

Background on Public Trust Doctrine

The State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable waterways upon its admission to the United States in 1850. The state holds and manages these lands for the benefit of all people of the state for statewide purposes consistent with the common law public trust doctrine ("public trust"). The public trust ensures that title to sovereign land is held by the state in trust for the people of the state. Public trust uses include maritime commerce, navigation, fishing, boating, water-oriented recreation, visitor-serving facilities and environmental preservation and restoration. Non-water dependent uses such as residential and general office or commercial uses are generally inconsistent with public trust protections and do not qualify as public trust uses.

In coastal areas, the landward location and extent of the state's sovereign fee ownership of these public trust lands are generally defined by reference to the ordinary high water mark,[34] as measured by the mean high tide line;[35] these boundaries remain ambulatory, except where there has been fill or artificial accretion. More specifically, in areas unaffected by fill or artificial accretion, the ordinary high water mark and the mean high tide line will generally be the same. In areas where there has been fill or artificial accretion, the ordinary high water mark (and the state's public trust ownership) is generally defined as the location of the mean high tide line just prior to the fill or artificial influence. It is important to note that such boundaries may not be readily apparent from present day site inspections.[36]

The mean high tide line is the intersection of the shoreline with the elevation of the average of all high tides calculated over an 18.6-year tidal epoch. This property line is referred to as "ambulatory" for two reasons: first, gradual changes to the shoreline due to factors such as variations in the height and width of sandy beaches, shoreline erosion or accretion, and uplift or subsidence of land can change the location of where the mean high tide line meets the shoreline. Second, the elevation of the mean high tide line itself changes over time and is likely to increase at an accelerating rate in the future due to sea level rise. Over time, sea level rise will continue to gradually cause the public trust boundary to move inland. Boundaries between publicly-owned waterways and adjoining private properties (referred to as littoral if they are along lakes and seas and riparian if along rivers and streams) have always been subject to the forces of nature and property boundary law reflects these realities.

Accelerating sea level rise will likely lead to more disputes regarding the location of property boundaries along the shoreline, since lands that were previously landward of the mean high tide line have become subject to the state's ownership and protections of the public trust. These disputes, in turn, will affect determinations regarding what kinds of structures and uses may be allowed or maintained in areas that, because of sea level rise, either are already seaward of the mean high tide line, are likely to become seaward of the mean high tide line in the future, or would be seaward of the mean high tide line if it were not for artificial alterations to the shoreline.

[34] Civil Code § 670.
[35] *Borax Consolidated v. City of Los Angeles* (1935) 210 U.S. 10.
[36] *Carpenter v. City of Santa Monica* (1944) 63 C. A. 2nd 772, 787.

Development in Malibu abuts the sea and is particularly vulnerable to beach erosion. Photo Credit: Lesley Ewing

California case law does not explicitly address how shoreline structures such as seawalls that artificially fix the shoreline temporarily and prevent inland movement of the mean high tide line affect property boundaries, if at all. The Ninth Circuit Court of Appeals, however, has interpreted federal common law as allowing the owner of tidelands to bring a trespass action against a neighboring upland property owner who built a revetment that prevented the natural inland movement of the mean high tide line. The court ruled that the actual property boundary was where the mean high tide line would have been if the revetment were not there and that the owner of the tidelands could require the upland owners to remove the portions of the revetment that were no longer located on the upland owners' properties.[37]

Coastal Commission and Local Government Public Trust Authority and Duties

The public trust gives the state the authority to manage tidelands and also imposes a duty to protect the public's interests in those tidelands.[38] The Legislature has broad authority to implement the public trust and to delegate authority over tidelands to state agencies or local governments. The State Lands Commission has exclusive jurisdiction over ungranted tidelands owned by the state,[39] as well as residual jurisdiction over tidelands granted to local trustees.[40] The Legislature has also granted to the Coastal Commission the authority to regulate and permit development within California's coastal zone, including development on tidelands or that may affect tidelands.[41] In cases where development is proposed on tidelands, the applicant will need to obtain a lease or other appropriate authorization from the State Lands Commission or the appropriate tidelands grantee in addition to an appropriate development approval from the Coastal Commission.

[37] *United States v. Milner* (9th Cir. 2009) 583 F.3d 1174, 1189-1190.
[38] *Nat'l Audubon Soc'y v. Superior Court* (1983) 33 Cal.3d 419.
[39] Pub. Res. Code §§ 6301, 6305, 6009.
[40] *State of Cal. ex rel. State Lands Com. v. County of Orange* (1982) 134 Cal.App.3d 20.
[41] Pub. Res. Code §§ 30000 et seq., 30519(b).

Local governments have a responsibility to protect public trust resources associated with tidelands, and they must carry out this responsibility when drafting LCPs and considering coastal development permit applications. Although the Coastal Commission retains the authority to issue coastal development permits for development located on tidelands,[42] local governments are obligated to have policies that regulate development on adjacent uplands in a manner that protects tidelands.[43] Local governments also play a critical role in protecting uplands that will likely become tidelands in the future due to sea level rise.

In describing the state's duty to protect public trust lands, the California Supreme Court has ruled that state agencies have a duty to "exercise […] continuous supervision and control over the navigable waters of the state and the lands underlying those waters."[44] Thus, when considering whether to approve projects that may affect public trust lands, agencies must consider the effects that the projects will have on "interests protected by the public trust, and attempt, so far as feasible, to avoid or minimize any harm to those interests."[45] Development located *on* tidelands must generally be water dependent or otherwise consistent with the public trust. As the State Lands Commission has articulated: "[u]ses that are generally not permitted on public trust lands are those that are not trust use related, do not serve a public purpose, and can be located on non-waterfront property, such as residential and non-maritime related commercial and office uses."[46] If there are competing trust-related uses of public trust lands, trustee agencies have significant authority to choose which use or uses to allow, though should attempt to reconcile competing trust uses or allow multiple uses when feasible.[47] For development located *near* tidelands, agencies must ensure that the development does not impair trust resources by, for example, impeding public access.[48]

Another underpinning of the public trust doctrine is that "[t]idelands subject to the trust may not be alienated into absolute private ownership; an attempted conveyance of such land transfers 'only bare legal title,' and the property remains subject to the public trust easement."[49] Although the state may lease trust lands for trust-consistent purposes, or may grant trust lands to public entities that will serve as trustee agencies for the land, or may lease to private entities subject to the public trust, courts will not interpret legislative action as fully alienating trust interests unless no other interpretation is reasonably possible.[50] This doctrine may affect landowners' ability to

[42] Pub. Res. Code § 30519(b).
[43] E.g., Pub. Res. Code §§ 30230, 30231, 30232, 30235, 30240, 30253.
[44] *Nat'l Audubon Soc'y,* 33 Cal.3d at 425.
[45] *Id*. at 426.
[46] CALIFORNIA STATE LANDS COMMISSION, PUBLIC TRUST POLICY FOR THE CALIFORNIA STATE LANDS COMMISSION, available at http://www.slc.ca.gov/About_The_CSLC/Public_Trust/Public_Trust_Policy.pdf; see also *Lechuza Villas West v. Cal. Coastal Comm'n* (1997) 60 Cal.App.4th 218 (upholding Coastal Commission's denial of permit for residential development due to concern that it would be located partly on tidelands).
[47] *Carstens v. Cal. Coastal Comm'n* (1985) 182 Cal.App.3d 277, 289; *Nat'l Audubon Soc'y,* 33 Cal.3d at 440; *State of California v. San Luis Obispo Sportsman's Assn*. (1978) 22 Cal. 3d 440, 448.
[48] See Pub. Res. Code § 30211; *Nat'l Audubon Soc'y*, 33 Cal.3d at 435-37 (agencies have duty to consider how use of non-trust resources affect public trust waters).
[49] *City of Berkeley v. Superior Court* (1980) 26 Cal.3d 515, 537 (quoting *Long Beach v. Mansell* (1970) 3 Cal.3d 462, 482); see also Cal. Const. art. X, § 3; Cal. Pub Res. Code § 7991. However, California courts have carved out a narrow exception allowing alienation of tidelands when the tidelands: 1) are valueless for trust purposes, 2) are dedicated to a highly beneficial public purpose, and 3) constitute a relatively small part of the whole trust area. *Mansell*, 3 Cal.3d at 485-86; *see also* Pub. Res. Code § 6307 (allowing exchange of tidelands for other lands if numerous factors are met).
[50] *People v. California Fish Co*. (1913) 166 Cal. 576, 597.

construct shoreline armoring that prevents the migration of tidelands, as approval of such armoring could be viewed as allowing the conveyance of what would be public tidelands into private use. At the least, it supports the idea that lawfully permitted shoreline armoring may temporarily prevent the *physical* migration of the shoreline but would not affect the *legal* migration of the boundary between private property and public tidelands.

No court has explicitly ruled on whether the Coastal Commission's or local governments' compliance with the Coastal Act fully satisfies their duty to consider and protect the public trust.[51] However, courts have ruled that compliance with other laws, such as the California Environmental Quality Act ("CEQA"), does not necessarily satisfy an agency's independent obligation to consider public trust impacts.[52] On the other hand, if agencies do in fact consider their public trust duties when analyzing a project's compliance with other environmental laws, that may well satisfy the agency's public trust obligations.[53]

Because the Coastal Act requires protection of public access, coastal habitats, recreation, and other public trust-related resources, analysis of a project's consistency with the Coastal Act (and, by extension, an LCP) may serve as an adequate analysis of a project's consistency with public trust principles. However, to ensure protection of the public trust, local governments should explicitly consider their public trust obligations when crafting LCP policies that govern development adjacent to tidelands and when considering whether to approve individual development projects that may affect public trust resources. In addition, the public trust doctrine should inform the interpretation of Coastal Act and LCP provisions to ensure that they are carried out in a manner that fully protects the public trust.

The Public Trust and Sea Level Rise Adaptation

Local jurisdictions should take their public trust duties into consideration when drafting sea level rise adaptation policies. Because the Coastal Commission has permitting authority for development on public trust lands, and because the Coastal Act, rather than LCPs, constitutes the standard of review for development on trust lands, LCPs should not include policies that directly apply to development on public trust lands. However, it is important for LCP policies to protect public trust resources by ensuring that adjacent development does not harm public trust resources or interfere with future migration of the public trust boundary. For example, adaptation policies must ensure protection of public trust lands for public trust purposes, including maritime commerce, navigation, fishing, boating, water-oriented recreation, visitor-serving facilities and environmental preservation and restoration. Because private residential development is not considered a public trust use, policies specific to residential adaptation must ensure that residences and any ancillary development, including shoreline armoring, will not substantially impair or be inconsistent with public trust needs in those lands.

[51] But see *Carstens,* 182 Cal.App.3d 277 (holding that Coastal Commission properly exercised its duty to consider various uses of tidelands and to protect public access to such lands when it analyzed a permit amendment's consistency with Coastal Act public access provisions); *Citizens for East Shore Parks v. State Lands Comm'n* (2012) 202 Cal.App.4th 549, 577 (stating that the *Carstens* "court essentially made no distinction between compliance with the [Coastal A]ct and the public trust doctrine.").

[52] Compare *Citizens for East Shore Parks*, 202 Cal. App.4th 549 (agency's CEQA review, which analyzed public trust issues, satisfied the agency's duty to consider public trust issues) with *San Francisco Baykeeper, Inc. v. State Lands Comm'n* (2015) 242 Cal.App.4th 202 (complying with CEQA does not necessarily demonstrate compliance with public trust duties and, where agency failed to explicitly consider public trust obligations during CEQA review, it violated its public trust duties).

[53] *Id*.

For development located on land subject to sea level rise and migrating public trust land boundaries, policies should ensure that applicants are aware of the risk of building in a location where the property boundary may change, that the development is not authorized to encroach on public trust land, and that private residential development (including shoreline armoring for such development) will need to be relocated or removed before it significantly impairs use of public trust land for public trust purposes.[54] Jurisdictions may also want to adopt a policy that requires, as a condition of a permit for new, shorefront development subject to sea level rise, that the landowner submit periodic evidence that the development remains on private property. Model Policies A.6 (Assumption of Risk), D.1 (Removal Conditions), D.3 (Mean High Tide Line Survey Conditions), F.8 (Shoreline Armoring Monitoring), and G.9 (Beach Management Plan) provide examples of how local governments could implement these requirements through their LCPs.

For a more in-depth discussion of the public trust doctrine in California and how it relates to sea level rise, see Center for Ocean Solutions, Stanford Woods Institute for the Environment, the Public Trust Doctrine: a Guiding Principle for Governing California's Coast under Climate Change (2017).[55]

General Principles of Takings Law

Please refer to the 2015 CCC SLR Policy Guidance for more background on the legal context of adaptation planning (Chapter 8. Legal Context).

The United States and California constitutions prohibit public agencies from taking private property for public use without just compensation. Section 30010 of the Coastal Act similarly prohibits public agencies implementing the Coastal Act from granting or denying a permit in a manner that takes or damages private property for public use without payment of just compensation. The classic "takings" scenario arises when a public agency acquires title to private property in order to build a public facility or otherwise devote the property to public use. In 1922, however, the United States Supreme Court ruled that, in certain circumstances, regulation of private property can constitute a taking even if the regulation does not involve acquisition of title to the property. As Justice Oliver Wendell Holmes stated, "while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking," (*Pennsylvania Coal Co. v. Mahon* (1922) 260 U.S. 393, 415.)

In the century since then, Courts have struggled to give agencies and property owners a more definite sense of exactly when a regulation "goes too far." The Supreme Court has identified three basic categories of takings that can occur in the context of land use regulation. Different legal standards apply depending on what kind of taking is at issue. (See, generally, *Lingle v. Chevron USA, Inc.* (2005) 544 U.S. 528).

[54] See *Lechuza Villas West,* 60 Cal.App.4th at 225, 243 (describing how a landowner who wishes to construct homes near the shoreline "risk[s] building on land it has legal title to today but which may become tidelands as a result of natural forces," and upholding Coastal Commission's denial of a permit to construct homes near a beach because the applicant "failed to meet its burden of showing that the project would not encroach on [existing] public tidelands.").

[55] Center for Ocean Solutions, Stanford Woods Institute for the Environment. 2017. The Public Trust Doctrine: a Guiding Principle for Governing California's Coast under Climate Change. Available at http://centerforoceansolutions.org/sites/default/files/publications/The%20Public%20Trust%20Doctrine_A%20Guiding%20Principle%20for%20Governing%20Califonia%2527s%20Coast%20Under%20Climate%20Change.pdf.

The most straightforward test applies to what is variously called a categorical, total, *per se*, or *"Lucas"* takings, which occurs when a regulation deprives an owner of all economically beneficial use of the property (see *Lucas v. South Carolina Coastal Council* (1992) 505 U.S. 1003). An agency that completely deprives a property owner of all economically beneficial use of the property will likely be found liable for a taking unless background principles of property law, such as nuisance[56] or the public trust doctrine,[57] independently restrict the owner's intended use of the property. Courts have generally been very strict about when they apply this test. If any economically beneficial use remains after application of the regulation, even if the value of that use is a very small percentage of the value of the property absent the regulatory restriction, a *Lucas* taking has not occurred.

Where a regulation significantly reduces the value of private property but does not completely deprive the owner of all economically beneficial use, the multi-factor "*Penn-Central"* test applies.[58] This test has no set formula, but the primary factors include the economic impact of the regulation, the extent to which the regulation interferes with distinct, reasonable investment-backed expectations, and the character of the governmental action. When evaluating the character of the governmental action, courts consider whether the regulation amounts to a physical invasion or instead more generally affects property interests through a program that adjusts the burdens and benefits of economic life for the common good. Whether a regulation was in effect at the time an owner acquired title is also a relevant factor, but is not by itself dispositive.[59] Because this test takes such a wide range of factors into account, case law does not provide clear guidance about the situations in which a regulation is likely to qualify as a "*Penn-Central"* taking. A *Penn-Central* claim is unlikely to succeed, however, unless the plaintiff can establish that the regulation very substantially reduces the value of the property.

The third category of takings claims applies to "exactions," that is, government permitting decisions that require a property owner either to convey a property interest or to pay a mitigation fee as a condition of approval.[60] Under the *Nollan/Dolan* line of cases, the agency must establish a "nexus" between the condition requiring a property interest or payment and the effects of the project that that property interest or payment is mitigating. That property interest or payment must also be roughly proportional to the impact that it is intended to mitigate. In California, the *Ocean Harbor House* case is a good example of a shoreline structure impact mitigation requirement that was found by the courts to meet the relevant standards of nexus and proportionality.[61]

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[56] See *Scott v. City of Del Mar* (1997) 58 Cal.App.4th 1296 (city ordered removal of seawalls that were encroaching onto public beach; court held there was no compensable taking because the seawalls, which obstructed a public right-of-way, were public nuisances).

[57] No published California case has held that the public trust doctrine is a "background principle" that defeats a takings claim. However, given the doctrine's long-standing roots in state law and its basis in the common law, state constitution, and statutory law, commentators have argued that it is an established background principle of property law in the state. *See e.g.*, BILL HIGGINS, INSTITUTE FOR LOCAL GOV'T, REGULATORY TAKINGS AND LAND USE REGULATION: A PRIMER FOR PUBLIC AGENCY STAFF 14. Other states have also found the public trust to be a "background principle" for purposes of takings analysis. *Esplanade Properties, LLC v. City of Seattle* (9th Cir. 2002) 307 F.3d 978, 985; *McQueen v. S.C. Coastal Council* (2003) 354 S.C. 142, cert denied 124 S. Ct. 466 (2003).

[58] *Penn Central Transportation Co. v. City of New York* (1978) 438 U.S. 104.

[59] See *Murr v. Wisconsin* (2017) 137 S. Ct. 1933, 1945 ("The reasonable expectations of an acquirer of land must acknowledge legitimate restrictions affecting his or her subsequent use and dispensation of the property"); *Palazzolo v. Rhode Island* (2001) 533 U.S. 606, 632-633 (O'Connor, J., concurring).

[60] See *Nollan v. California Coastal Comm'n* (1987) 483 U.S. 825; *Dolan v. City of Tigard* (1994) 512 U.S. 374; *Koontz v. St. Johns River Water Management Dist.* (2013) 133 S.Ct. 2586.

[61] *Ocean Harbor House Homeowners Assn. v. California Coastal Com*m'n (2008) 163 Cal.App.4th 215.

Addressing Takings Concerns

Because the determination of whether a particular policy or regulation may in some circumstances be applied in a way that constitutes a taking is so fact-intensive and context-specific, this Guidance cannot provide a simple set of parameters for when agencies should either allow exceptions to a land use regulation or consider purchasing a property interest. However, because sea level rise adaptation policies may potentially give rise to takings claims, the Guidance does provide policy recommendations that could address ways to avoid an unconstitutional taking.

First, local governments have broad authority to regulate land use. Even actions that may significantly reduce property value, such as rezoning or downzoning in hazardous areas, are possible without generating a successful takings claim, especially if it is clear that the regulation serves a public purpose, such as protecting an existing public recreational beach area, and does not unfairly single out particular property owners. Likewise, legislatively imposed, generally applicable development standards that do not require dedication of private property for public use or payment of money to the public should not be considered "exactions" that are subject to the heightened scrutiny of *Nollan*/*Dolan*.[62] Accordingly, adopting generally applicable development standards through an LCP—such as bluff setbacks, floor elevation requirements, recorded notices of coastal hazards, or specific restrictions on shoreline armoring—may provide a lesser risk of successful takings claims than if such restrictions are imposed on an ad-hoc, permit-by-permit basis.

In addition, local governments can adopt policies that reduce the risks of takings claims. For example, policies requiring assumption of risk, disclosure of hazards, waiver of rights to shoreline protective devices, and disclosure of possible sea level rise and migrating public trust boundaries can ensure that new property owners are on notice regarding the limitations of the property. This, in turn, will help ensure that any such owners have an appropriate, "reasonable investment backed expectation" for the use of the property: namely, that such use will be limited by future hazards, exacerbated by sea level rise.[63]

Land use restrictions that prevent all economically beneficial use of the entirety of a property[64] are vulnerable to *Lucas* takings claims unless those uses would qualify as a nuisance or are prohibited by property law principles such as the public trust doctrine. Agencies can minimize the risk of these claims by allowing economically beneficial uses on some of the property or for a certain amount of time, and by exploring whether legal doctrines regarding nuisance or the public trust independently allow for the potential limitations on the use of the property.[65] For example, if a home or seawall would impede public access along the coast, it may be a nuisance, and denial of a permit for the home or seawall—or conditioning of the permit to allow access—should therefore not constitute a taking.[66] Establishing a buyout, leaseback, or transferrable development rights program for properties that are subject to significant development restrictions may also

[62] *Cal. Building Industry Assn. v. City of San Jose* (2015) 61 Cal.4th 435, 461-62.

[63] See *Murr*, 137 S. Ct. at 1946 (owners' expectations about what they may do on their land may be influenced by the fact that it is sensitive coastal land, which may be more heavily regulated by the state).

[64] What qualifies as the entirety of a property can also be the subject of dispute. The property will normally include all legal lots on which the proposed development would be located, but may also include other lots that are in common ownership and adjacent to, or in close proximity with, the lots that would be developed. See *Murr*, 137 S. Ct. at 1946; *Norman v. United States* (Fed. Cir. 2005) 429 F.3d 1081, 1091; *District Intown Properties Limited Partnership v. District of Columbia* (D.C. Cir. 1999) 198 F.3d 874, 880).

[65] See, e.g., *Scott v. City of Del Mar* (1997) 58 Cal.App.4th 1296.

[66] *Id.*; Civ. Code § 3479.

minimize potential exposure to takings claims.

Pacifica during a King High Tide. Photo credit: Jack Sutton

Where a proposed development would not be located on public trust property and would be safe from hazards related to sea level rise in the near future, but cannot be sited so as to avoid those risks over the anticipated life of the structure, agencies may consider allowing the structure, but requiring removal once it is threatened or is no longer on private property (See Model Policy G.3 Adaptation Plan for Highly Vulnerable Areas). Property owners may argue that they have a right to protect threatened structures even if they have waived rights to shoreline armoring under the Coastal Act, but a recent federal court of appeal ruling casts significant doubt on the existence of any common law right to attempt to fix an ambulatory shoreline boundary through artificial structures such as seawalls.[67] In addition, a California case has held that a homeowner did not have a fundamental right to build a new revetment to protect his home from coastal hazards; rather, any right to build such a structure was subject to legitimate regulation under the Coastal Act.[68]

Local governments could also downzone areas vulnerable to sea level rise to reduce densities and limit development expectations, and they could manage nonconforming structures in order to bring them into conformance with LCP policies within a reasonable period of time. The long-term effectiveness of such a redevelopment-based adaptation strategy depends on at least two factors. First, policies should include clear measures that define the threshold of improvements that constitute "redevelopment." This is critical because, with "redeveloped" properties, the entire structure must be brought up to current LCP standards. In contrast, if the improvements qualify as "repair and maintenance," or other minor improvements, a landowner could maintain the structure for its remaining life and make minor improvements that meet current standards, but the whole structure need not meet current standards so long as the improvements do not increase the degree of non-conformity of a structure in a hazardous area. Additionally, in some cases, development that qualifies as repair and maintenance may be exempt from permitting requirements.[69] Second, an adaptation strategy should include downzoning of hazardous areas so

[67] *United States v. Milner* (9th Cir. 2009) 583 F.3d 1174, 1189-1190.
[68] *Whaler's Village Club v. Cal. Coastal Comm'n* (1985) 173 Cal.App.3d 240, 253-54 (abrogated on other grounds).
[69] Pub. Res. Code § 30610(d); 14 Cal. Code Regs. § 13252. See also any corresponding LCP provisions.

that buildings destroyed by disasters are not allowed to be rebuilt in place.[70] Instituting rebuilding restrictions in advance of damage will give property owners time to adjust their investment backed expectations and help local governments avoid takings challenges.

If an agency is contemplating requiring property owners to dedicate open space easements or other property interests, or requiring payment to mitigate project impacts, the agency should be careful to adopt findings explaining how requiring the property interest or payment is both logically related to mitigating an adverse impact of the project and roughly proportional to that impact. Legislatively adopting rules that establish the exact criteria for determining when to require these exactions and, if so, their magnitude, may also reduce an agency's exposure to takings claims.[71] With respect to mitigation fees, California cities and counties should also comply with applicable requirements of the Mitigation Fee Act.[72]

Navigating the balance between coastal resource protection and private property rights will require careful consideration of relevant precedent, nexus and rough proportionality, background principles of property law, and distinguishing government takings from takings by the forces of nature.[73]

Takings Analysis Policy

As described above, this Guidance and several of the model policies provide a framework for avoiding future instances of takings; however, there may still be circumstances where a taking of private property would be unavoidable when applying the Coastal Act. In those cases, to help carry out Section 30010 of the Coastal Act by avoiding an application of the Coastal Act or an LCP that would cause an unconstitutional takings of private property, a local government may adopt an LCP policy that allows some development in a sea level rise hazard zone even though that development would normally be prohibited pursuant to other LCP policies. Such a policy can specify that a certain amount of development in hazard zones may be allowed if the following criteria are met: (a) the amount, type, and duration of development allowed are the minimum necessary to avoid a taking; (b) all impacts to the coastal resources in the sea level rise hazard zone are avoided to the maximum extent feasible; and (c) all adverse impacts to the coastal resources in the sea level rise hazard zone will be fully mitigated (See Model Policy B.10 Takings Analysis). The Commission's approval of the Winget project in Humboldt County, in February, 2014, provides an example of using a takings override to allow development of a home in a hazardous location while ensuring that the home will be relocated or removed if and when it is threatened in the future.[74]

[70] See Pub. Res. Code § 30610 (g)(2)(A) (only allowing reconstruction of structures destroyed by natural disaster if the new structures conform to existing zoning requirements).

[71] The California Supreme Court has ruled that courts should be more deferential towards agencies when reviewing fees imposed pursuant to legislatively enacted rules of general applicability than when reviewing fees imposed on an ad hoc basis (see *Ehrlich v. City of Culver City* (1996) 12 Cal.4th 854, 881). The rationale is that fees imposed pursuant to rules of general applicability that involve little discretion are less likely to impose disproportionate burdens on property owners than fees determined on an ad hoc basis.

[72] Govt. Code, § 66000 *et seq.*

[73] Michael Allan Wolf, Strategies for Making Sea-Level Rise Adaptation Tools 'Takings-Proof', 28 J. Land Use & Envtl. L. 157 (2013), available at http://scholarship.law.ufl.edu/facultypub/404 (arguing that the Takings Clause of the United States Constitution applies to takings by government actors, not the forces of nature).

[74] https://documents.coastal.ca.gov/reports/2014/2/W15b-2-2014.pdf.

It should be noted that even without such a policy, the local government can approve development when necessary to avoid a taking, pursuant to Public Resources Code Section 30010. However, by adopting such a policy, local governments can more systematically assess those specific circumstances when applying particular sea level rise adaptation policies in specific circumstances would likely result in a regulatory taking of private property without just compensation and, if so, in those specific instances, allow a certain amount of development in order to avoid such a taking.

5. Implementing Adaptation Strategies

After identifying appropriate adaptation strategies for each planning area, communities can look to the policy compendium in Section 6 for policy language that can help implement those strategies. For protection, look at policies F.1 – F.10. For accommodation, look at policies C.1, E.1– E.2, and E.4. And for retreat, look at policies D.1 – D.3. Community scale adaptation strategies (policies G.1– G.11) include all types of adaptation and hybrid approaches. These various policies fit into different stages of the LCP Planning Steps that culminate in LCP implementation and re-evaluation.

LCP Planning Steps

The steps below from the CCC Sea Level Rise Policy Guidance provide the broadest framework for addressing sea level rise in an LCP. All communities should step through this framework when planning to update their LCPs to address sea level rise.

1. **Determine a range of sea level rise projections relevant to LCP planning area/segment** using best-available science.
2. **Identify potential physical sea level rise impacts in the LCP planning area/segment**, including inundation, storm flooding, wave impacts, erosion, and/or saltwater intrusion into freshwater resources.
3. **Assess potential risks from sea level rise to coastal resources and development in the LCP planning area/segment,** including those resources addressed in Chapter 3 of the Coastal Act.
4. **Identify adaptation measures and LCP policy options** to include in the new or updated LCP, including both general policies and ordinances that apply to all development exposed to sea level rise, and more targeted policies and land use changes to address specific risks in particular portions of the planning area.
5. **Draft updated or new LCP for certification with California Coastal Commission**, including the Land Use Plan and Implementing Ordinances.
6. **Implement the LCP and monitor and re-evaluate strategies as needed** to address new circumstances relevant to the area, including updating policies to address changed circumstances through future LCP amendment.

Local governments should maximize public participation throughout the LCP planning process. In particular, Steps 3 and 4 would benefit from public participation and engaging stakeholders in education about vulnerability and forward-looking adaptation planning through events such as stakeholder meetings, public workshops, or conferences. A community visioning and adaptation planning process could include discussion of options for vulnerable areas that reflect a community's risk tolerance, local hazard conditions, and community character. This process can also encourage community support for innovative adaptation strategies and targeted pilot projects.

The model policies presented in Section 6 of the Guidance provide a suite of options for communities to consider when creating or updating their LCPs to address sea level rise. Local governments structure their LCPs (through their Land Use Plans and Implementation Plans) in a variety of ways, with some local governments including significant policy guidance in the LUP, and reserving regulatory detail for the IP, and others providing detailed provisions in the LUP. Local governments should customize the model policies to align with their communities'

approach and to facilitate timely development of adaptation strategies. Table 3 shows a crosswalk of Residential Adaptation Policies to the steps of the CCC Sea Level Rise Policy Guidance.

Implementing adaptation strategies will be strengthened by tying policies to monitoring and enforcement of permit conditions. Actual policies and permits issued should be clear and identify benchmarks to evaluate implementation, so as to avoid any misunderstandings and to increase compliance.

Table 3. Crosswalk of policies and LCP planning steps

Step for addressing sea level rise in LCP planning		**Applicable residential adaptation policy #**
Step 1	Determine a range of sea level rise projections relevant to LCP planning area/segment using best-available science	A.1 Identifying and Using Best Available Science A.2 Identifying Planning Horizons
Step 2	Identify potential physical sea level rise impacts in the LCP planning area/segment	A.3 Mapping Coastal Hazards A.4 Site-specific Coastal Hazards Report Required A.5 Coastal Hazards Report Contents
Step 3	Assess potential risks from sea level rise to coastal resources and development in the LCP planning area/segment	G.1 Management of Sea Level Rise Hazards G.2 Adaptation Plan
Step 4	Identify adaptation measures and LCP policy options	B.1-4 New Development B.5-6 Setbacks B.7-8 Redevelopment B.9 Land Division C.1 Adaptive Design D.1-3 Managed Retreat E1-4 Moving Hazards away from Development F.1-11 Shoreline Armoring G.1-3 Developing Adaptation Planning Information G.6-9 Community Scale: Beach and Dune/Bluff/River Adaptation G.11 Transfer of Development Rights
Step 5	Draft updated or new LCP for certification with CCC	
Step 6	Implement the LCP and monitor and re-evaluate strategies as needed	A.3 Mapping Coastal Hazards D.3 Mean High Tide Line Survey Conditions G.4-5 Sea Level Rise Overlay Zones G.8-10 Trigger-Based Adaptation Approaches G.12-13 GHADs and CSAs, Aligning LCPs with LHMPs

Adaptation Pathways

A helpful approach for coastal communities to consider when planning for sea level rise involves phasing in short- and long-term adaptation strategies over time. This concept of adaptation

planning pathways[75] provides a structure for sequencing adaptation measures using the time horizon of expected sea level rise impacts. One way to think about this approach is through integrating LCP Planning Steps 4 and 6 in the framework outlined in Table 3 above.

Many Section 6 model policies facilitate implementation of this approach. For example, distinguishing between short- and long-term actions and triggers is inherent in such model policies as D.1 Removal Conditions/Development duration; G.6 Beach Nourishment; G.8 Repetitive Loss; and G.9 Beach Management Plan. To put this in context, urban and less developed coastal communities could choose these same policy options (e.g., setbacks) and still follow different pathways based on timing of impacts (e.g., the level of asset vulnerability to increments of sea level rise), designated triggers (e.g., beach width), investment resources (e.g., capital improvement funds), and availability of inland parcels (e.g., for transfer of development rights). Vulnerability assessments (and re-assessments) planned through A.3 (Mapping Coastal Hazards) and G.1 (Management of Sea Level Rise Hazards) can also potentially provide the shoreline monitoring feedback to inform phasing of adaptation approaches. Beyond vulnerability assessments, local governments may also choose to grapple with prioritizing protection of certain habitats or stretches of coastline, given that some resource losses due to sea level rise might be unavoidable.

The planning pathway approach for community scale adaptation also offers a way to manage uncertainty in timing and extent of sea level rise impact by incorporating triggering actions in the planning or implementation stages of adaptation strategies. For example, triggers based on extent of flooding, frequency of damages, distance from bluff edge, or periodic mean high tide line surveys might be selected to initiate new phases of adaptation. These triggers should be informed by local community involvement, and will reflect a community's risk tolerance, local hazard conditions and geography, and adaptation vision. Figure 6 shows some hypothetical trigger examples.

Triggers could also be used to specify a minimum planning horizon for community services that support residential development in some areas. Some of the model policies reference the temporary loss of community services (utilities, roads, water treatment, etc.) as potentially triggering implementation of the next phase of adaptation. Communities should also plan for the potential costs for implementation of adaptation programs now and in the future, especially as trigger conditions begin to emerge. Education and outreach, and enforcement or monitoring activities, might be a significant part of these transition times.

While adaptation options are typically designed to last for particular amounts of time, the coastal environment is dynamic and adaptation measures are not guaranteed to work forever. Communities should look for signs that some options have run their course and plan adaptation pathways to transition actions as needed, despite any predicted impact timeframe. Finally, analyzing a worst-case "high" projection for the planning horizon or expected life of the proposed development provides a conservative upper bound for planning pathways based on current information. It is important to note that not all development will be designed to withstand the sea level rise impacts projected in the planning horizon, but analysis of high sea level rise scenarios over the typical anticipated life of development types will help in adaptation planning. In areas

[75] An adaptation pathway can be defined as a decision-making strategy that is comprised of a sequence of decision-points over time. More explanation and case studies can be found at the CoastAdapt web site: https://coastadapt.com.au/pathways-approach.

subject to future hazards, the life of any particular development will be limited by site conditions. In some cases, it may be appropriate to design for the local hazard conditions that will result from more moderate sea level rise scenarios, as long as decision makers and project applicants plan to implement additional adaptation strategies if conditions change more than anticipated in the initial design. It might also be appropriate to allow some development on constrained parcels where investment backed expectations are appropriately limited by having permit conditions that acknowledge future coastal hazard risks and include plans for future adaptation measures or structure removal.

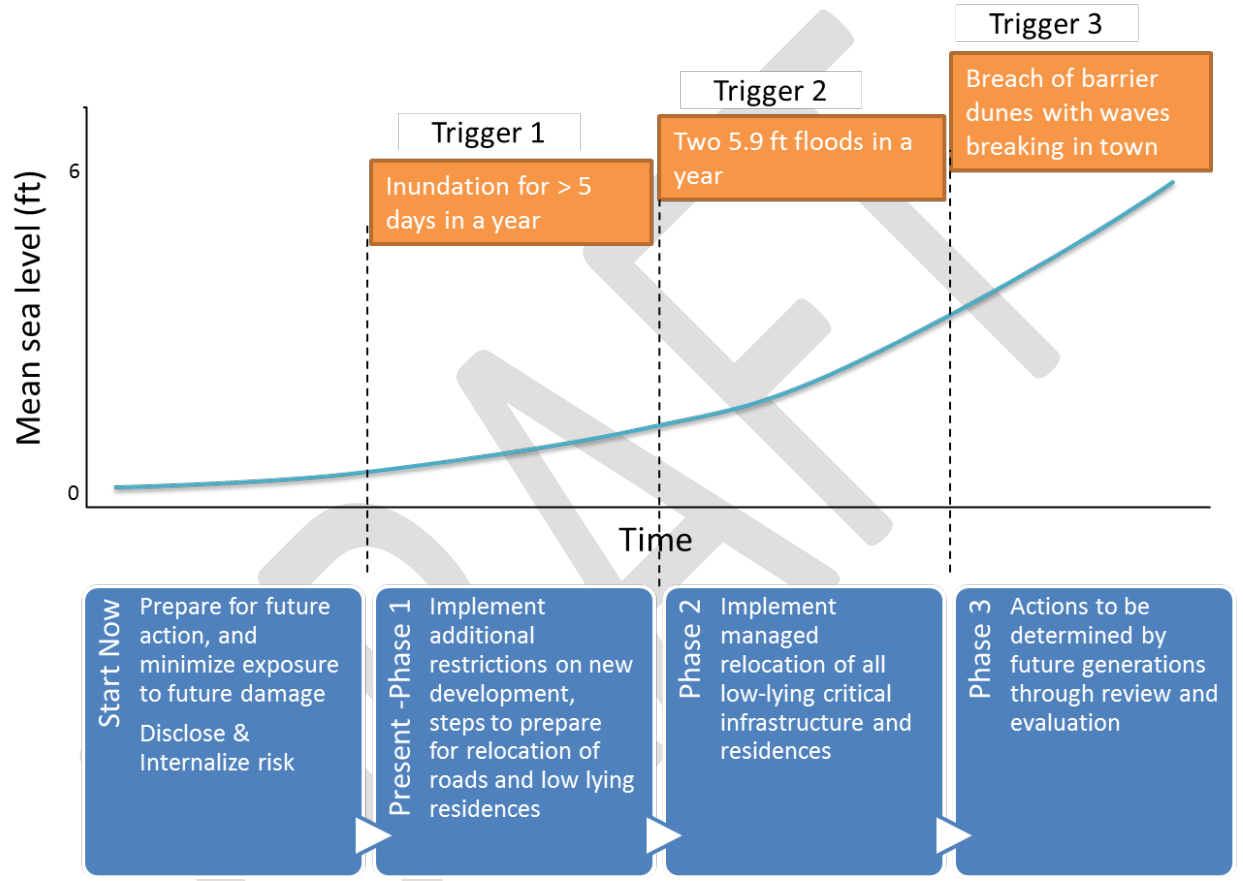

Figure 6. Hypothetical example of adaptation pathway using flood duration and flood extent triggers (based on Barnett et al. 2014)[76]

Regional Coordination

Many impacts of sea level rise will transcend jurisdictional boundaries. Similarly, the adaptation decisions made by coastal communities could themselves have consequences that affect areas outside the local jurisdiction. For these reasons, regional coordination will often enhance the effectiveness of local adaptation decisions and planners should coordinate regionally where appropriate and possible. For a comprehensive approach to managing the natural processes that shape the coast, coordinating action at the watershed scale on land and the littoral cell offshore may be most appropriate. Additionally, regional agencies, organizations, and planning efforts may

[76] Barnett, J., Graham, S., Mortreux, C., Fincher, R., Waters, E., & Hurlimann, A. (2014). A local coastal adaptation pathway. *Nature Climate Change*, *4*(12), 1103.

be good resources from which to gather information when performing analyses needed for LCP updates.

Coordination and Alignment with Other Planning-Related Processes

Many other planning processes, project reviews, and studies require or may include key information relevant to evaluating and addressing sea level rise risks in an LCP. Planners should be aware of these potential overlaps, do their best to track the on-going work of state and federal agencies, and make an effort to share information in cases where analyses required for some of these planning activities may overlap with the studies appropriate for sea level rise planning in LCPs.

One of the main areas of overlap with LCP planning is with the required elements of a Local Hazard Mitigation Plan (LHMP), and the Commission recommends coordinating an LHMP update with an LCP update if possible. As part of an LHMP, local governments identify the natural hazards that impact their community, identify actions to reduce the losses from those hazards, and establish a coordinated process to implement the plan. Other opportunities for sharing sea level rise information to inform related planning processes and documents include alignment with National Flood Insurance Program and Community Rating System guidelines in floodplain ordinances, relevant General Plan elements, capital improvement plans, and regional transportation plans.

Regarding General Plans, recent legislation (SB 379) requires General Plan Safety Elements to address climate change through a set of goals, policies, and objectives based on a vulnerability assessment.[77] To govern effectively in the coastal zone, a General Plan should be consistent with the local government's LCP, including with respect to climate change impacts such as sea level rise. Some LCPs are combined with the local government's General Plan and Zoning Ordinance documents, and some LCPs are separate documents that work in tandem with the General Plan and Zoning Ordinance. Regardless, when developing or amending a General Plan, local governments should coordinate closely with the California Coastal Commission to assure that general plan provisions intended to apply in the coastal zone are consistent with the governing LCP and California Coastal Act, as relevant. This alignment can be achieved through consistency between policies in the LCP and the General Plan, and by aligning the vulnerability assessments now required by SB 379 with the recommendations on sea level rise vulnerability assessments provided in the Sea Level Rise Policy Guidance.

For more examples of coordination and alignment opportunities, refer to the similar planning processes, projects, and documents listed in the CCC Sea Level Rise Policy Guidance[78].

Funding Opportunities

There are a number of different sources of funds available to help local governments update LCPs and implement adaptation projects. For example, the Coastal Commission, the Ocean Protection Council, and the Coastal Conservancy have grant programs designed to support local adaptation efforts. Some of these grant programs can fund implementation projects. Municipalities might also consider foundation and/or land trust grants for some adaptation projects, including acquisition of vacant vulnerable properties. California's Funding Wizard, a searchable database of

[77] Government Code § 65302(g)(4).
[78] See Figure 10 in Coastal Commission's 2015 Sea Level Rise Policy Guidance.

grants, rebates, and incentives for sustainable projects, is another source that might provide additional opportunities for adaptation implementation. Local governments might also look to other financing mechanisms, such as integrating adaptation efforts with capital improvement plans, bond measures, and other local financing tools.

Local governments should also consider opportunities to align their LCP and a Local Hazard Mitigation Plan (LHMP) in order to leverage funding options for resilience planning and the implementation of adaptation strategies. FEMA's Hazard Mitigation Assistance (HMA) grant programs – which include the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA) – are designed to support activities or projects that reduce or eliminate potential losses to assets from various hazards through planning activities and implementation of mitigation strategies. In many cases, there is direct overlap between LMHPs and LCPs in terms of the hazards assessment, planning processes, and strategies employed to reduce risk, such that funds obtained through the FEMA HMA programs could help meet LCP-related adaptation goals. Cal OES administers the HMA and FMA programs in coordination with FEMA. More information can be found at http://hazardmitigation.calema.ca.gov/grants or the FEMA HMA Web site. A list of funding sources for hazard mitigation activities can also be found in Appendix A.

Geologic Hazard Abatement Districts (GHADs)[79], County Service Areas (CSAs)[80], and other similar entities could provide a potential means for funding sea level rise adaptation measures on a neighborhood scale. A GHAD or CSA can provide the financial resources for adaptation approaches that extend beyond a single parcel by pooling contributions from its members and accumulating a funding reserve for anticipated future needs. Typically, these entities can borrow from lenders or issue bonds with very attractive credit terms.

The Commission recognizes that funding opportunities are constantly evolving, that demand for funding is increasing, and that there is a significant need for the development of additional funding opportunities.

[79] Geologic Hazard Abatement Districts are special districts formed to prevent, mitigate, abate, or control a geologic hazard or a structural hazard partly or wholly caused by a geologic hazard (Cal. Pub. Res. Code § 26525).

[80] The County Service Area Law (Government Code §25210.1 *et seq*.) provides a means of providing expanded service levels in unincorporated areas with new and increased demands for public facilities and services.

6. Model Policy Language

All local governments working on addressing climate change impacts in their coastal zone should analyze the possible effects of sea level rise and evaluate how sea level rise planning strategies could be implemented through their LCPs to protect public access and coastal resources and minimize hazards consistent with the Coastal Act. Prior sections of this policy Guidance present background, legal considerations and adaptation planning information to guide use of the model policies presented in Section 6. This Guidance is advisory and not a regulatory document or legal standard of review for the actions that the Commission or local governments may take under the Coastal Act. Rather, it is meant to provide direction on how to address sea level rise in LCPs in a manner that is consistent with the Coastal Act, and to provide detailed policy language that local governments have requested from the Commission. Model policies are provided as a tool to assist local governments in developing their own LCP policies. Utilizing the model policies, where relevant, can help ensure Coastal Act consistency, but jurisdictions remain free to modify the policies or develop different policies, so long as they are consistent with the Coastal Act.

A. UNDERSTANDING SEA LEVEL RISE HAZARDS

Note: The Coastal Act requires new development to minimize hazards and protect coastal resources while using sound science to guide decision-making and supporting public understanding and participation in coastal planning. Policies to define best available science, anticipated duration of development types, coastal hazard zones, and technical studies required in given contexts all provide ways to inform risk assessments, inform property owners and the public, and plan for the future effects of sea level rise and coastal hazards, consistent with the Coastal Act. Assumption of risk policies and real estate disclosures provide important mechanisms for educating property owners about hazards and their options for addressing them in the future.

Best Available Science

A.1 Identifying and Using Best Available Science

The best available, up-to-date scientific information about coastal hazards and sea level rise shall be used in vulnerability assessments, the evaluation of coastal development permit applications that present hazard risks, and the preparation of technical reports and related findings. Analyses shall include multiple sea level rise scenarios, one of which is a worst-case "high" projection for the planning horizon or expected duration of the proposed development ***[insert the minimum anticipated duration of development, e.g., (minimum 75 or 100 years unless otherwise specified)]***, based on best available scientific estimates of expected sea level rise at the time of the analysis. Sources of information may include, but shall not be limited to, state and federal agencies, research and academic institutions, and non-governmental organizations, such as the California Coastal Commission (CCC), Ocean Protection Council (OPC), National Oceanic and Atmospheric Administration (NOAA), the National Research Council, and the Intergovernmental Panel on Climate Change.

As of [***insert date***], the best available science is [***insert reference***]. However, best available science shall be updated, in keeping with regional policy efforts, as new, peer-reviewed studies on sea level rise become available and as agencies such as the OPC or the CCC issue updates to their guidance. Vulnerability assessments and related mapping shall be updated at least every ten years, or as necessary to address significant changes in sea level rise estimates.

A.2 Identifying Planning Horizons

The appropriate time horizon to use to evaluate sea level rise depends on the anticipated duration of development, after which such development is expected to be removed, replaced or redeveloped. For example, if a new structure has an anticipated duration of 75 years, then the hazards analysis will evaluate the site over 75 years, including evaluating the range of projected sea level rise over that time period. Using that evaluation, the structure would be set back or designed to avoid hazards over the planning horizon, if feasible. If avoidance is infeasible, it would be set back or designed to minimize flooding and geologic risk and assure structural stability over the planning horizon, and conditioned to disallow future armoring and require removal or other adaptation measures if the development becomes threatened. However, in areas subject to future hazards, the life of any particular development will be limited by site conditions and may be less than the duration anticipated at the time of construction. The anticipated life of development in the coastal zone is not an entitlement to maintain development in hazardous areas, but should be used for sea level rise planning purposes, and is generally defined by the following timeframes, unless a site or project specific analysis determines otherwise: [81]

a. Ancillary development or amenity structures (e.g. trails, bike racks, playgrounds, parking lots, shoreline restrooms): 5-25 years
b. Manufactured or mobile homes: 30-55 years[82]
c. Residential or commercial structures: 75-100 years
d. Critical infrastructure: 100-150 years

A.3 Mapping Coastal Hazards

Note: Creating hazard maps and keeping them up to date plays a critical role in implementing the Coastal Act and is also consistent with local governments' general plan obligations (Govt. Code § 65302(g)(4)). Local governments should, when possible, create hazard zone maps using Geographic Information System and make these digital data layers available to the public and property owners. In this way, community residents, visitors, investors, natural hazard disclosure companies, realtors, and insurers can be made aware of the risks and prepare for future hazards.

Adopting and maintaining up-to-date LCP coastal hazard maps may also streamline consideration of CDP applications because such maps could be used in lieu of site-specific coastal hazard reports in certain circumstances. Although such maps may provide less detailed or precise information than a site-specific report, local governments may be able to rely on them to ensure consistency with LCP hazard policies if they condition the CDP to address uncertainties related to hazards, such as by requiring that property owners accept the risk of developing in a hazardous location (A.6–Assumption of Risk) and agree to remove development subject to appropriate future triggers (D.1–Removal Conditions). However, site specific factors might also preclude the use of regional maps in some cases, so LCPs should clearly articulate the purpose of the maps and constraints on using them.

[81] Defined by common practice by CCC, local governments and developers.
[82] From U.S. Department of Housing and Urban Development (HUD),https://www.huduser.gov/portal/publications/durability_by_design.pdf

The [***insert name of City or County***] shall map areas subject to existing and future coastal hazards, including hazards that will be exacerbated by sea level rise, that present risks to life and property. These areas require additional review and regulation to minimize risks and protect coastal resources.

a. Coastal Hazard maps shall be developed that show areas of the [***City or County]*** that are subject to current or future coastal hazards, using multiple sea level rise scenarios to identify appropriate design standards and evaluate long term planning opportunities. The maximum anticipated extent of potential coastal hazards based on a worst-case "high" projection of sea level rise using best available science shall be considered. Coastal hazard areas include, but are not limited to the following:

- Coastal bluff erosion areas
- Beach erosion hazards areas
- Storm flood extent areas (estuarine or riverine related)
- Wave run up: Areas subject to direct wave attack and damage from wave runup
- Tidal inundation: Areas where routine inundation from tides occurs now and where inundation is likely to occur in the future with sea level rise
- Groundwater Inundation[83]: Current and future areas subject to hazards caused by elevated groundwater and/or reduced or inadequate drainage

b. Development proposed in potential hazard areas, including those mapped as hazardous [***insert reference to Coastal Hazard maps referenced above***, ***e.g. in Figure X***], shall be evaluated for potential coastal hazards at the site, based on all readily available information and the best available science. If the initial evaluation determines that the proposed development may be subject to coastal hazards over its anticipated duration, a site-specific Coastal Hazard Report is required, the purpose of which is to ensure that such development can be built in a manner consistent with applicable Local Coastal Program coastal hazards policies (see Policies A.4 – Site-specific Coastal Hazard Report Required, and A.5 – Coastal Hazard Report Contents).

c. The [***City or County]*** shall put property owners on notice if their parcels are subject to current or future coastal hazards on the Coastal Hazard maps.

d. Coastal Hazard maps shall be updated periodically as new science and modeling results and/or state guidance become available. This update shall occur every 10 years at minimum, or more frequently as necessary, through an LCP amendment.

[83] Where seawater and overlying groundwater responds to tidal forcing, sea level rise will cause the groundwater table to rise, and in low-lying areas the water table could approach and ultimately rise above the ground surface. Even where the water table does not rise above the land surface, groundwater at shallow depths could present significant challenges to the maintenance of development (Hoover et al., 2017).

Site-specific Coastal Hazard Studies

Note: Site-specific studies for coastal development permits are necessary unless hazards are identified on up-to-date LCP hazard maps at a level of detail adequate to ensure LCP policies and development standards can be complied with in the permitting process, including through use of permit conditions to address any uncertainties related to hazards (as described in the note, above). These site-specific hazard study policies (A.4 and A.5) are intended to apply to residential development and to be used together in an LCP. Local governments could consider not requiring site-specific hazard studies for temporary events or structures, or for other minor, short-term development where it is clear there will be no hazard risks over the project's life.

A.4 Site-specific Coastal Hazard Report Required

All development in areas potentially subject to coastal hazards shall be evaluated by reports that are prepared by a licensed civil engineer with expertise in coastal engineering and geomorphology or other suitably qualified professional. These reports shall be based on the best available science, shall consider the impacts from the high projection of sea level rise for the anticipated duration of the proposed development, shall demonstrate that the development will avoid or minimize impacts from coastal hazards, and shall evaluate the foreseeable effects that the development will have on coastal resources over time (including in terms of impacts on public access, shoreline dynamics, natural landforms, natural shoreline processes, and public views) as project impacts continue and/or change over time, including in response to sea level rise.

A.5 Coastal Hazard Report Contents

Note: Local governments should customize the policy addressing the scope and analysis required for the Coastal Hazard Report in a manner compatible with building code requirements and other applicable zoning and LCP policies and regulations. Potential sea level rise impacts will include more than what might be reported in a coastal hazard report. Biological or water quality impacts are also important for understanding the impacts of a proposed project and it may be appropriate for other reports to also analyze anticipated impacts from sea level rise. Report requirements identifying potential impacts on coastal resources on or near a site will also be necessary in some cases to inform policies like B.1- Siting to Protect Coastal Resources and Minimize Hazards and E.1- Habitat Buffers.

Coastal Hazard Reports required pursuant to Policy A.4 (Site-specific Coastal Hazard Report Required) shall include analysis of the physical impacts from coastal hazards and sea level rise that might constrain the project site and/or impact the proposed development. Reports should address and demonstrate the site hazards and effects of the proposed development on coastal resources, including discussion, maps, profiles and/or other relevant information that describe the following:

a. Current conditions at the site, including the current:
    - tidal range, referenced to an identified vertical datum, including the current mean high tide line
    - intertidal zone
    - inland extent of flooding and wave run-up associated with extreme tidal conditions and storm events
    - beach erosion rates, both long-term and seasonal variability
    - bluff erosion rates, both long-term and episodic
b. Projected future conditions at the site, accounting for sea level rise over the anticipated duration of the development, including:

- Shoreline, dune, or bluff edge, accounting for long-term erosion and assuming an increase in erosion from sea level rise
- intertidal zone
- inland extent of flooding and wave run-up associated with both storm and non-storm conditions

c. Safety of the proposed structure to withstand current and projected future hazards for its anticipated duration, including:
   - Identification of a safe building envelope on the site that avoids hazards
   - Identification of options to minimize hazards if no safe building envelope exists that would allow avoidance of hazards
   - Analysis of the adequacy of the proposed building/foundation design to ensure stability of the development relative to expected wave run-up, flooding and groundwater inundation (e.g., hydrostatic loads, uplift, or possible corrosion) for the anticipated duration of the development in both storm and non-storm conditions
   - Description of any proposed future sea level rise adaptation measures, such as incremental removal or relocation when threatened by coastal hazards

d. Discussion of the study and assumptions used in the analysis including a description of the calculations used to determine long-term erosion impacts and the elevation and inland extent of current and future flooding and wave runup.

e. For blufftop development, the report shall include a detailed analysis of erosion risks, including the following:
   - To examine risks from erosion, the predicted bluff edge, shoreline position, or dune profile shall be evaluated considering not only historical retreat, but also acceleration of retreat due to continued and accelerated sea level rise and other climatic impacts. Future long-term erosion rates should be based upon the best available information, using resources such as the highest historic retreat rates, sea level rise model flood projections, or shoreline/bluff/dune change models that take rising sea levels into account. Additionally, proposals for blufftop development shall include a quantitative slope stability analysis demonstrating a minimum factor of safety against sliding of 1.5 (static) and 1.1 (pseudostatic, k=0.15 or determined through a quantitative slope stability analysis by a geotechnical engineer), whereby safety and stability must be demonstrated for the predicted position of the bluff and bluff edge following bluff recession over the identified project life, without the need for caissons or other protective devices. The analysis should consider impacts both with and without any existing shoreline protective devices.

f. For development on a beach, dune, low bluff, or other shoreline property subject to coastal flooding, inundation, or erosion, the report shall include a detailed wave uprush and impact report and analysis, including the following:
   - The analysis shall consider current flood hazards as well as flood hazards associated with sea level rise over the anticipated duration of the development. To examine risks and impacts from flooding, including daily tidal inundation, wave impacts, runup, and overtopping, the site should be examined under conditions of a beach subject to long-term erosion and seasonally eroded shoreline combined with a large storm event (1% probability of occurrence). Flood risks should take into account

daily and annual high tide conditions, backwater flooding, water level rise due to El Niño and other atmospheric forcing, groundwater inundation, storm surge, sea level rise appropriate for the time period, and waves associated with a large storm event (such as the 100-year storm or greater). The analysis should consider impacts both with and without any existing shoreline protective devices.

A range of sea level rise scenarios shall be examined to understand the range of potential impacts that may occur throughout the anticipated duration of the development. At a minimum, flood risk from the highest projected sea level rise over the anticipated duration of the development, based on the current best available science, should be examined. Additionally, the analysis should consider the frequency of future flooding impacts (e.g., daily impacts versus flooding from extreme storms only) and describe the extent to which the proposed development would be able to avoid, minimize, and/or withstand impacts from such occurrences of flooding. Studies should describe adaptation strategies that reduce hazard risks and neither create nor add to impacts on existing coastal resources and that could be incorporated into the development.

Assumption of Risk

Note: A key component of an assumption of risk policy to address sea level rise hinges on property owners acknowledging that shoreline protective devices that would be inconsistent with Coastal Act or LCP policies are not allowed in the future to protect new residential development, and accepting the responsibility to remove or relocate structures and restore the site if it becomes unsafe or removal is required pursuant to adaptation planning requirements.

An important consideration for jurisdictions planning for sea level rise is recognizing that the public trust boundary will migrate inland in some locations as sea levels rise. As this occurs, shorefront development might come to be located on public trust property during its lifespan. LCP policies should recognize that development that comes to encroach on public trust land will likely cause new coastal resource and public trust impacts and will no longer be within the local jurisdiction's Coastal Act permitting authority. The development should therefore be conditioned to clarify that it does not allow encroachment onto public trust lands and that any such encroachment must be removed unless the owner of the structure obtains necessary authorization for it to remain from the Coastal Commission and the State Lands Commission or other tidelands trustee agency. In order to permit such structures to remain on public trust land, the Coastal Commission would need to find that they are consistent with Chapter 3 policies of the Coastal Act and with public trust doctrine principles, and the State Lands Commission would need to find that they do not substantially impair public trust resources.

A.6 Assumption of Risk

As a condition of coastal permit approval for new development in an area subject to current or future hazards, applicants shall be required to acknowledge and agree, and private applicants must also record a deed restriction on the property to acknowledge and agree [***modify following list as necessary to address specific case***]: 1) that the development is located in a hazardous area, or an area that may become hazardous in the future; 2) to assume the risks of injury and damage from such hazards in connection with the permitted development; 3) to unconditionally waive any claim of damage or liability against the ***[insert local government name, and Coastal Commission, if permit is appealed]***, its officers, agents, and employees for injury or damage from

such hazards; 4) to indemnify and hold harmless the ***[insert local government name, and Coastal Commission, if permit is appealed]***, its officers, agents, and employees with respect to approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards; 5) that they have no rights under Coastal Act Section 30235 and related LCP policies to shoreline armoring in the future; 6) that sea level rise could render it difficult or impossible to provide services to the site (e.g., maintenance of roadways, utilities, sewage or water systems), thereby constraining allowed uses of the site or rendering it uninhabitable; 7) that the boundary between public land (tidelands) and private land may shift with rising seas, the structure may eventually be located on public trust lands, and the development approval does not permit encroachment onto public trust land; 8) any future encroachment must be removed unless the Coastal Commission determines that the encroachment is legally permissible pursuant to the Coastal Act and authorizes it to remain, and any future encroachment would also be subject to the State Lands Commission's (or other trustee agency's) leasing approval; and 9) that the structure may be required to be removed or relocated and the site restored if it becomes unsafe or if removal is required pursuant to ***[insert LCP policy specifying adaptation planning requirements (i.e., Model Policy B.2 Removal Plan Conditions for New Development in Hazardous Areas)]***.

Real Estate Disclosure

Note: General plan and zoning laws in California allow local governments to require real estate disclosures related to coastal hazards for all applicable properties within their jurisdiction. Pursuant to the Coastal Act, the Commission has previously required disclosure of hazards during future real estate transactions as a condition in CDPs. In addition to requiring this, local governments could choose to require such disclosures when any property is transferred, regardless of whether it is subject to CDP authorization. Detail on how such a policy would be carried out would likely need to be provided in an Implementation Plan or other ordinance. The purpose of this policy is to disclose sea level rise risk so that property owners are aware of the potential hazards and can internalize the costs. Buyers of properties should know if the properties are located in current or anticipated future coastal hazard zones. Setting reasonable expectations about property use can also mitigate potential takings risks.

See note on Model Policy A.3 regarding how a local government might make hazard zone maps in a Geographic Information System accessible to the public and property owners interested in locating where properties might be at risk. The intent of Model Policy A.7, combined with A.3, is to make vulnerability information available for use in real estate disclosures. Disclosure of hazard risks in all real estate transactions should be required only after the local government maps the hazardous areas in a manner that makes it possible to determine particular parcels' hazard risk, and makes that information publicly available so that natural hazard disclosure companies can find it and disclose it during real estate transactions.

A.7 Real Estate Disclosure of Hazards

Real estate disclosures of all coastal hazards that are identified in ***[City or County]*** adopted hazards maps, including hazards associated with anticipated sea level rise, geologic hazards, groundwater inundation, coastal bluff retreat, coastal flooding, or shoreline erosion, shall be required in real estate transactions. Any site-specific analyses related to sea level rise and the

terms and conditions of any applicable coastal development permits must also be disclosed in real estate transactions.

B. AVOID SITING NEW DEVELOPMENT AND/OR PERPETUATING REDEVELOPMENT IN HAZARD AREAS

Note: The Coastal Act requires development to be resilient, minimize risks from hazards, and assure structural stability, while assuring the protection of shoreline recreational resources, ecological values, and other coastal resources. The policies in Section B are meant to be used together to govern new development on vacant parcels as well as redevelopment in areas with existing residential patterns. The intent of these policies is to site and design to protect coastal resources and minimize risks to life and property as required by the Coastal Act, using setbacks, redevelopment, nonconforming structure, and land division restrictions in areas threatened by sea level rise. Given the more complex redevelopment, takings and public trust issues that some communities will face, as well as the uncertainties inherent in predicting future hazards, policies regarding removal plans and reliance on shoreline protection will be important to ensure development is consistent with Coastal Act policies as sea levels rise.

In addition to requiring a case-by-case analysis to determine sufficient setbacks to minimize risks and assure structural stability, jurisdictions should establish minimum bluff or shoreline setback requirements in their LCPs. This can help establish community-wide norms that may allow for more predictability in permitting decisions and also provide visual benefits and a factor of safety by requiring homes to be set back a minimum distance which may be more or less than the minimum required for safety purposes.

B.1 Siting to Protect Coastal Resources and Minimize Hazards

a. Non-specific:

New development shall be sited to avoid hazards, taking into account predicted sea level rise, including groundwater changes, over the anticipated life of the development. If hazards cannot be completely avoided, then development shall be sited and designed to protect coastal resources and minimize risks to life and property to the maximum extent feasible. New development shall assure stability and structural integrity of the development without reliance on shoreline protective devices that substantially alter natural landforms along bluffs and cliffs or otherwise harm coastal resources in a manner inconsistent with LCP policies or Coastal Act public access policies, and not contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area.

b. Shoreline-specific:

Siting and design of new development on or near the shoreline shall take into account coastal hazards and the extent of shoreline migration and groundwater changes that can be anticipated over the expected duration of the development. Anticipated landward migration of the sea shall be determined based upon historical erosion rates, predicted acceleration of erosion and flooding due to continued and accelerated sea level rise, storm damage, and foreseeable changes in sand supply. Development shall be set back a sufficient distance to prevent impacts to coastal resources, minimize the impacts of coastal hazards on the development over its anticipated life, assure stability and structural integrity of the development without reliance on shoreline protective devices that substantially alter natural landforms along bluffs and cliffs or otherwise harm

coastal resources in a manner inconsistent with LCP policies or Coastal Act public access policies, and not contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area. In addition, when permitted, all development shall be subject to removal plan conditions in [***Model Policy B.2 – Removal Plan Conditions for New Development in Hazardous Areas]***.

c. Blufftop-specific:

New development shall be set back a sufficient distance to ensure its structural integrity for the anticipated duration of the development, taking into account sea level rise, erosion, and other geologic hazards, without reliance on shoreline protective devices that substantially alter natural landforms along bluffs and cliffs or otherwise harm coastal resources in a manner inconsistent with LCP policies or Coastal Act public access policies, including any existing shoreline protective devices associated with the site, pursuant to [***Model Policy B.5 – Determining Bluff Setback Line***]. Site-specific coastal hazard studies shall include a quantitative slope stability analysis demonstrating safety and stability for the predicted position of the bluff following bluff recession for the anticipated duration of the development under historical bluff retreat conditions, as well as with acceleration of bluff retreat due to continued and accelerated sea level rise and other climatic impacts (see [***Model Policy B.5 – Determining Bluff Setback Line]***). In addition, when permitted, all development shall be subject to removal plan conditions in [***Model Policy B.2 – Removal Plan Conditions for New Development in Hazardous Areas]***.

d. Dune-specific:

Siting and design of new development adjacent to dunes shall take into account the extent of landward migration of the foredunes that can be anticipated over the anticipated duration of the development. This landward migration shall be determined based upon historic dune erosion, storm damage, anticipated sea level rise, and foreseeable changes in sand supply. Development shall be set back a sufficient distance to prevent impacts to coastal resources, assure structural stability of the development without reliance on shoreline protective devices that harm coastal resources in a manner inconsistent with LCP policies or Coastal Act public access policies, and avoid coastal hazards over the expected duration of the development. ([***See also Model Policy E.4 – Flood Hazard Mitigation]***). When permitted, development shall be subject to removal plan conditions in [***Model Policy B.2 – Removal Plan Conditions for New Development in Hazardous Areas]***.

B.2 Removal Plan Conditions for New Development in Hazardous Areas

For development subject to coastal hazards, require structures to be designed so that they can be removed without significantly damaging the site or surrounding land, and impose a permit condition requiring preparation and execution of a Removal and Restoration Plan at such time as the development meets any of the removal criteria in ***Model Policy D.1 – Removal Conditions/Development Duration***, and indicating that it will be the property owner's responsibility to remove the structure(s) and restore the site at the owner's expense in a way that best protects the public trust and coastal resources. The plan shall specify that in the event that portions of the development fall to the bluffs, beach or ocean before they are removed/relocated, the landowner will remove all recoverable debris associated with the development from the

bluffs, beach or ocean and lawfully dispose of the material in an approved disposal site. The plan shall also specify that such removal requires a coastal development permit.

B.3 Reliance on Shoreline Armoring

All new development, including redevelopment (as defined in ***Model Policy B.7***), shall be sited and designed to ensure that: 1) it will not require shoreline protective devices that substantially alter natural landforms or conflict with other LCP resource protection policies or the public access and recreation policies of the Coastal Act, and 2) it will be structurally safe from erosion, flooding, and wave run-up for the anticipated duration of the development. These criteria apply even if new development, including redevelopment, is protected by a legally authorized shoreline protective device, in which case the new development and redevelopment on the site shall still be designed and sited in a manner that does not require or rely on the use of a shoreline protective device to ensure geologic stability. As a condition of permitting demolition or modification of development already present on site, any existing shoreline armoring structure associated with the development that is causing adverse impacts to coastal or public trust resources and that is under the applicant's control shall be removed if it is no longer necessary to protect remaining principal structures on the property or adjacent principal structures that are still entitled to retain shoreline armoring.

B.4 Bluff Face Development

Structures, grading, and landform alteration on bluff faces are prohibited, except for the following: public access structures where no feasible alternative means of public access exists, and shoreline protective devices if otherwise allowed by the LCP and the public access and recreation policies of the Coastal Act. Such structures shall be designed and constructed to be visually compatible with the surrounding area to the maximum extent feasible and to minimize effects on erosion of the bluff face.

B.5 Determining Bluff Setback Line

The bluff or geologic setback line is the location on the bluff top inland of which stability can be reasonably assured for the anticipated duration of the development without need for shoreline protective devices. The setback line shall account for the amount of erosion anticipated over the life of the development, plus an additional setback to ensure structural stability under future conditions. To determine and document the setback line, applications for bluff property development must include a geotechnical report from a licensed Geotechnical Engineer or a certified Engineering Geologist that establishes the bluff or geologic setback line for the proposed development. The analysis shall include a quantitative slope stability analysis demonstrating a minimum factor of safety against sliding of 1.5 (static) or 1.1 (pseudostatic, k-0.15 or determined through analysis by the geotechnical engineer), using shear strength parameters derived from relatively undeformed samples collected at the site. Future long-term erosion rates shall be based upon the best available information on bluff failure mechanisms, using resources such as the highest historic retreat rates, sea level rise flood projections, shoreline change models that take rising sea levels into account, future increase in storm, El Niño or other climatic events, and any known site-specific conditions. The analysis shall assume that any current shoreline protective device does not exist, such that the site would erode in a manner similar to unarmored sites in the same vicinity with similar geologic attributes.

B.6 Minor Development in Hazardous Areas

Minor and/or ancillary development, including ***[insert relevant development types based on existing pattern of development and consistent with view protection policies, e.g., public trails, benches, gazebos, patios, etc.]***, may be located seaward of the bluff or shoreline setback line, but no closer than [***insert appropriate distance***] inland of the bluff edge, provided that development

does not use a foundation that can serve as a bluff retaining device, such as caissons, or that requires landform alteration, and that the development is removed or relocated when threatened. In the event that portions of the development fall to the bluffs, beach or ocean before they are removed/relocated, the landowner will remove all recoverable debris associated with the development from the bluffs, beach and ocean pursuant to a coastal development permit (unless no coastal development permit is required) and lawfully dispose of the material in an approved disposal site.

Improvements, Alterations and Additions to Existing Structures

Note: New development, including redevelopment, must be regulated to ensure it meets safety and structural stability standards and adequately protects coastal resources under expected future conditions. As required by California Code of Regulations Section 13252(b), at a minimum, improvements and alterations that result in replacement of 50% or more of the existing structure shall be considered a replacement structure and treated as new development/redevelopment. To best protect coastal resources consistent with the Coastal Act, local governments should also define additions that result in an enlargement of more than 50% as redevelopment that requires the whole structure to be brought into conformance with the LCP. They could also use other triggers to ensure that existing structures aren't significantly redeveloped in hazardous areas unless the entire structure is brought into conformity with any relevant Coastal Act and LCP coastal protection standards. For example, in cases where development might not meet the 50% threshold for redevelopment related to replacement of structural members, it could still be considered redevelopment if the cost of alterations exceeds 50% of market value. Again, to ensure Coastal Act consistency, redevelopment should be defined, at a minimum, to include replacement of 50% of a structure. However, local governments should consider going beyond this minimum in order to ensure that current development in hazardous areas is not completely redeveloped, in piecemeal fashion, over time.

Improvements, alterations, and additions can constitute redevelopment regardless of whether they are undertaken all at once or in piecemeal fashion over time. Redevelopment policies should be drafted to ensure that owners may not avoid the need to bring redeveloped structures into compliance with current LCP standards by, for example, replacing 49 percent of structural components one year and then replacing another 40 percent the next year. In calculating cumulative work that counts toward the definition of redevelopment, jurisdictions should consider all work undertaken after the date the Coastal Act went into effect. Local jurisdictions may wish to customize this policy to better conform with their regulations and deal with the challenges inherent in searching old records. As an application requirement, jurisdictions could also require applicants to provide evidence of any prior renovations undertaken after January 1, 1977.

The long-term effectiveness of a redevelopment-based adaptation strategy depends on at least two factors. First, policies should clearly define the threshold of improvements that constitute "redevelopment." If non-exempt improvements or repair and maintenance fall short of the definition of redevelopment, a landowner could maintain the existing structure for its remaining life and make any improvements that meet current LCP and, if applicable, Coastal Act standards. However, the whole structure need not be brought up to current standards so long as the improvements do not increase the structure's non-conformity with hazard or other LCP policies. Second, an adaptation strategy should include downzoning of hazardous areas so that buildings destroyed by disasters are rebuilt in safer locations rather than being allowed to be rebuilt in the same location pursuant to Coastal Act exemptions for rebuilding after a disaster (See Public

Resources Code § 30610(g)). Instituting rebuilding restrictions in advance of damage will give property owners and real estate markets time to adjust before disasters strike.

When non-conforming structures are redeveloped, they should be brought into conformity with all coastal resource protection standards in an LCP. However, local governments may choose to allow the redeveloped structure to remain in non-conformity with non-coastal protection standards contained in an LCP, which might include, for example, parking or front yard setback standards. Doing so would provide more flexibility for allowing reasonable redevelopment in hazardous areas.

B.7 Redevelopment

A development proposal reaches the threshold of being a replacement structure or redevelopment if it meets criteria a or b below. Development meeting this definition must be brought into conformance with all coastal resource protection policies in the LCP.

a. Development that consists of alterations including (1) additions to an existing structure, (2) exterior and/or interior renovations, and/or (3) demolition or replacement of an existing home or other principal structure, or portions thereof, which results in either:

    1. Replacement (including demolition, renovation or alteration) of 50% or more of major structural components including exterior walls, floor, roof structure or foundation, or a 50% increase in gross floor area. Alterations are not additive between individual major structural components; or

    2. Replacement (including demolition, renovation or alteration) of less than 50% of a major structural component where the proposed replacement would result in cumulative alterations exceeding 50% or more of that major structural component, taking into consideration previous replacement work undertaken on or after January 1, 1977; or an alteration that constitutes less than 50% increase in floor area where the proposed alteration would result in a cumulative addition of 50% or greater of the floor area, taking into consideration previous additions undertaken on or after January 1, 1977.

OR

b. Development that consists of any alteration of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction, based on the documented construction bid costs and either an appraisal by a professional property appraiser or County assessor data, if it is based on current market values.

B.8 Nonconforming Structures in Areas Subject to Coastal Hazards

When proposed development would involve redevelopment of an existing structure that is legally non-conforming due to a coastal resource protection standard, the entire structure must be made to conform with all current coastal resource protection standards and policies of the LCP and, if applicable, the Coastal Act. Non-exempt improvements to existing non-conforming structures, regardless if the proposed improvements meet the threshold of redevelopment, shall not be permitted when the improvements increase the degree of non-conformity of the existing structure by, for example, increasing the hazardous condition, developing seaward, or increasing the size of the structure in a non-conforming location.

Land Division

B.9 Restrict Land Division in Hazardous Areas

Limit land divisions, including lot line adjustments, in areas vulnerable to coastal hazards, including hazards exacerbated by sea level rise. Prohibit the creation of new lots (including adjusted lots) in such areas, unless it is demonstrated either that: 1) the new lot(s) would be permanently protected for open space, public access, or other similar purposes consistent with the LCP, or 2) resultant parcels contain a buildable area in which development on new lots would comply with LCP policies protecting coastal resources, would remain located on private property despite the migration of the public trust boundary, not require the future construction or augmentation of a shoreline protective device, be adequately served by public services (e.g., water, sewer, and safe, legal, all-weather access as applicable) over the anticipated duration of the development, and otherwise be consistent with all LCP policies.

Exceptions

Note: Despite the Coastal Act's requirements to minimize hazards and protect coastal resources, local governments must still ensure that actions on coastal development permits do not result in an unconstitutional taking of private property. Many LCPs already contain takings policies to address this need. The model language below notes that background principles of property law like the public trust doctrine or nuisance abatement might change the context of decisions related to sea level rise adaptation actions in the future. This policy helps clarify when a taking might not be a consideration.

Communities might also create adaptation plans on a neighborhood scale (see Model Policy G.3– Adaptation Plan for Highly Vulnerable Areas) to provide strategies for hazardous areas where development must be approved to avoid an unconstitutional taking of private property.

B.10 Takings Analysis

Where full adherence with all LCP policies, including for setbacks and other hazard avoidance measures, would preclude a reasonable economic use of the property as a whole, the **[*city or county, or Commission if on appeal*]** may allow the minimum economic use and/or development of the property necessary to avoid an unconstitutional taking of private property without just compensation. There is no taking that needs to be avoided if the proposed development constitutes a nuisance or is otherwise prohibited pursuant to other background principles of property law (e.g., public trust doctrine). Continued use of an existing structure, including with any permissible repair and maintenance (which may be exempt from permitting requirements), may provide a reasonable economic use. If development is allowed pursuant to this policy, it must be consistent with all LCP policies to the maximum extent feasible.

C. DESIGN FOR THE HAZARD

Note: The Coastal Act requires hazards to be minimized. Accommodation strategies rely on methods that modify existing developments or design new developments to minimize hazard risks and thus increase the resiliency of development to the impacts of sea level rise. Design options for accommodation can be an important part of phasing a community's response to sea level rise impacts, especially when it is not feasible to avoid hazards altogether. The policy below is general, but could be customized to the applicable hazards a community is confronting. Also see Model Policy E.4 for flood hazard mitigation design options.

Adaptive Design

C.1 Adaptive Design

For new development, where relocation and/or structure removal might be necessary at some time in the future, ensure that foundation designs or other aspects of the development will accommodate future relocation and/or structure removal. Such relocation and/or removal shall be demonstrated in final plans, and may be phased over time. Alternative design options should be considered and employed where appropriate and if site conditions allow, such as constructing smaller structures, increasing finished floor elevations, and installing wall flood vents.

C.2 Design Guidelines to Reduce Greenhouse Gas Emissions

Encourage property owners to reduce greenhouse gas emissions by using weatherizing techniques, as well as solar panels, and wind energy, where compatible with community character, coastal views and protection of biological resources.

D. MOVING DEVELOPMENT AWAY FROM HAZARDS

Note: Coastal Act Section 30235 permits shoreline protective devices when necessary to protect existing residential structures in danger of erosion and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Section 30253 requires new and redeveloped residential structures to be located or designed so that they minimize risks from flooding and other future hazards and will assure structural stability without the need for shoreline protection that alters natural landforms. Other Coastal Act policies require protection of sensitive habitat, public access, and other coastal resources. Thus, as sea levels rise and hazardous areas, habitat, and public trust lands migrate inland, the Coastal Act will require new development to be located further inland in situations where other adaptation measures are infeasible, essentially resulting in managed retreat on a parcel scale. On a neighborhood or community scale, there may also be cases where a managed retreat program provides the best way to comply with Coastal Act policies that require minimizing hazards, protecting coastal resources and maximizing public access. The following polices help ensure that new development minimizes hazards, assures structural stability, is located in areas where present and future services are able to accommodate it, protects sensitive habitat and public recreational areas, and does not substantially impair uses of public trust lands, consistent with the Coastal Act. Also see the model policies in Section G for options related to community scale managed retreat.

Managed Retreat

D.1 Removal Conditions/Development Duration

New development on private property located in hazardous areas shall be conditioned to require that it be removed and the affected area restored at the applicant's expense if: (1) any government agency with relevant authority and jurisdiction has ordered that the structures are not to be occupied due to hazards, or be removed; (2) essential services to the site can no longer feasibly be maintained (e.g., utilities, roads); (3) removal is required pursuant to LCP policies for sea level rise adaptation planning; or (4) the development requires new and/or augmented shoreline protective devices that conflict with LCP or relevant Coastal Act policies. In addition, permits shall include a condition stating that the development approval does not permit encroachment onto public trust lands and that any future encroachment must be removed unless the Coastal Commission determines that the encroachment is legally permissible pursuant to the Coastal Act and authorizes it to remain, and any future encroachment would also be subject to the State Lands

Commission's (or other trustee agency's) leasing approval. Such condition shall be recorded on a deed restriction against the subject property.

D.2 Contingency Funds

Require property owners proposing new development in hazardous areas to document that financial contingencies are in place if it becomes necessary to modify, relocate and/or remove development that becomes threatened in the future by sea level rise and/or when removal triggers are met. For significant new development, such as hotels or multi-family housing, financial contingencies must be in the form of a bond, letter of credit, cash deposit, lien agreement or other security deemed adequate by the ***[insert City or County]*** Attorney.

D.3 Mean High Tide Line (MHTL) Survey Conditions

Note: The MHTL is the intersection of the shoreline with the elevation of the average of all high tides calculated over an 18.6-year tidal epoch. A MHTL survey provides a piece of evidence for the MHTL—and thus the property line—at a specific point in time, but it does not indicate a permanent property line. This property line is referred to as "ambulatory" for two reasons: first, gradual changes to the shoreline due to factors such as variations in the height and width of sandy beaches, shoreline erosion or accretion, and uplift or subsidence of land can change the location of where the mean high tide line meets the shoreline. Second, the elevation of the mean high tide line itself changes over time and is likely to increase at an accelerating rate in the future due to sea level rise.

As part of any development application, jurisdictions should ensure that the applicant has appropriate legal title to the land being developed. In locations where sea level rise may cause the public trust boundary to move inland over the life of the development, it is important to ensure that the development remains on private land over time. Imposing a condition requiring at least one initial MHTL survey, and periodic MHTL surveys thereafter, will help provide evidence that the development is located on, and remains on, private property. Such surveys also provide baseline data that can be useful for understanding an area's shoreline dynamics and sea level rise over time, which in turn can inform a jurisdiction's vulnerability assessments and adaptation plans. Jurisdictions may want to modify the model policy to more precisely define the situations in which MHTL surveys are required—e.g., they may not be useful or appropriate in situations where a boundary line has been fixed by law, where development is located on filled tidelands bounded by bulkheads, or where a jurisdiction already has clear evidence of the public trust boundary and there is no risk that the proposed development will encroach on public trust lands during its expected lifetime.

As a part of any application for low-lying development adjacent to coastal waters, the applicant shall submit a Mean High Tide Line (MHTL) survey prepared by a licensed professional land surveyor of the Subject property based on field data collected within 12 months of the date submitted. Such survey shall be at the landowner's expense and shall be conducted in consultation with the California State Lands Commission (CSLC) staff. Prior to submitting this survey to the Commission, it must be approved by the CSLC as compliant with CSLC survey standards. In addition, every ***[5-10]*** years, or in the event of reaching a specified trigger ***[(i.e., new tidal datum epoch, seismic event of magnitude 5.5 or greater, rise in annual local MSL records of [x] above current MSL datum (where [x] might be based upon difference in elevation between lowest portion of the development and the current MSL datum)]***, the landowner shall submit additional MHTL surveys. Such surveys shall:

a. Use either the published Mean High Water elevation from a National Oceanic and Atmospheric Agency published tide station closest to the project or a linear interpolation between two adjacent tide stations, depending on the most appropriate approach in light of tidal regime characteristics.
b. Use the most current tidal epoch.
c. Use local, published control benchmarks to determine elevations at the survey site. Control benchmarks are the monuments on the ground that have been precisely located and referenced to the local tide stations and vertical datum used to calculate the Mean High Tide elevation.
d. Match elevation datum with tide datum.
e. Reference all elevations and contour lines to the North American Vertical Datum 1988 (NAVD88).
f. Note survey date, datum, and MHTL elevation.

E. MOVING HAZARDS AWAY FROM DEVELOPMENT

Note: The model policies below should be considered for relevant shoreline types. Certified LCPs are already required to have policies and standards to ensure that environmentally sensitive habitat area (ESHA), wetlands, and other coastal habitats and resources are protected; however, in light of sea level rise, additional protections might be needed. An additional buffer area can allow for the migration of wetlands and other shoreline habitats caused by sea level rise over the anticipated duration of development, thus avoiding significant disruption or degradation to sensitive habitat, and allowing for the continued existence of the habitat.

E.1 Habitat Buffers

Provide a buffer of at least ***[insert distance of buffer]*** feet in width from the edge of wetlands or other environmentally sensitive habitat areas and at least ***[insert distance of buffer]*** feet in width from the edge of riparian habitat. A sea level rise buffer area shall be added to the habitat buffer if necessary to allow for the migration of wetlands and other shoreline habitats caused by sea level rise over the anticipated duration of the development. Except for temporary uses, as described below, uses and development within sea level rise buffer areas shall be limited to minor passive recreational uses, with fencing, desiltation or erosion control facilities, or other improvements deemed necessary to protect the habitat, to be located in the upper (upland) half of the buffer area. Water quality features such as drainage swales required to support new development shall not be constructed in wetland buffers. Temporary uses may also be placed in the sea level rise buffer area until such time as sea level rise causes the wetlands or other shoreline habitat to migrate to within 100 feet of the temporary uses, at which time, they shall be removed. All habitat and buffers identified shall be permanently conserved or protected through a deed restriction, open space easement or other suitable device. All development, such as grading, buildings and other improvements, adjacent to, or draining directly to an environmentally sensitive habitat area must be sited and designed so it does not significantly degrade habitat values, impair functional capacity, or impair the continuance of the habitat area.

Note: The Coastal Act requires approved shoreline protection to be the least environmentally damaging feasible alternative. Soft shoreline protection is often an alternative that enhances natural coastlines and provide some natural storm protection as well as habitat benefits. Soft protection alternatives are sometimes hybrids of hard and soft approaches. For example, a horizontal levee consists of hardened protection (levee) set back from the coastline with a wide expanse of natural habitat such as coastal marsh between the water and the levee. The intent in this case is to use a setback of a harder structure such as a levee or shoreline protection to allow marshes to provide natural buffering to reduce the impacts of coastal flooding, storm surge and wave action. It is also important to note that the term "soft" shoreline armoring can refer to shoreline restoration projects, or to shoreline armoring that includes a natural component, such as a revetment that is buried beneath sand and vegetated. While the former may be a permissible restoration project in many circumstances, the latter constitutes shoreline armoring that is generally not permitted to protect new development, though may be approved if it is necessary to protect an existing structure or coastal dependent use in danger from erosion, and is the least environmentally damaging feasible alternative, as required by the Coastal Act.

E.2 Soft Shoreline Protection

Encourage the use of soft or natural shoreline protection methods, such as dune restoration, beach/sand nourishment, living shorelines, horizontal levees, and other "green" infrastructure as alternatives to hard shoreline protective devices. Soft shoreline protection devices shall be fully evaluated for coastal resource impacts, and shall only be approved if found consistent with the LCP policies related to shoreline protection. The ***[City or County]*** should consider how these options may need to change over time as sea level rises.

E.3 Avoid Adverse Impacts from Stormwater and Dry Weather Discharges

New development shall provide adequate drainage and erosion control facilities that convey site drainage in a non-erosive manner to minimize hazards resulting from increased runoff and erosion. Runoff shall be directed inland to the storm drain system or to an existing outfall, when feasible. If no storm drain system or existing outfall is present, blufftop runoff shall not be channelized or directed to the beach or the ocean.

E.4 Flood Hazard Mitigation

If it is infeasible for new development to avoid flooding hazards, development should be designed to minimize risks from flooding, including as influenced by sea level rise, over the anticipated life of the development and otherwise constructed using design techniques that will limit damage caused by floods. Residential design shall incorporate appropriate flood hazard mitigation measures, including: ***[include all applicable, and add any other appropriate measures]*** elevating the finished floor (e.g., above the estimated combined 100-year storm flood elevation considering sea level rise and wave uprush scenario); locating only non-habitable space below the flood hazard elevation; elevating and storing hazardous materials out of the flood hazard area; elevating mechanical and utility installations; prohibiting basements; and using flood vents and anchoring structures where appropriate. However, elevation should be limited to ensure consistency with visual resource protection policies, and to ensure that access to utilities, including water, sewer, and roads, can continue over the anticipated duration of the development. If such access cannot be ensured consistent with LCP policies, then conditions shall be added requiring assumption of risk, removal triggers, and retreat management plan.

F. BUILDING BARRIERS TO PROTECT FROM HAZARDS

Shoreline Armoring

Note: The Coastal Act limits the use of shoreline protective devices and requires coastal resources to be protected when shoreline protection is allowed. In areas between the first public road and the sea, where shoreline protection is located, the standard of review is not only the LCP, but also the public access and recreation policies of the Coastal Act. In addition, many shoreline armoring projects are located partly or wholly on tidelands, within the Commission's retained jurisdiction. In such cases, applicants will need to apply to the Commission for a permit, and Chapter 3 of the Coastal Act will be the standard of review, at least for the portion within the Commission's jurisdiction, or for the whole project if the applicant, local government, and Commission agree to process a consolidated permit for the whole project.

Coastal Act Section 30253 requires new development to minimize risks from hazards, to avoid creating or contributing significantly to erosion and geologic instability, and to not in any way require construction of armoring that substantially alters natural landforms along bluffs and cliffs. Other Coastal Act provisions also limit the circumstances in which shoreline armoring may be permitted. For example, Section 30251 requires that new development minimize the alteration of natural land forms and be visually compatible with the character of surrounding areas, and Section 30210 requires provision of maximum public access to the coast. A common way to comply with these requirements is by establishing bluff-top and shoreline setbacks so that new development will not require armoring that impacts landforms, visual resources or access.

Despite this strict limitation on shoreline armoring for new development, Section 30235 allows armoring that alters natural shoreline processes when it is needed to protect existing structures, coastal dependent uses, or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. However, such protection is only required to be permitted if it is necessary – i.e., if the existing structure is in fact in danger – and if the proposed shoreline protection is the least environmentally-damaging alternative to abate the danger. As described in the Commission's 2015 Sea Level Rise Policy Guidance, the Commission interprets the term "existing structures" in Section 30235 as meaning structures that were in existence on January 1, 1977—the effective date of the Coastal Act. In other words, Section 30235's requirement to permit shoreline armoring in certain circumstances generally only applies to structures that existed as of January 1, 1977.

Managing shoreline armoring has been challenging for many local governments because urban areas are frequently made up of both developed and undeveloped lots. In addition, many structures in existence in 1976 have since been "redeveloped" through renovations, remodeling, additions, and complete demolition and rebuild. The reality of effective shoreline management is that the Coastal Act and LCPs must address and be applied to a wide variety of physical and legal circumstances that may not be addressed by a simple application of the Coastal Act distinction between existing structures, which may be allowed shoreline armoring even if that armoring has impacts that would otherwise be prohibited by LCP or relevant Coastal Act policies, and new development, which is generally not entitled to armoring that is inconsistent with any resource protection policies of the LCP or access policies of the Coastal Act. See further discussion in section entitled 'Adaptation Strategies for Development Constructed after January 1, 1977'.

A suite of shoreline armoring policies can offer guidance for many of the shoreline armoring contexts, laying out the general policies first, then offering details on prioritization, siting and design, mitigation, and expectations for the shoreline armoring in the future. Policies F.1 through F.9 can help achieve Coastal Act consistency in areas where shoreline protection that would alter the natural shoreline may be needed now or in the future. In areas where bulkheads that do not alter the natural shoreline process are involved, Policy F.10 may be appropriate.

F.1 Shoreline and Bluff Protective Devices

Shoreline protective devices, including revetments, breakwaters, groins, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes, shall be permitted when required to serve coastal-dependent uses or protect existing principal structures or public beaches in danger from erosion, when designed to eliminate or mitigate adverse impacts on local shoreline sand supply, and when there is no less environmentally damaging alternative, unless a waiver of rights to shoreline protective devices applies on the property. Any such structures shall be sited to avoid sensitive resources, if feasible, and adverse impacts on all coastal resources shall be mitigated. Existing marine structures causing water stagnation or contributing to pollution problems and fish kills shall be phased out or upgraded where technically feasible. For the purposes of this policy, "existing structure" means a principal structure (e.g., residential dwelling or second residential unit) that was legally permitted prior to the effective date of the Coastal Act (January 1, 1977) and that has not subsequently undergone redevelopment ***([pursuant to Model Policy B.7])***.

F.2 Prioritization of Types of Shoreline Protection

Shoreline protective devices shall only be permitted if no other feasible, less environmentally damaging alternative, including but not limited to relocation of the threatened development, beach nourishment, non-structural drainage and native landscape improvements, or other similar non-structural options, can be feasibly used to address erosion hazards and to minimize risk of flooding and provide structural stability. Such non-structural options shall be identified, used and prioritized wherever feasible to protect coastal resources, including coastal habitats, public recreational uses, and public access to the coast. Where such non-structural options are not feasible in whole or in part, soft protection (e.g., sand bags, revetments that are combined with dune restoration, etc.) shall be used and prioritized wherever feasible before any more significant hard shoreline protective devices (including, but not limited to, seawalls, revetments, breakwaters, groins, bluff retention devices, and caisson foundation systems) are permitted.

F.3 Siting and Design to Avoid and to Mitigate Impacts

New shoreline protective devices shall be sited and designed to eliminate or mitigate adverse impacts on local shoreline sand supply. They shall also be sited and designed to avoid other coastal resource impacts to the maximum extent feasible, including through: eliminating or mitigating all adverse impacts on beach area; protecting and enhancing public recreational access; protecting and enhancing public views; minimizing alteration of, and being visually subordinate to, the natural character of the shoreline; avoiding or mitigating impacts to archeological resources; avoiding encroachment onto public trust lands and interference with the natural migration of the public trust boundary; and protecting other coastal resources in a manner consistent with applicable Coastal Act and LCP policies and the public trust.

Impacts from shoreline protective devices on beach area and local shoreline sand supply generally include: losing sand and beach area through the device's physical encroachment on a beach, fixing of the back beach, preventing new beach formation in areas where the bluff/shoreline would have otherwise naturally eroded, and losing sand-generating bluff/shoreline materials that

would have entered the sand supply system absent the shoreline protective device. If such impacts cannot be avoided, they shall be mitigated through options such as providing equivalent new public access or recreational facilities or undertaking restoration of nearby beach habitat. If such options are not feasible, proportional in-lieu fees that consider the full value of the beach—including with respect to impacts on shoreline sand supply, sandy beaches, public recreational access, public views, natural landforms, beach ecology, and water quality—may be used as a vehicle for impact mitigation provided that such in-lieu fees are deposited in an interest bearing account managed by the ***[insert City or County]*** and used only for acquisition or improvements of coastal public access, biological restoration, or other relevant mitigation in the vicinity of the project. New shoreline protective devices may not be approved if they cannot adequately eliminate or mitigate adverse impacts on local shoreline sand supply.

F.4 Repair and Maintenance of Shoreline Protective Devices

Non-exempt repair and maintenance of existing, legally permitted shoreline protective devices may be permitted as repair and maintenance only if the activities do not result in an enlargement or extension of armoring. Repair and maintenance activities shall not result in a seaward encroachment of the shoreline protective device or substantially impair public trust resources. Repair and maintenance projects shall include measures to address and mitigate all coastal resource impacts that the repair and maintenance activities may cause, including with respect to local sand supply, public views and public recreational access. Replacement of 50 percent or more of the protective device shall not be considered repair and maintenance but instead constitutes a replacement structure subject to provisions applicable to new or replacement shoreline protective devices.

F.5 Evaluation of Existing Shoreline Armoring

Applications for new development or redevelopment on property that is protected by existing shoreline protective devices shall not rely on the existing device for protection (see B.3 - Reliance on Shoreline armoring) and shall be required to provide an assessment of the continued efficacy and necessity of such protective devices. This must include an evaluation of whether the shoreline protective device can feasibly be removed or modified (and affected areas restored to natural conditions) in connection with demolition or modification of the existing structure that the protective device was built to protect. If the assessment indicates that existing shoreline protective devices can feasibly be removed or modified, and that there is a greater coastal resource and/or public access benefit to removal or modification, and if the shoreline armoring is under the applicant's control, then removal or modification shall be required as a condition of approval for the demolition or alteration of the existing structure(s). However, if the device continues to be necessary to protect other existing principal structures on the property, other adjacent existing principal structures, or coastal dependent uses entitled to protection, then it may remain for so long as it is necessary for those purposes and its duration is addressed pursuant to ***[Model Policy F.6]***.

F.6 Shoreline Armoring Duration

Shoreline protective devices shall only be authorized until the time when the existing principal structure that is protected by such a device: 1) is no longer present; 2) no longer requires armoring; or 3) is redeveloped. Permittees shall be required to submit a coastal permit application to remove the authorized shoreline protective device within six months of a determination that the shoreline protective device is no longer authorized to protect the structure it was designed to protect because the structure is no longer present or no longer requires armoring and the device is not needed to protect adjacent development that is still entitled to shoreline armoring. In the case of redevelopment, any potential rights to protection are terminated and removal of the shoreline

protective device shall be required as part of demolition and alteration of the structure being redeveloped.

F.7 Shoreline Armoring Mitigation Period

As a condition of approval for new, redeveloped or non-exempt repairs to shoreline protective devices, require mitigation of impacts to shoreline sand supply, public access and recreation, and any other relevant coastal resource impacts in 20-year (or smaller) increments, starting with the building permit completion certification date. Permittees shall apply for a coastal permit amendment prior to expiration of each 20-year mitigation period, proposing mitigation for coastal resource impacts associated with retention of the shoreline protective device beyond the preceding 20-year mitigation period, and such application shall include consideration of alternative feasible mitigation measures in which the permittee can modify or remove the shoreline protective device to lessen its impacts on coastal resources.

F.8 Shoreline Armoring Monitoring and Mean High Tide Line Surveys

As a condition of approval for new, redeveloped or non-exempt repairs to shoreline protective devices, require a monitoring plan to identify the impacts of the shoreline armoring on the surrounding area and determine when a shoreline protective device is no longer needed for protection. The monitoring plan shall specify requirements for periodic inspection ***(e.g., every [5 years])*** for structural damage, excessive scour, or other impacts from coastal hazards and sea level rise, impacts to shoreline processes and beach width (both at the project site and the broader area and/or littoral cell as feasible), and impacts to public access and the availability of public trust lands for public use. Every ***[x]*** years, or in the event of reaching a specified trigger, the landowner shall submit a new Mean High Tide Line (MHTL) survey of the Subject property based on field data collected within 12 months of the date submitted. Such surveys must comply with the standards in ***[Model Policy D.3].***

Note: The intent of a policy describing limits on future shoreline armoring is to inform property owners about the risks of placing new development or redevelopment in a hazardous area subject to sea level rise impacts and to ensure consistency with Coastal Act policies that limit shoreline armoring. As described above, Coastal Act Section 30253 and other Coastal Act provisions significantly limit the ability to approve shoreline armoring for new development. The first part of Model Policy F.9 ensures that applicants for new development, as well as future property owners, are aware that they may not claim a right under Section 30235 to obtain shoreline armoring for the new development. However, this policy would not restrict an owner's ability to later apply for and obtain shoreline armoring that is fully consistent with the LCP and with the Coastal Act's public access provisions. This part of the policy is appropriate for any new non-coastal dependent development located in a hazardous area where there is a possibility that wave action, flooding, erosion or other sea level rise impacts could someday threaten the structure.

The second part of F.9 provides an alternative, broader limitation that may be appropriate for new development in locations where any future shoreline armoring would clearly be inconsistent with relevant LCP policies and the public access policies of the Coastal Act. In areas of the coast where the local government has determined, through its LCP, that armoring is inappropriate, use of this policy language will help ensure that applicants for new development are clearly informed that they will not be able to construct armoring to protect their new structures. This broader policy carries out Section 30253's mandate that new development not in any way require the construction of shoreline protection that substantially alters natural landforms along bluffs or cliffs, and the requirements of other relevant Coastal Act policies (e.g., Sections 30210 , 30240, 30251) to protect access, recreational resources, visual resources, and other coastal resources. Local jurisdictions should consider which policy to apply in different areas, depending on the adaptation strategies chosen in those areas and the possibility that Coastal Act-consistent armoring could be a part of that adaptation strategy. For an approach that local governments can use to implement F.9, see Model Policy G.4 Sea Level Rise Hazard Overlay Zone.

F.9 Limits on Future Shoreline Armoring

As a condition of approval of a coastal development permit for new development or redevelopment on a beach, shoreline, bluff, or other area subject to coastal hazards, applicants shall be required to acknowledge that the new development or redevelopment does not qualify as a structure entitled to shoreline protection under Coastal Act Section 30235 [***or corresponding LCP provision Model Policy F.1***]. The applicant shall also waive any right to claim that the structure is entitled to shoreline protection under Coastal Act Section 30235 [***or corresponding LCP provision Model Policy F.1***]. Private property owners shall be required to record that acknowledgment and waiver in a deed restriction [(***see also Model Policy A.6 – Assumption of Risk***)]. For purposes of this policy, the term *coastal hazards* includes, but is not limited to, tidal and storm flooding, storm conditions, waves, wave run-up, bluff retreat, erosion, and landslides, as influenced by sea level rise over time.

Alternative language to use where appropriate, OR as an additional policy to apply in particular areas

As a condition of approval of a coastal development permit for new development or redevelopment on a beach, shoreline, bluff, or other area subject to coastal hazards, applicants shall be required to acknowledge and agree that no bluff or shoreline protective device(s) shall ever be constructed to protect the approved development, including if it is threatened with damage or destruction from coastal hazards in the future. As a condition of approval, applicants shall also waive any rights to construct such devices that may exist under applicable law. Private property owners shall be required to record that acknowledgement, agreement, and waiver in a deed restriction [***(see also Model Policy A.6 – Assumption of Risk***)]. For purposes of this policy, the term *coastal hazards* includes, but is not limited to, tidal and storm flooding, storm conditions, waves, wave run-up, bluff retreat, erosion, and landslides, as influenced by sea level rise over time.

F.10 Bulkheads for Waterfront Development

New development or redevelopment on property currently protected from flooding by bulkheads is permitted to rely on those bulkheads to demonstrate that the project will protect life and property from coastal hazards if: 1) the existing bulkheads, and feasible augmentation of them necessary to protect the proposed structure over its life, do not alter natural shoreline processes

along bluffs or cliffs or cause adverse impacts to public access, marine habitat, aesthetics or other coastal resources protected in the LCP, including when considering migration of public trust lands and impacts from anticipated groundwater changes; and 2) property owners record a waiver of any rights to seaward expansion of the bulkhead as a condition of approval of a coastal development permit for new development when a coastal hazards report (see Policy A.4 –Site-specific Coastal Hazard Report Required) establishes that an existing bulkhead cannot be removed and/or an existing or replacement bulkhead is required to protect existing principal structures and adjacent development or public facilities on the site or in the surrounding area. Waiver of rights to future shoreline protection includes repair or maintenance, enhancement, reinforcement, or any other activity affecting the bulkhead, that results in any encroachment seaward of the authorized footprint of the bulkhead. The principal structure(s) should be set back a sufficient distance 1) to allow for repair and maintenance of that bulkhead including access to any subsurface deadman or tiebacks and 2) to allow for realignment of necessary bulkheads as far landward as possible and in alignment with bulkheads on either side.

Note: 14 California Code of Regulations Section § 13009 defines an emergency as, "a sudden unexpected occurrence demanding immediate action to prevent or mitigate loss or damage to life, health, property, or essential public service." Local vulnerability assessments should give some indication of where emergency hazards are more likely to emerge, and can allow a community to begin planned adaptation strategies for segments of their coastline to respond proactively. However, emergency applications for shoreline protective devices are still likely to increase as risks of storm damage are exacerbated by sea level rise. It is important to note that the emergency permit is only a temporary authorization of development. The Commission often authorizes emergency work for 90 days, but local governments may choose other timeframes, based on particular circumstances. The regular coastal development permit process for such development allows for an alternatives analysis to determine the best way to implement adaptation measures that consider impacts on neighboring properties as well as cumulative impacts on shoreline processes and coastal resources.

Local governments can avoid emergency permit requests unintentionally resulting in permanent armoring by enforcing temporary armoring expiration dates, requiring a regular coastal permit application after issuance of emergency permits, and specifying conditions for removal of emergency shoreline armoring if it is not authorized in a subsequent regular coastal permit.

F.11 Emergency Permits

In the event of an emergency, the [***Planning Director***] may issue an emergency Coastal Development Permit to authorize emergency work in compliance with Section 30624 of the Coastal Act. The [***Planning Director***] shall not issue an emergency Coastal Development Permit for any work to be conducted on any tidelands, submerged lands, or on public trust lands, whether filled or unfilled, or any other area within the Coastal Commission's retained coastal permit jurisdiction; requests for emergency work in these areas shall be referred to the Coastal Commission. The emergency approval shall conform to the Local Coastal Program. The emergency permit process is intended to allow for emergency situations to be abated through use of the minimum amount of temporary measures necessary to address the emergency in the least environmentally damaging short- and long-term manner, including that the development is easily removable. The [***Planning Director***] may request, at the applicant's expense, verification by a qualified professional of the nature of the emergency and the range of potential solutions to the emergency situation, including the ways such solutions meet these criteria.

a. Application. An application for an emergency Coastal Permit shall be filed with the [***Planning Director***] in writing if time allows, or in person or by telephone if time does not allow.

b. Required information. The applicant shall report to the [***Planning Director***] the following information, either during or as soon after the emergency as possible (and in all cases before the emergency Coastal Permit expires):

1. The nature and location of the emergency;
2. The cause of the emergency, insofar as this can be established;
3. The remedial, protective, or preventive work required to deal with the emergency; and
4. The circumstances during the emergency that appeared to justify the course(s) of action taken, including the probable consequences of failing to take action.
5. An application for an emergency shoreline protective device shall be accompanied by a hazards report [(***see Policy xxx***)]. If the applicant is unable to provide all such information due to the nature of the emergency, then the applicant shall provide at a minimum: (a) a description of what measures, if any, were taken in advance in order to mitigate the hazard and (b) an analysis of alternatives, including use of sand bags, as well as the "no action" alternative.
6. All required technical reports and project plans.

The Director shall verify the facts, including the existence and nature of the emergency, as time allows.

c. Notice. The [***Planning Director***] shall provide public notice of the proposed emergency work, and determine the extent and type of notice based on the nature of the emergency. The ***[Planning Director***] shall notify the Executive Director of the Coastal Commission as soon as possible about potential emergency coastal permits, and shall report, in writing, to the Executive Director after the emergency coastal permit has been issued, the nature of the emergency, and the work involved.

d. Emergency permit approval. The [***Planning Director***] may grant an emergency permit upon reasonable terms and conditions, including an expiration date, if the [***Planning Director***] finds that:

1. An emergency (i.e., a sudden unexpected occurrence demanding immediate action to prevent or mitigate loss or damage to life, health, property or essential services) exists that requires action more quickly than permitted by the procedures for a Coastal Development Permit, and the work can and will be completed within 30 days unless otherwise specified by the emergency permit;
2. Public comment on the proposed emergency action has been reviewed, if time allows; and
3. The proposed work is consistent with applicable Local Coastal Program policies.
4. The proposed work is the minimum amount of temporary development necessary to abate the emergency in the least environmentally damaging short- and long-term manner.

The decision to issue an emergency permit is at the sole discretion of the [***Planning Director***], provided that subsequent Coastal Development Permits required for the project shall comply with all applicable provisions of the LCP.

e. Coastal Permit required. All emergency Coastal Development Permits shall expire ninety (90) days after issuance, unless extended for good cause by the [***Planning Director***], if such

extension is limited as much as possible in duration. All emergency development pursuant to this section is considered temporary and must be removed and the affected area restored if the development is not subsequently permitted by a regular coastal development permit within 6 (six) months of the date of emergency permit issuance, unless the [***Planning Director***] authorizes an extension of time for good cause. Within 30 days of issuance of the emergency Coastal Permit, the applicant shall apply for a regular Coastal Permit. Failure to file the applications and obtain the required permits may result in enforcement action.

G. COMMUNITY SCALE ADAPTATION PLANNING

Note: The Coastal Act calls for public understanding of, and maximum public participation in, coastal planning. The Coastal Act also requires protection of coastal resources for current and future generations, including through orderly development that reduces risks and preserves public access. To achieve consistency with these Coastal Act requirements, much of sea level rise adaptation for residential land use will require a community approach, as the scope of parcel level actions is too limited to address all coastal hazard impacts, especially when existing residential development is already located in hazardous areas. For example, unless individual bulkheads in a community are raised together, the lowest one will be the weak link and will expose larger areas (homes and roads) to flooding. Community scale adaptation approaches should reflect public participation in the planning process (LCP steps 3 and 4) and may require regional collaboration depending on the extent of anticipated shoreline impacts from the anticipated community-wide adaptation options. Community participation in adaptation planning can highlight unique coastal resources and different opportunities for maintaining them within the adaptation pathways approach.

Community scale adaptation plans should also take into account other climate change impacts (e.g. changes in precipitation patterns, fire frequency, etc.), and jurisdictions should work with other counties and cities to develop and incorporate expectations for potential future impacts given other watershed scale changes. These changes may be related to climate change effects, other development upstream, or management decisions and processes.

Developing Adaptation Planning Information

G.1 Management of Sea Level Rise Hazards

a. Gather information on the effects of sea level rise, including identifying the most vulnerable areas, structures, facilities, and resources; specifically areas with priority uses such as public access and recreation resources, including the California Coastal Trail, Highway 1, significant ESHA, wetlands or wetland restoration areas, open space areas where future wetland migration would be possible, and existing and planned sites for critical infrastructure.

b. The [***Insert city or county***] shall conduct a vulnerability assessment [by ***insert date***] and establish baseline conditions using best available science identified pursuant to Policy A.1 - Identifying and Using Best Available Science - and use multiple sea level rise scenarios including estimates of high projections of expected sea level rise.

c. The [***Insert city or county***] shall update Sea Level Rise Maps at least every 10 years or as necessary to allow for the incorporation of new sea level rise science, monitoring results, and information on coastal conditions.

d. Research the potential to increase setbacks for or relocate existing and planned development to safer locations in order to minimize hazards and protect coastal resources. Explore the feasibility of a managed retreat program, which may involve protecting vacant land through zoning or conservation easements and/or removing development from areas vulnerable to sea level rise and restoring those areas to a natural state for open space or recreation. Identify potential mechanisms and incentives for implementation, which may include options to:
    1. Acquire vacant vulnerable properties.
    2. Acquire developed vulnerable properties before damage occurs.
    3. Acquire developed vulnerable properties after significant destruction by storms, erosion, or high tides.
    4. Explore the feasibility of public parkland exchange programs that encourage landowners to move out of hazardous areas.
    5. Identify and make available (e.g., through rezoning) land outside the hazard areas to allow owners of vulnerable properties to relocate nearby.
    6. Explore clustering of development density in areas not vulnerable to coastal hazards and limiting development in areas that are vulnerable.
    7. Develop Transfer of Development Rights programs.
    8. Develop programs to phase out the use of homes in coastal hazard areas, such as through leasebacks.
    9. Work with entities that plan or operate infrastructure, such as Caltrans, public utilities, railroads, water districts, etc., to plan for potential relocation or realignment of public infrastructure impacted by sea level rise.
    10. Support development of Geologic Hazard Abatement Districts (GHADs), County Services Areas (CSAs), or other similar entities to address the prevention, mitigation, abatement, and control of geologic hazards for specific neighborhoods

e. Join and/ or facilitate collaborative sea level rise adaptation efforts with other local, regional, state and federal entities to promote restoration or enhancement of natural ecosystems, such as coastal wetlands and sandy beaches.

f. Support efforts to monitor sea level rise impacts to recreational resources, natural resources and ESHA, including ***[insert names of beach areas]***; ***[insert names of wetland areas]***; and ***[insert names of creeks]***and other creeks; rocky intertidal areas, beaches and other habitat types vulnerable to sea level rise. Collaborate with other local, regional, state and federal entities to establish monitoring methods and track the effects of sea level rise.

g. Promote natural infrastructure pilot projects (horizontal levees, dune restoration, etc.) with environmental benefits that enhance natural and recreational resources while protecting assets from sea level rise and increased storm surges. Study and monitor such projects over time and share lessons learned with other jurisdictions.

h. Update standards for ESHA buffers and setbacks to account for sea level rise, based on the best available science and considering the effects of shoreline development on landward migration of wetlands.

G.2 Adaptation Plan

Develop and implement an adaptation plan that examines priorities for adaptation, timelines, options, specific projects to be implemented, phasing and action triggers. As components of the adaptation plan, assess seasonal and long-term shoreline changes and the potential for flooding or damage from erosion, sea level rise, waves, storm surge or seiches. Plans should provide recommendations for adapting existing development, public improvements, coastal access, recreational areas, and other coastal resources. Plans should evaluate the feasibility of hazard avoidance, managed retreat, restoration of the sand supply and beach nourishment in appropriate areas.

G.3 Adaptation Plan for Highly Vulnerable Areas

(Reference Policy B.1 Siting to Protect Coastal Resources and Minimize Hazards)
If development cannot be located and designed in a manner that meets the coastal hazard avoidance and minimization requirements of [***insert relevant policy, e.g., Model Policy B.1***] over the full anticipated life of the development, the development may nevertheless be approved if it meets all of the following criteria:

a. The LCP includes a Sea Level Rise Adaptation Plan for the area that: (1) analyzes resources and development that are vulnerable to coastal hazards, including as exacerbated by sea level rise, (2) evaluates adaptation alternatives, (3) identifies preferred strategies to protect coastal resources consistent with the Coastal Act, and (4) provides programs and policies to implement those strategies;
b. The proposed development is the least environmentally damaging feasible alternative, and is sited-and designed to protect coastal resources and minimize hazards to the extent feasible;
c. The approval is conditioned to require removal or other adaptation measures when specific triggers are met to ensure that the development does not: (1) interfere with the continued existence of adjacent environmentally sensitive habitat areas or recreation areas, (2) substantially impair public trust resources, (3) become structurally unstable, or (4) pose unacceptable risks to life or property or otherwise create a nuisance;
d. The proposed development is consistent with the public access and recreation policies of the Coastal Act, as well as all relevant LCP policies except ***[insert relevant policy, e.g., Model Policy B.1]***.
e. A hazard assessment must demonstrate that the development appropriately minimizes risks to life and property and ensures structural stability for a minimum of ***[insert relevant timeframe based on type of development, such as twenty years for primary residential structures]*** years.

Sea Level Rise Overlay Zones

Note: Sea Level Rise Overlay Zones (hazard overlay zones and beach open space zones) can be useful tools for overall, long-term adaptation strategies. Policies on Sea Level Rise Overlay Zones should cross reference relevant LCP policies that provide the actions triggered by the presence of the zone. An overlay zone can meet multiple objectives, set boundaries based on a worst case scenario, and define the policy considerations for those areas. For example, policies in Sea Level Rise Overlay Zones might trigger downzoning, redevelopment restrictions, structure removal, or other adaptation measures for development. A Sea Level Rise Overlay Zone could also be incorporated into a shoreline management plan that preserves coastal resources in the long term, allows for inland shoreline migration, and defines future expectations for what development will be permitted in sea level rise hazard zones going forward.

G.4 Sea Level Rise Hazard Overlay Zone

(Reference Policy A.3 Mapping Coastal Hazards)
Minimize risks to life and property associated with sea level rise through application of policies and standards specific to the Sea Level Rise Hazard Overlay Zone [***insert reference to maps, e.g., (see Figure X)***]. Policies in this section ***[insert section or policy numbers]*** shall apply to all properties within the Sea Level Rise Hazard Overlay Zone.

G.5 Beach Open Space Zone

Establish a 'Beach Open Space' zone located in ***[the defined hazard/management area]*** to provide for current and future beach access and management, including inland migration of the beach as sea level rises. The purpose of the zone is to provide for protection of the migrating/ambulatory beach and public access to and along it. All existing development that is not for public access or recreation would become non-conforming in the zone district. Unless otherwise required to be approved pursuant to other LCP policies, new development would be prohibited within the zone, with the exception of: 1) new development on properties that participate in the Managed Retreat Program as specified in ***[Model Policy G.10–Managed Retreat Program]***, and 2) development related to habitat restoration, public access or beach/ocean recreational opportunities.

Community Scale: Beach and Dune Adaptation

Long term planning for all urban beachfront development should consider that the adaptive capacity of beaches may diminish where shoreline armoring prevents the natural migration of the beach as sea levels rise, even with continued sand nourishment. Additionally, communities need to consider the availability of sand resources for their future nourishment needs given increasing beach erosion and limited sand supplies.

G.6 Beach Nourishment

In coordination with the Coastal Commission and other permitting agencies (e.g., State Lands Commission, U.S. Army Corps of Engineers), develop and implement a comprehensive beach nourishment program to assist in maintaining beach width and elevations. The beach nourishment program should include measures to protect water quality and to minimize and mitigate potential adverse biological resource impacts from deposition of material, including measures such as sand compatibility specifications, restrictions on volume of deposition, timing or seasonal restrictions, and identification of environmentally preferred locations for deposits. The [***insert City or County***] should consider developing an opportunistic sand program and determining how replenishment options may need to change over time as sea level rises.

Community Scale: Bluff Erosion Adaptation

G.7 Improve Drainage on Bluffs to Reduce Erosion

Investigate areas which could be significantly contributing to increased groundwater flows to the bluffs and determine whether improving drainage and/or reducing irrigation could potentially reduce bluff erosion. If measures to improve drainage or reduce over-watering are found to have the potential to reduce bluff erosion, the ***[insert City or County]*** should inform property owners about appropriate irrigation practices and drainage improvements as part of existing water conservation outreach programs.

Trigger-Based Adaptation Approaches

Note: Trigger-based adaptation approaches present a mechanism by which adaptation actions can be phased over time. Local governments must first understand baseline vulnerability conditions (potentially through vulnerability assessment per Policy G.1) to identify thresholds that might have been exceeded in the past, or that may be exceeded in the future on a community scale. Trigger-based policies should also be developed through a community adaptation planning process that identifies appropriate trigger types and responsive actions (e.g., beach nourishment) or programs (e.g., managed retreat program).

Model Policies G.8 – G.10 contain conceptual elements or triggers that could be written in a single customized policy for a particular location. For example, a managed retreat program could use repetitive loss or beach width triggers to set community priorities for targeted buy-outs. Additionally, a similar policy to the managed retreat program for beaches could be applied for wetlands or other habitat areas subject to sea level rise.

G.8 Repetitive Loss

The ***[insert City or County]*** shall develop a Repetitive Loss Program to eliminate or reduce damage to property, impacts on coastal resources, and the community disruption caused by repeated flooding or storm damage. A Repetitive Loss Structure is a structure that has suffered damage and filed FEMA claims or coastal development permits or exemption applications for residences damaged beyond ***[insert percentage: XX%]*** on two or more occasions during a rolling 10-year period. The Repetitive Loss Program shall require properties with Repetitive Loss Structures to be rezoned to less intensive uses that limit reconstruction and to accommodate shoreline migration, increased coastal flooding, inundation, and related sea level rise impacts. The Program shall include maintaining a database of property flooding and damage to further identify and monitor local hazard areas, as resources are available. Where hazards make it difficult for private owners to achieve a reasonable use of the property, acquisition of the property by the ***[insert City or County]*** shall be encouraged.

G.9 Beach Management Plan

Establish a comprehensive beach management plan within the framework of adaptation planning and regular LCP updates to protect and enhance existing beach areas. The Plan shall identify actions and programs that can be implemented in the near term or would be implemented based on pre-determined future triggers to preserve recreational, habitat, and other coastal resource values and should include research into opportunities for additional adaptation actions that would be implemented based on future impacts. The beach management plan shall also include and expand upon the following actions:

a. Establish a minimum beach width that maintains optimum public recreational access and habitat function. The analysis used to establish the minimum width shall include considerations of daily tidal range, seasonal erosion, and short-term, storm driven erosion.
b. Coordinate with sediment management plan actions and establish appropriate triggers for sediment management activities and/or implementation of the Managed Retreat Program (***[Model Policy G.10***]) so that width is maintained as the beach naturally migrates over time in response to erosion, sea level rise, and other coastal processes
c. Monitor beach width, mean high tide line and bluff toe elevation.
d. Monitor public access, beach use, and any impacts to public trust lands. Identify and track locations, times, and durations throughout the year when the beach is too narrow to be adequate for recreation and/or lateral access.

e. Pursue opportunities for beach nourishment or otherwise increasing beach widths and enhancing beach access.
f. Evaluate adaptation opportunities for vulnerable roads and highways that provide beach access, and pursue opportunities that would maintain vehicular, bicycle and pedestrian access while protecting the beach and public access to it.
g. Revise the ***[City or County's]*** Local Hazard Mitigation Plan to provide for and support the Managed Retreat Program and to incorporate findings of relevant Vulnerability Assessments or Adaptation Plans.

Note: Multiple community-scale policy mechanisms (e.g., buy-outs, transfer of development rights, beach management plans) provide potential approaches to allowing the preservation of coastal resources (such as beaches or wetlands) despite natural shoreline change as sea levels rise. These approaches tend to function as rolling easements when planned in advance and coupled with overlay zones and accompanying downzoning of residential uses. Rolling easements can lead to the removal of structures that are designed and approved with managed retreat triggers (e.g., based on surveys of minimum beach width or mean high tide line). LCPs that include triggers and establish adaptation programs for addressing sea level rise impacts can help communities maximize habitat and natural resilience benefits while accommodating residential use during the time that the site can effectively support both habitat and development.

G.10 Managed Retreat Program

Establish a Managed Retreat Program to remove, modify or relocate development when necessary to protect and provide for the migrating shoreline. and associated coastal resources, such as sandy beach area. The Managed Retreat Program must consist of at least the following components:

a. When the beach area of [***insert jurisdiction or specific beach name(s)***] is reduced below the minimum beach width established pursuant to [***Model Policy G.9***], development adjacent to the beach that is enrolled in the Managed Retreat Program must be moved, modified or removed and the area restored to open space to ensure the minimum beach width of ['[***XXX feet' or 'to restore adequate public access to the beach' feet or 'for more than XX percent of the calendar year'***].
b. All new development, which includes redevelopment including but not limited to modification of the foundation for elevation, in the Beach Open Space zone must enroll in the Managed Retreat Program. Permits for such development shall be conditioned to require its modification or removal when necessary to maintain the minimum beach width, and a deed restriction must be recorded to carry out this requirement and notify all new owners of this condition.
c. Property owners with existing development may voluntarily enroll in the Managed Retreat Program. The [***insert City or County***] shall pursue funding to purchase easements or development rights from such property owners who voluntarily enroll in the Managed Retreat Program. Restrictions applied pursuant to voluntary enrollment may be structured such that removal for the purpose of maintaining beach width as required in subsection (a) above cannot be triggered on the subject property for a minimum length of time, such as a minimum of 30 years, unless the structure is damaged or threatened and modifications to the structure itself (such as elevation or floodproofing) cannot address the threat., or unless any other removal triggers apply (such as pursuant to [***Model Policy D.1***]). Funding for the voluntary program may come from in-lieu fees, grants, or other state or federal funds.
d. The [***insert City or County]*** shall pursue funding to acquire non-conforming structures from willing sellers within the Beach Open Space zone and lease these residences to

provide residential or vacation rental use until such a time that the structure routinely blocks lateral public access; is within the minimum beach width area~~;~~ [***'for more than XX percent of the calendar year']***; is damaged ***[beyond XX% or is threatened with imminent damage;%];*** is no longer habitable; is otherwise required to be removed pursuant to ***[Model Policy D.1]***; or leasing becomes otherwise infeasible.

Transfer of Development Rights

Transfer of development rights (TDR) is a market-based tool that can help implement phased retreat from shoreline hazard zones. TDR programs enable individual transactions to transfer development rights from privately owned parcels (i.e., sending sites) to areas that can accommodate additional growth (i.e., receiving sites). Property owners in sending areas receive compensation for giving up their right to develop, while developers in receiving areas pay for the right to develop at greater densities or heights than would otherwise be allowed by current zoning. TDR is not intended to limit growth, but can allow communities to identify which areas are suitable to receive development rights and how much additional development is appropriate.

G.11 Transfer of Development Rights Program

The City shall encourage the protection of ***[insert description of shoreline such as coastal bluff tops, dunes, or beaches]*** by establishing a Transfer of Development Rights program that concentrates development in receiving districts that are outside of areas vulnerable to sea level rise and provides for the transfer of development rights from sending districts that are in areas vulnerable to sea level rise.

Financing Adaptation

Note: Implementation of adaptation approaches will require significant funding in the future. Geologic Hazard Abatement Districts (GHADs), County Service Areas (CSAs), and other similar entities provide a potential means for funding sea level rise adaptation measures on a neighborhood scale. By accumulating a funding reserve for anticipated future needs, a GHAD or CSA can provide the financial resources necessary for adaptation approaches that extend beyond a single parcel. Typically, these entities can borrow from lenders or issue bonds with very attractive credit terms. Another avenue to consider is identifying options for project funding that might overlap with LCP adaptation from other programs such as the Federal Emergency Management Agency's Hazard Mitigation Assistance (HMA) grant programs. Appendix A lists some potential funding sources.

G.12 Geologic Hazard Abatement Districts (GHADs) and County Service Areas (CSAs)

Explore the feasibility of forming Geologic Hazard Abatement Districts (GHADs) and/or CSAs to fund measures to address the prevention, mitigation, abatement, and control of geologic hazards within a designated sea level rise hazard zone.

G.13 Aligning LCPs with LHMPs

Coordinate across [***City/County***] departments and seek to align the Local Hazard Mitigation Plan (LHMP) with the LCP to ensure that proactive adaptation efforts are coordinated and responses to damage from future coastal hazards are streamlined. Identify future adaptation projects that meet the goals of both the LCP and LHMP and leverage FEMA funding opportunities for hazard mitigation and other related funding mechanisms to implement such projects.

Appendix A.

Funding Opportunities for LCP Planning and Project Implementation

Project Implementation Funds

The following table includes a list of grant funding available for implementation of sea level rise adaptation projects and programs. Much of this information was compiled by the Governor's Office of Emergency Services (Cal OES).

Grant Name	Agency	Purpose	Contact
Proposition 1 Grants **Protect Ocean and Coastal Resources**	Ocean Protection Council	Funding from Prop 1 is intended to fund projects that provide more reliable water supplies, restore important species and habitat, and develop a more resilient and sustainably managed water system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades.	OPC http://www.opc.ca.gov/category/funding-opportunities/
Proposition 1 Grants **Climate Ready Grants**	California Coastal Conservancy	Proposition 1 Grants for multi-benefit ecosystem and watershed protection and restoration projects. Climate Ready Grants are focused on supporting planning, project implementation and multi-agency coordination to advance actions that will increase the resilience of coastal communities and ecosystems	Coastal Conservancy http://scc.ca.gov/grants/proposition-1-grants/ http://scc.ca.gov/climate-change/climate-ready-program/
SB 1 Adaptation Planning Grants	Caltrans	Support actions at the local and regional level to advance climate change adaptation efforts on the state transportation system	Caltrans http://www.dot.ca.gov/hq/tpp/grants.html

Pre-Disaster Mitigation (PDM) Program	Administered by: Cal OES Funded by: US Department of Homeland Security, Federal Emergency Management Agency (FEMA)	Provides funds for hazard mitigation planning and projects on an annual basis. The PDM program was put in place to reduce overall risk to people and structures, while at the same time reducing reliance on federal funding if an actual disaster were to occur.	Cal OES http://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/pre-disaster-flood-mitigation FEMA https://www.fema.gov/pre-disaster-mitigation-grant-program
Hazard Mitigation Grant (HMG) Program	Administered by: Cal OES Funded by: US Department of Homeland Security, Federal Emergency Management Agency (FEMA)	Provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.	Cal OES http://www.caloes.ca.gov/cal-oes-divisions/recovery/disaster-mitigation-technical-support/404-hazard-mitigation-grant-program FEMA https://www.fema.gov/hazard-mitigation-grant-program
Flood Mitigation Assistance (FMA) Program	Administered by: Cal OES Funded by: US Department of Homeland Security, Federal Emergency Management Agency (FEMA)	Provides grants to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP.	Cal OES http://www.caloes.ca.gov/cal-oes-divisions/hazard-mitigation/pre-disaster-flood-mitigation FEMA https://www.fema.gov/flood-mitigation-assistance-program

Public Assistance (PA) Program	US Department of Homeland Security, Federal Emergency Management Agency (FEMA)	To provide supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.	FEMA https://www.fema.gov/public-assistance-local-state-tribal-and-non-profit
Community Development Block Grant (CDBG) Program	US Department of Housing and Urban Development	Program works to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses.	HUD http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs
Watershed Surveys and Planning	US Department of Agriculture, Natural Resource Conservation Service	To provide planning assistance to Federal, state and local agencies for the development or coordination of water and related land resources and programs in watersheds and river basins.	NRCS http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/wsp/
Watershed Protection and Flood Prevention	US Department of Agriculture, Natural Resource Conservation Service	To provide technical and financial assistance in planning and executing works of improvement to protect, develop, and use of land and water resources in small watersheds.	NRCS http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/wfpo/
Land and Water Conservation Fund Grants	US Department of the Interior, National Park Service	To acquire and develop outdoor recreation areas and facilities for the general public, to meet current and future needs.	NPS http://www.nps.gov/lwcf/index.htm

SBA Disaster Loan Program	US Small Business Administration	SBA provides low-interest disaster loans to businesses of all sizes, private non-profit organizations, homeowners, and renters. SBA disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.	SBA https://www.sba.gov/content/disaster-loan-program
Clean Water Act Section 319 Grants	US Environmental Protection Agency	To implement state and tribal non-point source pollution management programs, including support for non-structural watershed resource restoration activities.	EPA http://water.epa.gov/polwaste/nps/319hfunds.cfm
Flood Control Works/ Emergency Rehabilitation	US Department of Defense, Army Corps of Engineers	To assist in the repairs and restoration of public works damaged by flood, extraordinary wind, wave or water action.	USACE http://www.usace.army.mil/Missions/EmergencyOperations/NationalResponseFramework/FloodControl.aspx
Emergency Streambank and Shoreline Protection	US Department of Defense, Army Corps of Engineers	To prevent erosion damages to public facilities by the emergency construction or repair of streambank and shoreline protection works (33 CFR 263.25)	USACE http://www.mvr.usace.army.mil/BusinessWithUs/OutreachCustomerService/FloodRiskManagement/Section14.aspx
Small Flood Control Projects	US Department of Defense, Army Corps of Engineers	To reduce flood damages through small flood control projects not specifically authorized by Congress.	USACE www.usace.army.mil https://www.cfda.gov/index?s=program&mode=form&tab=core&id=2216ee03c69db437c431036a5585ede6
Land Acquisition Program	Wildlife Conservation Board	The WCB acquires real property or rights in real property on behalf of the California Department of Fish and Wildlife (CDFW) and can also grant funds to other governmental entities or nonprofit organizations to acquire real property or rights in real property.	WCB www.wcb.ca.gov