



# Policies for a Rising Bay Project Final Report

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SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

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# Executive Summary

The San Francisco Bay Conservation and Development Commission (BCDC) was created over 50 years ago in response to widespread infill of the San Francisco Bay (the Bay) for development, and subsequent environmental degradation. The agency's enabling legislation, the McAteer-Petris Act, gives BCDC the authority to regulate development in and around Bay, and specifically limits the use of fill. BCDC's policies are detailed in the San Francisco Bay Plan, which was first approved in 1968 and has subsequently been amended. After 50 years of successful stewardship, the result of BCDC's policies has been the significant expansion of the size of the Bay, the establishment of hundreds of miles of trails, parks, beaches, promenades, and other shoreline areas open to public access, and the restoration and protection of Bay habitat, species, and water quality.

However the future that the San Francisco Bay faces is much different than the past that spurred BCDC's legislation and policies. Sea level rise will expand the size of the Bay even further, and multi-benefit shoreline protection projects such as wetland restoration or "living levees" often depend upon the addition of fill to provide flood protection and habitat adaptation. Since the Commission amended the Bay Plan in 2011 to adopt climate change; BCDC has since learned a significant amount about the issue through its work in leading the Adapting to Rising Tides Program and collaborating with federal, state, regional and local agencies and organizations in the public, non-profit and private sectors. These collaborations have raised questions about how the Commission can continue to support local and resilience and adaptation to sea level rise, and to what extent their current policies allow them to do so.

The Policies for a Rising Bay project was developed in order to evaluate the Commission's laws and policies in light of the novel threats to the Bay presented by sea level rise; and to determine if changes are needed to help facilitate the region to advance appropriate resilience and adaptation actions. To ensure a broad and collaborative review of the Commission's laws, policies, and climate change program, the Commission staff organized a steering committee composed of over 30 stakeholders representing public, private, and non-governmental organizations. Working together with steering committee members and other interested parties, the Commission staff analyzed existing laws and policies through one-on-one interviews, case studies, and a series of working meetings.

This process has resulted in the identification of four overarching policy issues:

1. Fill for Resilience and Adaptation – Habitat Restoration and Protection
2. Fill for Resilience and Adaptation – Innovative Shoreline Solutions
3. Environmental Justice and Social Equity
4. Adaptive Management

Though many stakeholders expressed concern that BCDC's policies regarding fill may prohibit certain natural shoreline protection approaches, this project found that BCDC policies are flexible enough to allow fill for a range of habitat resilience and green infrastructure approaches such as barrier beaches or low, constructed berms for wave attenuation. Although certain regulatory constraints exist, BCDC has already permitted adaptive projects including the Sonoma Creek Marsh restoration project and the Aramburu Island habitat enhancement project, amongst others. However the Commission's policies were found to be inadequate regarding risks associated with sea level rise: (1) addressing inadequate shoreline protection that exposes adjacent properties to flooding; and (2) addressing environmental justice and sea level rise, where factors such as lack of resources and public engagement can render disadvantaged communities more vulnerable to sea level rise.

Steering committee discussion in conjunction with the Commission staff analysis and consultation produced a wide range of both short-term and long-term suggested policy options in order to respond to the above issues. Examples of short-term policy responses suggested include:

- Convene appropriate technical experts to develop guidance on the design and implementation of innovative shoreline protection projects addressing sea level rise, either informally or in a formal process with an advisory board.
- Work with stakeholders and community partners to create a Regional Resilience and Adaptation Plan that identifies key community and population vulnerabilities; establishes policies working collaboratively with a regional working group, to address sea level rise, environmental justice, social equity issues; and develops appropriate resilience and adaptation strategies.

Mid to long-term possible responses to the issues raised include:

- Investigate an amendment to the McAtteer-Petris Act to adopt explicit language that recognizes the challenges of sea level rise and the need for fill for habitat and shoreline resilience.
- Modify or exempt minimum fill and mitigation requirements for habitat restoration and shoreline protection projects.

Explore policy and legislative changes such as:

- Amend the Bay Plan to adopt policy language allowing more than minor fill for habitat resilience and adaptation projects.
- Designate “resilience and adaptation priority use areas.”
- Require applicants to consider innovative green shoreline protection solutions.
- Create a Regionwide Permit for innovative shoreline protection and restoration projects.
- Request that the legislature amend the McAtteer-Petris Act to specifically include sea level rise and climate adaptation.
- Include findings and policies in the Bay Plan on social equity and environmental justice.
- Develop a comprehensive multi-agency permit application and approval process (based on the success of the Long Term Management Strategy and Dredged Materials Management Office (DMMO)) for projects that place fill in the Bay to accelerate the region’s resilience, starting with nature-based adaptation solutions.

See the report for the full policy analysis and list of policy options suggested. The Policies for a Rising Bay project is part of the San Francisco Bay Conservation and Development Commission’s climate change program, which involves building the region’s capacity to plan for sea level rise and ensuring that the Commission’s laws and policies support and encourage appropriate resilience and adaptation.

# Acknowledgements

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# Key Terms

**Adaptive Management:** Adaptive management is “a cyclic, learning-oriented approach that is especially useful for complex environmental systems characterized by high levels of uncertainty about system processes and the potential for different ecological, social and economic impacts from alternative management options. Effective adaptive management requires setting clear and measurable objectives, collecting data, reviewing current scientific observations, monitoring the results of policy implementation or management actions, and integrating this information into future action.”<sup>1</sup>

**Beneficial Fill:** The increase in utilization of fill for habitat restoration, as well as building up wetland elevation to promote resilience and adaptation to future sea level rise, have given rise to the term “beneficial reuse of fill” – or “beneficial fill” for short. The term “beneficial fill” may cause confusion, since a local government utilizing fill to build up a levee or a developer using fill to build a hotel can claim that these projects are also producing benefits (i.e. flood protection, or local economy in these examples). Generally, however, “beneficial fill” signifies fill that is used for habitat restoration or habitat sea level rise adaptation, rather than for non-environmental purposes such as development or flood protection. The definition of fill that guides the Commission’s application of regulations, and policies stems from the McAteer-Petris Act (please see the definition of Fill below).

**Disadvantaged Communities:** Disadvantaged communities may include, but are not limited to: a) Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation; b) Areas with concentrations of people that are of low income, high unemployment, low levels of home ownership, high rent burden, sensitive populations, or low levels of educational attainment.<sup>2</sup>

**Environmental Justice:** Environmental justice is defined by California state law as, “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.”<sup>3</sup>

**Fill:** The McAteer-Petris Act defines fill as “earth or any other substance or material, including pilings or structures placed on pilings, and structures floating at some or all times and moored for extended periods of time, such as houseboats or floating docks.”<sup>4</sup> The Commission’s regulations provide that the term “any other substance or material,” as used in the definition of fill, “includes portions of any structure or any work that extends over any area within the Commission’s jurisdiction by cantilevering or other similar engineering techniques.”<sup>5</sup>

Federal regulations implementing the Clean Water Act define fill material as “material placed in waters of the United States where the material has the effect of: (i) Replacing any portion of a water of the United States with dry land; or (ii) Changing the bottom elevation of any portion of a water of the United States”<sup>6</sup>

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1 San Francisco Bay Conservation and Development Commission. (2012). San Francisco Bay Plan. Climate Change Finding I (p. 32).

[http://www.bcdc.ca.gov/plans/sfbay\\_plan.html](http://www.bcdc.ca.gov/plans/sfbay_plan.html)

2 SB. 535, California Environmental Protection Agency (2014) (enacted). Designation of Disadvantaged Communities .

3 California Government Code Section 65040.12(e).

4 California Government Code Section 66632(a).

5 Title 14. Natural Resources. Division 5. San Francisco Bay Conservation and Development Commission, 14 C.C.R. § 10711 §§ Chapter 7. Special Rules-Article 2. Other Special Rules-§ 10711. Cantilevering.

6 Title 40 - Protection Of Environment, 40 C.F.R. § 232.2 §§ Chapter I - Environmental Protection Agency (Continued)-Subchapter H - Ocean Dumping-Part 232 - 404 Program Definitions; Exempt Activities Not Requiring 404 Permits (U.S. Government Publishing Office July 1, 2011).

**Green Shoreline Solutions:** The terms green, nature-based, and nonstructural are used interchangeably in this document and refer to working with natural processes to construct and sustain flood protection strategies such as barrier beaches, wetlands, and tidal creeks.

**Grey Shoreline Solutions:** The terms grey, hard, armoring and structural are used interchangeably in this document and refer to traditional shoreline and flood protection strategies such as tidal barriers, levees, and revetment that are implemented on a project-by-project basis and not integrated with adjacent shoreline protection.

**Horizontal Levee:** A horizontal levee combines an earthen levee that provides flood protection with the enhancement of existing tidal marsh to enable adaptation to sea level rise.

**Innovative Shoreline Solutions:** Innovative shoreline solutions refer to new methods to construct and sustain the shoreline and flood protection, including green solutions and the combination of “green and grey” strategies. Current examples of innovative approaches: wetland restoration in conjunction with shoreline armoring, horizontal levee, alternative engineering designs such as floodable or removable buildings. Per Climate Change Finding (h), “effective, innovative adaptation approaches minimize public safety risks and impacts to critical infrastructure; maximize compatibility with and integration of natural processes; are resilient over a range of sea levels, potential flooding impacts and storm intensities; and are adaptively managed.”

**Major Project:** The Commission defines a major project to be any project that does not qualify as a minor repair or improvement, as defined in the California Code of Regulations Section 10601, or any project deemed controversial.

**Minor Permit:** A minor permit is also known as an “administrative permit,” these permits can be issued for an activity that qualifies as a minor repair or improvement in a relatively short period of time and without a public hearing on the application. Although an administrative permit application can be processed quickly, the proposed project must be reviewed against the same policies that are used to determine whether a major permit can be approved. See California Code of Regulations Section 10601 and 10602 for the regulatory definition.

**Priority Use Area:** Specific areas that are identified and designated in the San Francisco Bay Plan as reserved for important uses such as ports, water-related industry, airport, wildlife refuges, or water-related recreation.

**Public Access:** The Commission is directed by the McAteer-Petris Act and the San Francisco Bay Plan to ensure that each new shoreline development increases public access to the Bay “to the maximum extent feasible,” in accordance with the Commission’s Public Access Policies.

**Public Trust:** Virtually all of publicly and privately-held unfilled tidelands and submerged lands within the Commission’s jurisdiction are subject to the public trust doctrine, where the McAteer-Petris Act and the Bay Plan are an exercise of authority by the Commission for the purpose of protecting land for the benefit, use and enjoyment of the public.

**Regionwide Permit:** Routine maintenance work that qualifies for approval under an existing Commission regionwide permit and can be authorized in a very short period of time by the Commission’s Executive Director without Commission review or a public hearing.

**Resilience:** Resilience is defined as the capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption.

**Risk:** Risk is a function of the likelihood of an impact occurring and the consequence of that impact.<sup>7</sup>

**Risk Assessment:** Climate change risk assessments identify and prioritize issues that can be addressed by adaptation strategies.<sup>8</sup>

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<sup>7</sup> San Francisco Bay Conservation and Development Commission. (2012). San Francisco Bay Plan. Climate Change Finding f (p. 32).

[http://www.bcdc.ca.gov/plans/sfbay\\_plan.html](http://www.bcdc.ca.gov/plans/sfbay_plan.html)

**San Francisco Bay:** In this document the San Francisco Bay refers to the area within the Commission’s jurisdiction, which is defined generally to be the Bay waters, including wetlands and sloughs; certain waterways that are tributaries to the Bay; the shoreline band (see definition below); salt ponds and the Suisun Marsh. See the McAteer-Petris Act for precise definition of the Commission’s jurisdiction.

**Sea Level Rise:** As sea level rises, higher water levels will become more frequent, increasing the extent, depth, and duration of temporary flooding and extending the area that is permanently inundated. The Commission uses the National Research Council (NRC) Sea-Level Rise for the Coasts of California, Oregon, and Washington study, released June 2012, that provides regionally specific sea level rise projections.

**Shoreline Band:** The San Francisco Bay shoreline area of the Commission’s jurisdiction extending from the mean high tide line one hundred feet landward and parallel.

**Special Area Plans:** The Commission, in partnership with local governments, can prepare and implement “special area plans” that are amendments to the San Francisco Bay Plan that apply any or all of the Bay Plan policies in greater detail to the area covered by the Special Area Plan. The Commission has adopted four special area plans.

# Introduction

The Policies for a Rising Bay project is part of the San Francisco Bay Conservation and Development Commission's (Commission) climate change program, which involves building the region's capacity to plan for sea level rise and ensuring that the Commission's laws and policies support and encourage appropriate resilience and adaptation to future conditions. The main goal of this project is to collaboratively evaluate the Commission's laws and policies to determine the changes that are needed to ensure that the Commission and its staff have the tools and policies in place to support increased resilience in the region's neighborhoods, natural areas and economy.

The outcomes of this project will help ensure that the Commission has a robust legal and policy framework to evaluate, encourage, and facilitate resilience and adaptation actions that support environmental, social and economic conditions along the shoreline. This effort will also ensure that the Commission achieves its mandate to regulate the Bay as an integrated ecological system, promoting and protecting the public trust, ensuring public access to the shoreline, and permitting appropriate shoreline development all in light of a changing Bay as sea levels rise. The Commission's guiding principles derive from the Public Trust, as stated in the Bay Plan: "the McAteer-Petris Act and the Bay Plan are an exercise of authority by the legislature over public trust lands and establish policies for meeting public trust needs." The Commission recognizes the need to ensure its laws and policies are updated to reflect current needs and the public trust doctrine serves as a solid underpinning for any future changes.

To this end, this effort considers how the Commission can most effectively allow fill for resilience and adaptation projects, including large-scale habitat restoration and enhancement efforts needed to increase the sustainability of wetlands threatened by sea level rise. The project is also helping to better understand how to apply the San Francisco Bay Plan directive to encourage innovative adaptation strategies which restore and maintain San Francisco Bay ecosystems, protect shoreline communities and critical infrastructure (including new development that is consistent with the Bay Plan), and to ensure the Bay shoreline is accessible to all. While the Commission has policies encouraging the use of innovative shoreline protection strategies, in some settings grey strategies may be necessary and in others combinations of "green and grey" adaptation strategies may be the best approach. Given these strategies will continue to evolve with our understanding of how best to address changing Bay conditions, the project considers how to encourage innovative, green shoreline protection even though some of these projects may not satisfy the Commission's current minimum fill or maximum public access policies.

In addition, as part of the project stakeholders and Commission staff are evaluating how existing laws and policies can be used to ensure protection of vulnerable and disadvantaged Bay Area communities via resilience and adaptation actions – a challenging issue given the Commission's current authority. However it is a challenge that needs to be solved based upon the significant impacts a changing Bay will have on environmental justice communities throughout the Bay Area.

Lastly, to ensure that the region is working together in a clear and transparent manner toward building shoreline resilience, Commission staff and permit applicants need improved guidance on the necessary criteria to be included in sea level rise project assessments, the types of projects that should be required to conduct such assessments, and the resilience and adaptive management strategy parameters required of permit applicants by the Commission.

# Background

In 1965, the California Legislature passed the McAteer-Petris Act to create the Commission as a new temporary state agency. In 1969, the Legislature made the Commission a permanent state agency, adopted the Bay Plan by reference into state law, and directed the Commission to use the Bay Plan findings, policies and maps to guide the Commission's regulatory decisions. The agency is charged with conserving Bay resources and regulating proposed development within its jurisdiction in a way that prevents unnecessary Bay fill and ensures maximum feasible public access to the Bay. Commission permits are required for filling, dredging, and substantial changes in use of a structure or area within the Commission's jurisdiction.

The Commission's jurisdiction includes all tidal areas of the Bay, "and specifically, the marshlands lying between mean high tide and five feet above mean sea level; tidelands (land lying between mean high tide and mean low tide); and submerged lands (land lying below mean low tide)" and over a 100-foot shoreline band inland of the Bay. The Commission also has jurisdiction in salt ponds, managed wetlands, and certain waterways (McAteer-Petris Act Section 66610).<sup>9</sup>

The McAteer-Petris Act is an expression of the public trust and Section 66605 requires that all projects proposing fill in the Bay, salt ponds, managed wetlands and certain waterways jurisdiction must meet certain requirements (Box 1). Fill projects in the Commission's salt ponds and managed wetlands jurisdiction are only subject to 66605(c), (d), (e), (f), and (g). The Bay Plan specifies these and other McAteer-Petris Act requirements and includes findings and policies on subject areas ranging from water quality and climate change to commercial fishing and airports. A fill project requires that all applicable Bay Plan policies be applied in the proposed project review phase. All of the policies have equal status, and every Commission permit decision must be fully consistent with all applicable policies. Due to the differences associated with the type of project proposed, not all policies apply in all situations. For example, the policies on dredging are not relevant to a proposed development project located entirely on existing land, and the policies on ports are not applied to a wetland restoration project. However, multiple policies are regularly

## **Box 1. McAteer-Petris Act Section 66605. Findings and Declarations as to Benefits, Purposes and Manner of Filling.**

The Legislature further finds and declares:

- (a) That further filling of San Francisco Bay and certain waterways specified in subdivision (e) of Section 66610 should be authorized only when public benefits from fill clearly exceed public detriment from the loss of the water areas and should be limited to water-oriented uses (such as ports, water-related industry, airports, bridges, wildlife refuges, water-oriented recreation, and public assembly, water intake and discharge lines for desalinization plants and power generating plants requiring large amounts of water for cooling purposes) or minor fill for improving shoreline appearance or public access to the bay;
- (b) That fill in the bay and certain waterways specified in subdivision (e) of Section 66610 for any purpose should be authorized only when no alternative upland location is available for such purpose;
- (c) That the water area authorized to be filled should be the minimum necessary to achieve the purpose of the fill;
- (d) That the nature, location, and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources, or other conditions impacting the environment, as defined in Section 21060.5 of the Public Resources Code;
- (e) That public health, safety, and welfare require that fill be constructed in accordance with sound safety standards which will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters;
- (f) That fill should be authorized when the filling would, to the maximum extent feasible, establish a permanent shoreline;
- (g) That fill should be authorized when the applicant has such valid title to the properties in question that he or she may fill them in the manner and for the uses to be approved.

<sup>9</sup> The Commission's jurisdiction is also described in the Bay Plan section Area of Jurisdiction. San Francisco Bay Conservation and Development Commission. (2012). San Francisco Bay Plan. Area of Jurisdiction (p. 5). [http://www.bcdc.ca.gov/plans/sfbay\\_plan.html](http://www.bcdc.ca.gov/plans/sfbay_plan.html).

applied to a single project. In addition, the Bay Plan includes priority land use designations for certain areas around the Bay to ensure that sufficient lands are reserved for important water-oriented uses (such as ports, airports, water related industry), natural preservation, and enjoyment of the Bay (waterfront recreation). Projects inconsistent with these designations may not be approved by the Commission, or may require an amendment to the Bay Plan.

In addition to the authority that the legislature approved in the McAteer-Petris Act and the Bay Plan, the Commission is the Coastal Zone Management Agency (CZMA) for the San Francisco Bay and is responsible for implementing the coastal zone management plan for San Francisco

Bay.<sup>10</sup> California has three agencies that make up its coastal zone management program—the Commission in the San Francisco Bay, the California Coastal Commission that administers the CZMA on the Pacific Coast and the California Coastal Conservancy that runs a variety of projects for the entire state. As part of the Commission’s CZMA authority, the Bay Plan includes policies that identify and direct the Commission’s intention to undertake future studies or planning, and others offer advice to local governments, other agencies and organizations in dealing with Bay management issues. In the case of federal projects, the Commission has the authority to determine if a project is



consistent with the Commission’s policies to the maximum extent practicable, and require changes to the project through special conditions. Federal consistency is not part of the Commission’s permitting process, but set forth in state law, “under the Coastal Zone Management Act, federal agencies are generally required to carry out their activities and programs in a manner "consistent" with the Commission's coastal management program”.<sup>11</sup> When the federal government issues a “consistency determination” the Commission can object or concur, with or without conditions. If the federal agency does not agree with the Commission’s determination, mechanisms exist to elevate the decision or that would allow the project to proceed. Consistency determinations are generally reviewed in a similar manner as a permit application.

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10 Coastal Zone Management Act of 1972, 109-58 § 16 U.S.C. § 1456. Coordination and cooperation (Section 307) (2005).

<https://coast.noaa.gov/czm/act/sections/#307>

11 San Francisco Bay Conservation and Development Commission. (2012). San Francisco Bay Plan (p. 9). [http://www.bcdc.ca.gov/plans/sfbay\\_plan.html](http://www.bcdc.ca.gov/plans/sfbay_plan.html)

# Methodology

This project was designed as a collaborative effort that engaged an external steering committee to support Commission staff in the analysis of the Commission’s laws and policies. This process included close coordination with the steering committee throughout the steps described below:

Step 1 – Project Scope

Step 2 – Policy Analysis

Step 3 – Case Study Analysis

Step 4 – Findings and Policy Options

During Step 1 the project’s steering committee was formed. The steering committee included representatives that could provide environmental, economic and equity perspectives to ensure a variety of perspectives were considered during the project. Step 2 involved the analysis of the Commission’s law and policies to explore the range of issues identified by the steering committee and others. During Step 3, staff developed case studies to investigate policy issues identified during Step 2. The fourth and final step identified the policies and practices that may pose a challenge to resilience and adaptation projects and summarizes the policy options available to the Commission.



The process began by the Commission staff conducting an assessment of existing laws and policies, including the evaluation of how the laws and policies have been interpreted and applied over time. This step resulted in a Policy Analysis Memo that was reviewed by Commission staff and the steering committee (a modified version of the memo is included in Appendix A). Additionally, interviews were conducted with stakeholders, interested parties and the Commission staff with experience in applying the law and policies. During the interviews, key questions and issues surfaced regarding the Commission’s laws and policies. These questions and issues, which helped to guide further policy research, are included in the policy analysis section.

The next step in the process was to incorporate feedback into an evaluation of the Commission’s laws and policies. To augment the interviews, Commission staff conducted an evaluation of relevant Commission permits to understand how the laws and policies have been interpreted in the past. Below is a sample of the questions that were used during this evaluation:

What were the original proposed amount of fill and the permitted amount?

Did the project consider short-term impacts and long-term habitat health?

What Bay Plan policies could have stalled the project [but did not]?

What was the policy basis used for determining “beneficial fill”?

## Box 2. Policies for a Rising Bay Steering Committee Members & Organizations

Jim	Allison	Capitol Corridor
Tameeka	Bennett	Youth United for Community Action
Brad	Benson	Port of San Francisco
John	Bourgeois	South Bay Salt Pond Restoration Project
Jason	Brush	Commissioner Bay Fill Working Group
Paul	Campos	Northern California Building Industry Association
Ken	Kirkey	Metropolitan Transportation Commission
Stephanie	Hom	Metropolitan Transportation Commission
John	Coleman	Bay Planning Coalition
Margaret	Gordon	West Oakland Environmental Indicators Project
Marie	Harrison	GreenAction
Jane	Hicks	Commissioner Bay Fill Working Group
Kristina	Hill	University of California, Berkeley
Marc	Holmes	The Bay Institute
Beth	Huning	San Francisco Bay Joint Venture
Amy	Hutzel	California State Coastal Conservancy
Roger	Leventhal	Marin County Flood Control & Water Conservation District
David	Lewis	Save the Bay
Jeremy	Lowe	San Francisco Estuary Institute
Jim	McGrath	Commissioner Bay Fill Working Group
Anne	Morkill	U.S. Fish & Wildlife Service
Barry	Nelson	Commissioner Bay Fill Working Group
Diane	Oshima	Port of San Francisco
Paloma	Pavel	Breakthrough Communities
Sean	Randolph	Commissioner Bay Fill Working Group
Steven	Reel	Port of San Francisco
Parin	Shah	Asian Pacific Environmental Network
Richard	Sinkoff	Port of Oakland
Salote	Soqo	Environmental Justice Coalition for Water
Mark	Stacey	University of California, Berkeley
Dilip	Trivedi	Moffatt and Nichol

The Commission staff reviewed key projects that permitted fill for habitat restoration and built shoreline protection projects. To understand if and how environmental justice may have been considered in the past, staff also reviewed projects in communities identified as disadvantaged and vulnerable. The review of these projects answered many of the questions that steering committee members raised during the interviews.

While these steps facilitated the evaluation of the current application of McAteer-Petris Act and the Bay Plan policies, in order to evaluate the possible challenges that future projects may pose, four hypothetical projects were developed as case studies. An evaluation process was applied to each of the case studies to consider the challenges of the Commission's current law and policies and interpretations or statutory conflicts. The Commission staff worked with steering committee members and technical experts to develop four conceptual project proposals to explore green and grey infrastructure adaptation solutions as well as challenges related to governance and social equity.

The four case studies are summarized below and presented in Appendices C-F.

1. The transportation case study presents an interstate highway adjacent to the Bay with residential and commercial development inland. The case study includes as the adaptation action a beach, a mudflat recharge area, and an enclosure over the highway to provide public access and open space and retain a connection to the Bay and shoreline.
2. The shoreline community case study includes a neighborhood with residential, commercial and industrial land uses adjacent to a creek. The adaptation actions in the case study include a horizontal levee at the back of the marsh, sediment augmentation, and a tide gate across the creek to protect the residential, commercial and light industrial properties.
3. The airport case study depicts an airport adjacent to a residential community that is flooded by rising sea levels from areas both on and off airport property. The adaptation action proposed in the case study involves raising the existing levee on the airport property and covering it with riprap to improve existing flood infrastructure.
4. The contaminated lands case study investigates Commission policies applicable to a closed and covered municipal landfill with a residential neighborhood to the north and a wetland to the south. The landfill, which was closed as a dry site, is vulnerable to wave erosion and water infiltration as sea level rises. The adaptation actions are a new shoreline revetment and a cutoff slurry wall against infiltration.

### **Box 3. Key Laws and Policies Identified by the Policies for a Rising Bay Project**

McAteer-Petris Act Section 66605(a)  
McAteer-Petris Act Section 66605(b)  
McAteer-Petris Act Section 66605(c)  
McAteer-Petris Act Section 66605(d)  
McAteer-Petris Act Section 66632(f)(2)  
Fish, Other Aquatic Organisms and Wildlife Policy 5  
Water Quality Policy 1  
Water Surface Area and Volume Policy 1  
Tidal Marshes and Tidal Flats Policy 1  
Tidal Marshes and Tidal Flats Policy 3  
Tidal Marshes and Tidal Flats Policy 6  
Tidal Marshes and Tidal Flats Policy 8  
Subtidal Areas Policy 1  
Subtidal Areas Policy 2  
Subtidal Areas Policy 6  
Climate Change Policy 3  
Climate Change Policy 5  
Safety of Fills Policy 4  
Protection of the Shoreline Finding (e)  
Protection of the Shoreline Policy 1 (c)  
Protection of the Shoreline Policy 1 (d)  
Protection of the Shoreline Policy 4  
Dredging Policy 5  
Dredging Policy 11 (b)  
Public Access Policy 5  
Public Access Policy 6  
Mitigation Policy 1

The Commission staff analyzed the proposed adaptation actions based on existing law and policies, and discussed the issues with steering committee members in breakout groups where steering committee members asked questions, identified concerns and provided ideas and recommendations address the issues.

As outlined above, the Policies for a Rising Bay project has been a multi-step, collaborative process involving both stakeholders and Commission staff in every phase of the project. The interviews, permit review, policy analysis, and case studies have led to the exploration of specific policy issues and recommendations for consideration by the Commission. Policy analysis, observations and recommendations by Commission staff and the steering committee are summarized in the following section.

# Case Studies and Adaptation Solutions

The Commission staff worked with steering committee members and technical experts in order to develop four hypothetical case study project proposals to evaluate a range of sea level rise adaptation solutions. Analysis of existing Commission policies regarding climate change, fill, shoreline protection, natural resources, and other policies relevant to sea level rise was led by Commission staff; then potential policy limitations, gaps, and conflicts regarding the adaptation solutions were identified and discussed with Commission staff and steering committee to develop observations from the case studies.

Commission staff evaluated the case study adaptation solutions and analyzed how existing BCDC policies would apply. This evaluation does not include an analysis of other State or Federal fill policies.<sup>12</sup> The analysis of specific sections of the McAteer-Petris Act and policies from the Bay Plan led to the identification of key policy issues for each of the adaptation solutions proposed.

Each case study is described below along with the policy analysis, policy gaps, guidance and lessons learned. See Table 1 for a summary of relevant policies, and Appendices C-F for a complete summary of the case studies including full scenario description, analysis, and steering committee discussion.

## Ground Transportation Case Study

The ground transportation case study investigates a scenario where a regionally important shoreline highway is vulnerable to flooding and future sea level rise. The highway is a major truck and commuter route, and is critical to goods movement throughout the region and state. The highway cannot be abandoned due to insufficient feasible alternate routes, and the fact that it serves as de facto flood protection for residential communities behind it. The highway sits on top of a raised berm, and elevating the highway into a viaduct or causeway would expose adjacent properties and communities to flooding.

The adaptation solutions analyzed in this case study include a large seawall to protect the highway, coupled with a large amount of fill placement to preserve mudflat habitat and create a barrier beach for wave attenuation, recreational and public access benefits. The fill placement for mudflat habitat (“mudflat recharge”) is proposed as a multi-benefit resilience and adaptation solution: (1) The recharge acts to preserve the mudflat habitat from rising sea level; (2) The mudflat recharge offsets the increased erosion due to wave reflectivity from the sea wall; and (3) The mudflat recharge enhances wave attenuation.



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<sup>12</sup> Refer to Appendix G for a summary of State and Federal fill policies.

## Policy Analysis

The mudflat recharge and barrier beach creation adaptation solutions would require a substantial amount of initial fill, in addition to likely periodic nourishment or additional placement of fill over time. To meet the Commission's minimum fill policies, the project would have to evaluate whether an alternative solution with less fill, such as a riprap shoreline or floodwall, could provide the same protection without the fill. The project would have to determine the impact to habitat from these alternatives, in order to demonstrate that the mudflat recharge and beach creation solutions result in additional habitat benefit. The mudflat slope, beach location, fill type and other project design characteristics would need to be justified to be the minimum necessary to fulfill the proposed objective of shoreline protection. The project's public benefits (e.g. flood protection, public access) must be evaluated and compared to its detriments (e.g. habitat loss, loss of open water area) – for example, how the benefits of the additional mudflat and beach compare to the impact to and loss of existing habitat. Additionally, in order to satisfy the Commission's climate change policies, the mudflat recharge would have to be designed to be resilient to future sea level rise and flooding projected by 2050, and show that in combination with the barrier beach the project will provide flood protection until 2100.

A project may be considered “self-mitigating” to the extent that the habitat value of the fill is greater than the present habitat values of the site and impacts of construction. The proposed mudflat recharge and barrier beach would likely not be self-mitigating since the mudflat habitat value may not be sufficient to offset the loss of the subtidal habitat – therefore it is possible this project would require substantial mitigation.

## POLICY GAPS, GUIDANCE AND LESSONS LEARNED

Depending upon actual characteristics specific to the project location and design, the mudflat recharge, barrier beach and seawall adaptation solutions proposed can be permitted within the Commission's current policies. However several specific policies and project characteristics complicate the implementation of these adaptation approaches:

1. Fill policies – Since there is no distinction in the Commission's laws and policies between fill for structural shoreline protection or development, and fill for habitat restoration or creation, the fill proposed for the mudflat recharge and beach creation must meet the same minimum standard as if the fill were proposed for a marina or jetty. In a case with such a large amount of fill proposed, Commission staff would work with the permit applicant to explore alternative design characteristics to decrease the amount of fill needed, potentially decreasing the project's flood protection and habitat benefits.
2. Public benefits versus detriments – Fill is allowed under the Commission's policies when the public benefits of the fill exceed the detriments. For the proposed adaptation solutions, the short-term impacts of the project to habitat and natural resources are clear and covered by the Commission's current policies on fish and wildlife, tidal marsh and subtidal habitat, and water quality. However, the additional habitat and recreational benefits of the mudflat recharge and beach creation are uncertain, far in the future, and harder to quantify. For example, placing fill at the current site will result in buried fauna and biota for which standard environmental impact and mitigation policies would apply. However, in the long-term new and resilient habitat would be created and the project could result in a net increase in biodiversity – but there are no standards or methods to quantify this benefit. Additionally, there is no manner to place the short-term impacts in the context of impacts that would occur if no action is taken (e.g. rising sea level causing conversion and loss of sub-tidal habitat to mudflat, and mudflat to shallow water habitat).
3. Permitting process – Nature-based shoreline adaptation solutions like the mudflat recharge and beach creation occur in Bay water, where the Commission's fill policies apply. Other shoreline structural adaptation solutions, such as revetment or levees can be located entirely in the shoreline band, where the Commission's climate change and fill policies can only be applied to public access. Additionally, the mudflat recharge and beach creation would likely need periodic nourishment or reapplication of fill, thus potentially requiring multiple permits as opposed to a single permit.

## Shoreline Community Case Study

In the shoreline community case study, residential and commercial properties are vulnerable to joint riverine and coastal flooding that is expected to worsen as sea level rises. An existing levee system provides only moderate flood protection, and a marsh with several listed species is located where the creek meets the Bay. Since the marsh is adjacent to the community, it cannot migrate landward and rising sea level threatens to force marsh conversion to mudflat.

The project proposes combining three adaptation solutions to safeguard the community and marsh: installing a tide gate, placing fill to create a horizontal levee, and placing fill on the marsh to increase its elevation (“marsh sediment augmentation”). The tide gate would be closed during high tide events in order to prevent the incoming tide from raising the creek height to where overtopping occurs; and would be closed more and more often as sea level rises. The horizontal levee would impact the existing marsh, but create new high marsh and transition zone habitat. The marsh sediment augmentation would enhance sediment accretion in order to help the marsh keep up with sea level rise.

### Policy Analysis

In this scenario the local flood control agency doesn’t own the creek-side property that would allow a floodwall or larger levee system, so a tide gate is proposed as a flood adaptation solution. The tide gate would impact the exchange of fresh and salt water, impede sediment flows, and cause significant impact to wildlife connectivity and processes that support healthy habitats and species. This is contrary to numerous Bay Plan policies to protect and preserve Bay environmental processes. Closing the gate at high tide would cause additional erosion on the shore and marsh – an impact that would increase over time as the gate is closed more frequently. It is doubtful how long the flood protection benefits would last: though the proposal states the gate will only close 33 times a year under existing conditions, during an El Niño period the gate would have to close nearly every day, and with increasing frequency as sea level rises until the gate fails.

The horizontal levee adds transitional habitat for the marsh to adapt to sea level rise in addition to flood protection benefits; however due to the extensive impact to 69 acres of existing healthy marsh in the case study scenario, in addition to the uncertainty and expected time frame for new habitat development, the horizontal levee may not be considered self-mitigating. Despite the addition of valuable high-elevation transitional marsh habitat from the horizontal levee, the levee would likely require substantial mitigation. The Commission traditionally requires 3:1 mitigation for marsh impact; and that the mitigation be sited close to the project and either prior to or concurrent to the project. Due to the project size and the fact that most of the available land is already in progress to be restored it is unlikely that fee-based mitigation would be accepted. The horizontal levee would also impede view from the subsided residential and commercial area behind the marsh, thus impacting public visual access of the Bay.

Utilizing sediment dredged from the creek to “augment” the marsh to help it adapt to sea level rise triggers the Commission’s fill policies. Depending upon whether the sediment and placement location are suitable, the Commission’s policies on tidal marshes do permit fill for habitat purposes, as long as the Commission agrees that the volume is minor. Because the fill is enhancing existing habitat and helping to adapt the marsh to sea level rise it is likely that the adaptation solution would be considered beneficial reuse and self-mitigating; although some measures may be required to offset the temporary loss of habitat within the creek itself, such as planting vegetation after dredging.

### POLICY GAPS, GUIDANCE AND LESSONS LEARNED

Of the three adaptation solutions proposed, the clearest conflict is with the tide gate, as the Commission’s current policies are difficult to reconcile with the negative impacts of tide gates. The horizontal levee and marsh sediment augmentation are supported by the Commission’s policies as adaptation solutions that could be permitted, though certain policies may restrict their implementation:

1. Mitigation policies – Horizontal levees can be permitted under the Commission’s current policies, however in this scenario the extensive marsh impact and the likely lack of suitable mitigation sites nearby would raise significant hurdles to the project.

2. Tidal marsh policies – A “minor amount of fill” can be permitted for habitat purposes. Use of appropriate dredged material to augment marsh sediment in a manner which minimizes impact to vegetation and benthic communities (e.g. using tidal action in combination with thin layers) in addition to the fact that the augmentation is for the sole benefit of the marsh, contributes to the adaptation solution and so likely qualifies as self-mitigating and easier to permit.
3. Public benefits versus detriments – Discussion and analysis of this case study revolved around the wording in the McAteer-Petris Act Section 66632(f): “A permit shall be granted for a project if the commission finds and declares that the project is either (1) *necessary to the health, safety or welfare of the public in the entire bay area*, or (2) of such a nature that it will be consistent with the provisions of this title and with the provisions of the San Francisco Bay Plan then in effect” (emphasis added). This suggests that a large adaptation project not fully consistent with the Commission’s policies could be approved if it is shown to have significant regional value, yet there is no calculation or guidance to evaluate the tradeoff between local impact and regional benefit of shoreline adaptation projects.

## Airport Case Study



This case study depicts an airport that is vulnerable to flooding by rising sea levels from areas both on and off the airport property. The airport is currently protected on its Bay-side by a perimeter dike, but is vulnerable to flooding through the neighboring low-income community that lies between the Bay and the airport to the north.

The adaptation solutions examined in this scenario include raising and stabilizing the airport’s perimeter dike via an adaptive management approach, and addressing deficiencies in the adjacent community’s flood protection. The adaptive management approach proposed is to periodically raise dike heights and add riprap over time in response to rising sea levels. To address offsite flood vulnerabilities, the airport plans to develop a long-term strategy in conjunction with neighboring land uses.

### Policy Analysis

Per the Commission’s climate change policies, the airport’s proposed adaptation solutions must be resilient to projected sea level at 2050, and adaptive to expected sea level at 2100. Raising and fortifying the perimeter dike will protect the Bay side of the airport, but no matter what improvements the airport makes it will still be vulnerable to flooding on the north side through adjacent property that it has no authority over. The proposed adaptive management strategy of raising the dike height periodically when needed to keep pace with rising sea level is limited due to perimeter height restrictions imposed by the Federal Aviation Authority regulations in order to give planes enough clearance for takeoff and landings.

The Commission’s policies state that new shoreline protection projects should be appropriate to the project location and use, and be “integrated with current or planned adjacent shoreline protection measures.” This means if the adjacent land use had

better shore protection and the airport proposed inadequate protection, the Commission could require the airport meet the neighbor's higher standards so that the shoreline protection strategies are integrated. However in this scenario where the neighboring parcel's inadequate flood protection increases the airport vulnerability, the Commission's policies to integrate shoreline protection don't apply.

## **POLICY GAPS, GUIDANCE, AND LESSONS LEARNED**

The airport and the Commission have no authority under current policies to require the neighbor to improve their shoreline. This scenario reveals an important gap in the Commission's policies on shoreline protection:

Shoreline protection policies – Though current policies state that shoreline protection must be integrated with adjacent protection, these policies fail to consider a scenario where an adjacent land use renders a property vulnerable to flooding or sea level rise. If such a case were to occur, there is little the Commission could do to alleviate the vulnerability of a regional asset. However, if inadequate shoreline protection were proposed for the adjacent property, the airport's perimeter dike plans could be used to require higher shoreline protection for the adjacent property. A regional shoreline protection plan could also allow the Commission to consider shoreline protection in a more comprehensive way, as opposed to the current case-by-case approach.

## **Contaminated Lands Case Study**

In the contaminated lands case study, a closed landfill that has been converted to a shoreline park is vulnerable to wave and tidal erosion. The landfill contains both hazardous and municipal waste, and its existing shoreline revetment is composed of degraded concrete rubble. South of the landfill is marsh habitat, and north is a low-income community.

The proposed adaptation solutions are to install a new, engineered revetment with riprap, elevated high enough to protect against a 100-year flood event and one foot of sea level rise. As part of an adaptive management plan, supplementary material could be added to the revetment to increase its height if sea levels rise more than one foot. If necessary, a cutoff slurry wall would be installed if monitoring results show saltwater intrusion or higher groundwater levels due to sea level rise.

### **Policy Analysis**

The proposed shoreline protection project, while important and necessary, likely poses negative impacts to the adjacent low-income community – for example, increased erosion and flood risk due to wave reflection off the revetment, and altered sediment flow. The Commission's policies on shoreline protection and safety of fills call for location and use-appropriate protection over the expected life of the project. The revetment must be constructed according to sound engineering standards, and be integrated with adjacent existing or planned shoreline protection. Per the Commission's climate change policies, the proposed project is designed to be resilient to expected 2050 flood levels, and adaptive to 2100 flood level taking into account future sea level rise.

Current Regional Water Quality Control Board (RWQCB) requirements include semi-annual monitoring of leachate, stormwater, groundwater, and levee condition. These monitoring activities and the proposed adaptation solutions of periodically raising the revetment and installing a slurry wall, as part of an adaptive management plan would have to undergo a risk assessment prepared by a qualified engineer. Innovative adaptation solutions should also be considered, wherever feasible and appropriate. The consequences of revetment or slurry wall failure (e.g. mobilization of contaminants) should be included in the risk assessment. Should a slurry wall be installed in the future as part of the adaptive management plan, the applicant and Commission may be forced to tradeoff public access for shoreline safety and protection.

## POLICY GAPS, GUIDANCE, AND LESSONS LEARNED

Though the adaptation solutions proposed in the contaminated lands case study can be permitted by the Commission, the uncertainty in regards to vulnerability of shoreline contaminated lands, as well as the potential consequence of flooding, makes adaptation planning difficult. Key outcomes from the case study include:

1. Interagency coordination – Contaminated lands that have been remediated to a standard appropriate for dry land, that then become inundated due to flooding and sea level rise could pose a significant environmental and human health threat. Proactive planning and permitting in coordination with the Regional Water Quality Control Board will be required. The RWQCB in 2009 began requiring contaminated lands such as landfills to include sea level rise in their stormwater pollution prevention plans as part of their waste discharge requirements.
2. Climate change policies – There is little available guidance or knowledge regarding what is appropriate sea level rise protection for contaminated land, or sea level rise impact on groundwater. The Commission has no set guidelines for balancing risk and innovation in shoreline protection strategies versus potential consequence of failure, nor guidance on what constitutes “feasible and appropriate” locations or land uses. Projects are reviewed on a case-by-case basis until guidance or a regional plan is developed.
3. Environmental justice – The scenario of a closed and managed contaminated land near a low-income community has a significant environmental justice component. If the revetment is located in the shoreline band the Commission can only apply public access policies. If the shoreline adaptation solution involves filling the Bay, the Commission can use some shoreline and environmental protection policies to ensure impact to the adjacent community is minimized. But there are no direct and clear environmental policies that the Commission could use to ensure that disadvantaged communities are not disproportionately impacted by the project.

The four case studies described above provided a venue for discussing the Commission’s law and policies with a steering committee representing a diversity of interests and expertise, identifying trade offs and defining the scope of potential policy and legislative changes that may be necessary in order to adequately respond to the issues that rising sea levels will create for the region. Using the information from the interviews, permit review, policy analysis and case studies provided the basis for the observations, recommendations and next steps from this project. Policy analysis, observations and recommendations by the Commission staff and the steering committee are summarized in the following section.

**Table 1: Case Study Adaptation Solutions Requiring Bay Fill**

Adaptation Solution	Key BCDC Policies	Applicable BCDC Policies	Policy Gaps & Lessons Learned
<b>Seawall, mudflat recharge, and beach creation</b>	Minimum fill policy Public Benefits v. Public Detriments of fill Shoreline Protection policies Habitat policies Public access policies Mitigation policies	McAteer-Petris Act 66605(d) Shoreline Protection Policies 1 & 4 Subtidal Policies 1 & 2 Tidal Marsh and Tidal Flat Policy 1 Water Quality Policy 2 Fish, Other Aquatic Organisms and Wildlife Policies 1, 2, 3, 4(b) Water Surface Area and Volume Policies 1 & 2 Climate Change Policies 3, & 5 Public Access Policy 7 Appearance Design and Scenic Views Policy 14 Mitigation Policies 2, 4, 6, 7, & 11	<p>Fill policies – since there is no distinction between types of fill in the Commission’s policies, fill for restoration and habitat adaptation must meet the same minimum standard as fill for development. The project would need to explore alternatives and designs that would decrease the amount of fill needed.</p> <p>Public benefits versus detriments – the project has clear impacts/detriments, yet the habitat and recreational benefits of the mudflat recharge and beach adaptation solutions are uncertain and hard to quantify. No action produces a significant detriment – loss of subtidal habitat due to sea level rise, however this is not taken into account.</p> <p>Permitting – innovative, green shoreline adaptation solutions often require reapplication of fill and are located in the Bay, where more of the Commission’s policies and scrutiny occurs. Grey structural shoreline adaptation approaches are usually located in the shoreline, where only public access policies apply. This may result in an easier permitting process for grey structural solutions.</p>
<b>Tide gate, horizontal levee, marsh sediment augmentation</b>	Minimum fill policy Public Benefits v. Public Detriments of fill Impacts to habitat Mitigation policies	McAteer-Petris Act 66605(b) & (e) Fish, Other Aquatic Organisms and Wildlife Policies 1, 2, & 4 Water Quality Policies 1, & 2 Water Surface Area and Volume Policies 1, 2 & 3 Tidal Marsh and Tidal Flats Policies 1, 2, 3, 5, 6, 8 Climate Change Policies 1, 2, 3, 5 & 7 Safety of Fills Policies 1, 2, & 4 Shoreline Protection Policies 1, 3, 4, & 5 Dredging Policies 2, 3, 4, & 11 Public Access Policies 1, 2, 5 Appearance, Design and Scenic Views Policy 2, 14 Fill in Accord with the Bay Plan Policy 1 Mitigation Policies 1-11	<p>Mitigation policies – depending upon specific project and site characteristics such as amount of fill used, impact to existing habitat, and availability of nearby mitigation sites, mitigation requirements for horizontal levees may pose barriers to implementation.</p> <p>Tidal marsh policies – a project utilizing appropriate fill and placement strategies to minimize impact to vegetation and benthic communities, and with the sole purpose of marsh adaptation, is likely to qualify as self-mitigating and easier to permit.</p> <p>Public benefit versus detriments – an adaptation project inconsistent with the Commission’s policies must be found to be “necessary to the health, safety or welfare of the public in the entire bay area”.</p>

<b>Perimeter dike, adjacent shoreline protection</b>	<ul style="list-style-type: none"> <li>Climate change policies</li> <li>Safety of fills</li> <li>Shoreline protection</li> <li>Environmental justice and social equity</li> <li>Priority Use Areas</li> </ul>	<ul style="list-style-type: none"> <li>Safety of Fills Policy 4</li> <li>Climate Change Policy 3</li> <li>Shoreline Protection Policy 1</li> <li>Water Quality Policy 3</li> <li>Fish, Other Aquatic Organisms and Wildlife Policy 2</li> <li>Tidal Marshes and Tidal Flats Policy 1</li> </ul>	<p>Shoreline protection policies – the Commission’s authority does not extend to lands adjacent to a proposed project, and cannot force a property owner to improve their shoreline protection – even to protect a regional asset like an airport.</p> <p>Priority use areas – designated and special plan areas offer greater policy flexibility to permit innovative shoreline protection projects.</p> <p>Environmental justice and social equity – the Commission’s policies are limited in considering environmental justice issues.</p>
<b>Shoreline revetment with riprap, cutoff slurry wall</b>	<ul style="list-style-type: none"> <li>Climate change policies</li> <li>Water quality policies</li> <li>Shoreline protection</li> <li>Environmental justice and social equity</li> <li>Adaptive management</li> </ul>	<ul style="list-style-type: none"> <li>Shoreline Protection Policy 1</li> <li>Safety of Fills Policy 4</li> <li>Climate Change Policies 3, 4 &amp; 5</li> <li>Fish, Other Aquatic Organisms and Wildlife Policy 2</li> <li>Tidal Marshes and Tidal Flats Policy 1</li> <li>Water Quality Policy 3</li> <li>Public Access Policy 6</li> </ul>	<p>Interagency coordination – the Regional Water Quality Control Board is the lead agency on contaminated land management issues, and proactive sea level rise planning and permitting is required.</p> <p>Climate change policies – there is minimal data available regarding sea level rise impact on groundwater, nor how to effectively balance innovative shoreline protection with the potential consequence of failure via a risk assessment for contaminated lands.</p> <p>Environmental justice and social equity – the Commission’s policies are limited in considering environmental justice issues.</p>

<sup>1</sup> This list may not be exhaustive, actual policies applicable may vary depending upon specific site characteristics, environmental conditions, and project designs.

# Policy Options for Adaptation

In order to consider policy options to support adaptation and resilience Commission staff developed policy evaluation criteria to assess key policies and issues identified in the previous tasks, and determine possible policy steps to move forward. In collaboration with the Commission regulatory staff and the Policies for a Rising Bay advisory steering committee, several adaptation solutions inconsistent with the Commission's policies were identified, and policy options ranging from developing internal guidance, to pursuing legislative action, to changing policies were discussed and debated.

## Inconsistent Adaptation Solutions

The policy analysis, case study development and evaluation, and steering committee discussion identified two sea level rise adaptation solutions that are inconsistent with the Commission's current policies: tide gates, and requiring shoreline protection for property adjacent to a shoreline planning or project area.

Tide gates, or two-way flow structures installed to prevent tides from migrating upstream, are generally used to maintain water heights below flood levels in tidally-influenced creeks and channels. Tide gates create significant environmental effects including altered exchange of fresh and salt water and impeded sediment flow, impacting wildlife connectivity and processes supporting species and habitat. These impacts are directly contrary to specific Commission policies established to protect species and habitat, as well as the physical processes that ensure ecological function. Less harmful alternatives to tide gates exist; including installing or raising levees and floodwalls, or channel widening or deepening to name just a few examples.

Acquiring easements, rights-of-way, or adjacent land can be barriers to their implementation; but their environmental cost is lower and is more aligned with the Commission's directive and policies.



In addition to tide gates, the airport case study highlighted a second adaptation solution inconsistent with the Commission's policies and authority: compulsory shoreline protection for those increasing the vulnerability of their neighbors. In a scenario where a project area will be flooded through an adjacent parcel, the only adaptation solutions available are either to raise the inland elevation of land that is owned by the project proponent, or by encouraging cooperation and coordination amongst neighbors. Outside of project or area plans, the Commission has no authority or policies

to mandate landowners to construct shoreline protection, even if no action results in increasing the vulnerability and risk to others.

## Evaluation Criteria

After discussing, analyzing, and testing adaptation solutions and their relevant policies; a series of evaluative questions were developed to analyze the case study adaptation solutions and their relevant policies:

- How to encourage innovative sea level rise approaches and minimize the potential of failure?
- How to weigh long-term potential public benefits over short-term impacts?
- How should mitigation be evaluated for sea level rise adaptation projects?

- How to evaluate tide gate impacts to long-term land use decisions and natural processes?
- Should there be an adaptive management plan for every project?
- Should BCDC, or another agency, have the authority to compel applicants to protect adjoining properties when constructing shoreline protection?
- How to consider environmental justice in the context of shoreline adaptation?
- How to ensure applicants explore non-structural methods of shoreline protection?
- When a project is proposed on a contaminated site, what should an adaptive management plan consist of?
- What could BCDC do to consider the mobilization of contaminated substances into communities and the environment during shoreline protection projects?

During breakout discussion groups, the Policies for a Rising Bay steering committee members used these questions to explore the trade-offs and benefits of various adaptation solutions, the conditions under which the solutions could be successfully supported by Commission policies, and the merits of potential policy options to further support specific adaptation solutions. Given the diverse interests represented in the project's steering committee, ranging from environmental justice community representatives to development stakeholders, it's no surprise that perceptions regarding the Commission's next steps on sea level rise adaptation and resilience policy differ. For the key policy issues, gaps, and limitations identified during this process, a wide variety of policy options representing a range of views are presented in the policy options section below.

# Policy Analysis and Options

The process and methodology described in the previous section resulted in the identification of four priority policy themes. The Commission staff and steering committee interviews, case study analysis, and group discussions raised questions about whether the Commission’s current laws and policies are appropriate to an environmental and social context that today is very different than when the laws were written 50 years ago. Addressing the policy questions highlighted below can help the Commission fulfill its mandate to address climate change and sea level rise in the San Francisco Bay by promoting innovative shoreline protection strategies, conserving Bay habitat, ensuring the safety of vulnerable communities, permitting appropriate development, and encouraging flexible and appropriate climate resilience and adaptation.

## 1. Fill for Resilience and Adaptation – Habitat Restoration and Protection

Rampant placement of fill in the Bay for development was a principle reason for the passage of the McAteer-Petris Act and creation of the Commission. The McAteer-Petris Act’s broad definition of fill, in combination with strict standards governing its placement for development, has provided the regulatory basis that the Commission has used to help restore over 30 square miles of habitat and open over 350 miles of shoreline to public access. The average amount of fill in the Bay has decreased from 21 acres per year in 1970 to about five acres per year today, excluding seismic bridge retrofits and habitat restoration projects.

During interviews and group discussions, steering committee members noted that the Commission’s mandate and past practices regarding fill were not developed to address, or even consider, rising sea levels. Restoring, conserving and protecting the Bay may require filling large areas with material and resulting in, among other things, the conversion of one type of habitat to another (e.g. tidal marsh to mudflat)—counter to the Commission’s historic mandate of approving minimal fill in the Bay and practice of conserving existing resources.

### Current Commission Law and Policies

All fill projects – in the Bay, certain waterways, salt ponds, and managed wetlands – must currently meet 66605 Sections (b) and (c) of the McAteer-Petris Act. These two sections are intended to ensure that no unnecessary fill is placed in the Bay. Commission staff work with permit applicants to reduce the amount of fill proposed to the “minimum necessary” to achieve the purpose of each fill project. The Commission may under certain conditions authorize minor amounts of fill to improve shoreline appearance, for public access, or for dredged material beneficial reuse projects. Mitigation is typically required of fill projects. The Commission retains discretion over the amount of fill that constitutes the “minimum necessary” and the mitigation required for that fill based on the specific conditions of a proposed project and analysis of its fill impacts.

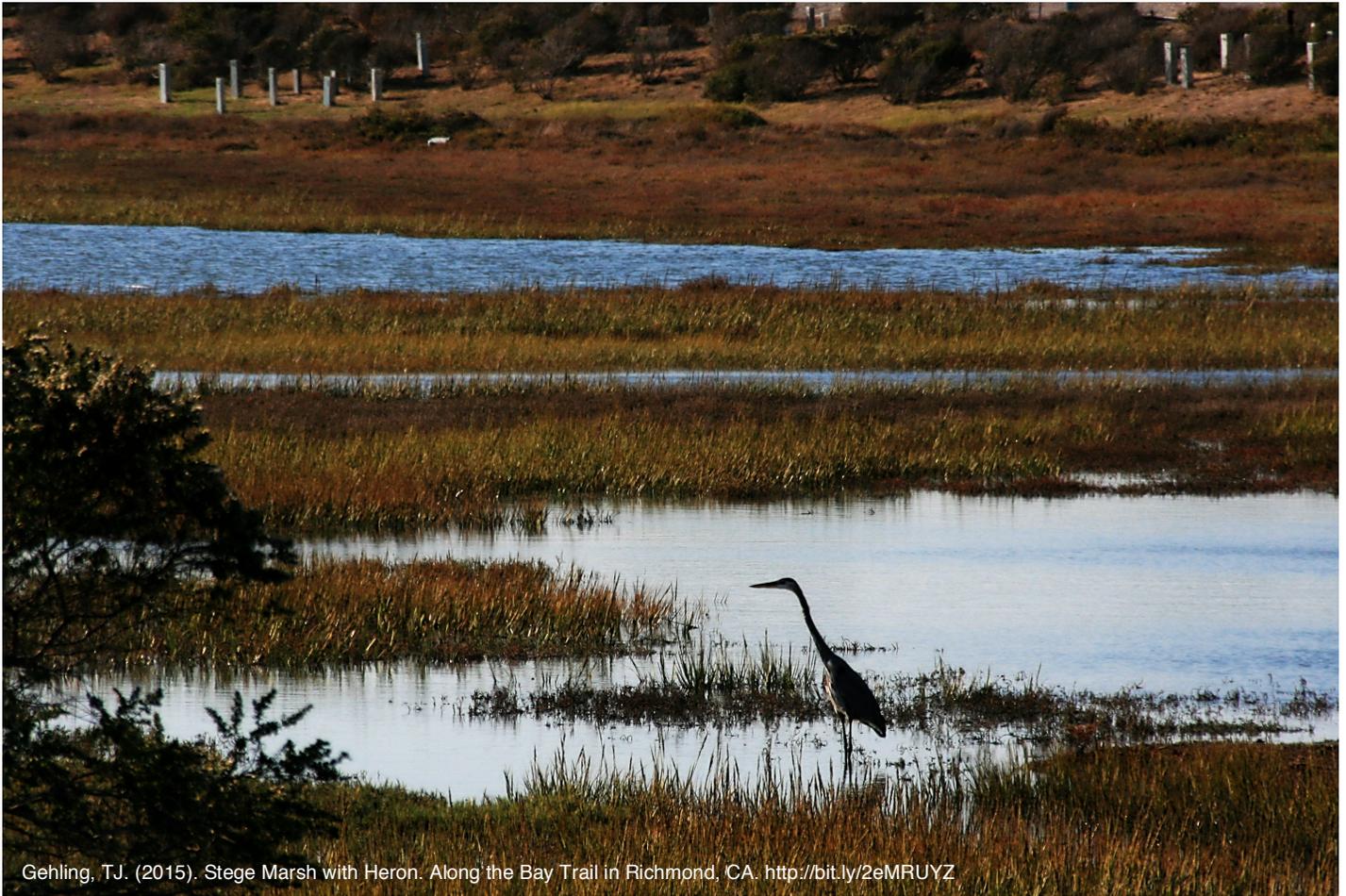
### Box 4. Fill and “Beneficial Fill”

The McAteer-Petris Act of 1969 defines fill as: “earth or any other substance or material, including pilings or structures placed on pilings, and structures floating at some or all times and moored for extended periods of time, such as houseboats or floating docks.”<sup>1</sup> The Commission’s regulations provide that the term “any other substance or material,” as used in the definition of fill, “includes portions of any structure or any work that extends over any area within the Commission’s jurisdiction by cantilevering or other similar engineering techniques.”

The above definition is what guides the Bay Conservation and Development Commission in applying regulations, and permit and planning. The increase in utilization of fill for habitat restoration, as well as building up wetland elevation to promote resilience and adaptation to future sea level rise, have given rise to the term “beneficial reuse of fill” – or “beneficial fill” for short. The term “beneficial fill” may cause confusion, since a local government utilizing fill to build up a levee or a developer using fill to build a hotel can claim that these projects are also producing benefits (i.e. flood protection, or local economy in these examples). Generally, however, “beneficial fill” signifies fill that is used for habitat restoration or habitat sea level rise adaptation, rather than for non-environmental purposes such as development or flood protection.

## Key Policy Questions:

- How to apply the minimum fill “test” when considering wetland habitat protection in light of rising sea levels? Should a maximum fill threshold be established?
- Placing fill in wetlands to address rising sea levels may result in impacts to species and habitats that current policies protect. Can current policies allow impacts, including short-term, given the potential for long-term benefits? How should a “no-action” outcome potentially resulting in a loss of certain kinds of habitat be considered in evaluating these proposals?
- Adaptively-managed wetlands could need multiple applications of fill to adapt to continuously rising water levels and, thus, prevent sites from drowning or transitioning to a different habitat type. How could the Commission facilitate repeated fill application(s) needed to increase wetland resilience as sea levels rise? What should the mitigation requirements be for these projects? Are these projects self-mitigating?



Gehling, T.J. (2015). Stege Marsh with Heron. Along the Bay Trail in Richmond, CA. <http://bit.ly/2eMRUYZ>

## Steering Committee Observations

- a) The Commission’s original mandate and past practices regarding fill were not designed to address rising sea level.
- b) Wetland protection and restoration projects may require more significant amounts of fill.
- c) Restoring, conserving and protecting wetlands from rising sea levels may require placing fill that results in impacts and/or conversion of one type of habitat to another (e.g. tidal marsh to mudflat)—contrary to the Commission’s current policies on fill and resource conservation. Filling the Bay often requires mitigation to offset associated impacts, making it more challenging to implement such projects.

- d) The Commission applies current laws and policies to approve and permit fill for habitat protection and restoration projects on a case-by-case basis. However, given that the effects of sea level rise and the strategies to reduce the risks extend beyond any one project, a regional approach is warranted.
- e) There is significant uncertainty for any given site about the volume and physical/chemical characteristics of fill needed to protect or restore wetlands from rising sea levels. Additional uncertainties include: the timeframe over which the fill is needed; whether and how many times repeated placement (and related authorizations) may be needed to maintain marsh grades, and the likelihood of success.

## POLICY OPTIONS

1. Organize and work with wetland scientists and technicians, coastal engineers, and others to develop guidance to define the minimum volume, type of fill, placement methods, shrinkage rates, and design approaches necessary to ensure habitat resilience and adaptation to rising sea levels. In analyzing projects with fill for habitat restoration and protection the Commission and permit applicants should consider how to address the following:
  - how to evaluate tradeoffs between short-term fill impacts and long-term benefits,
  - the volume and minimum amount of fill necessary for the project,
  - public access needs and requirements
2. In the case of habitat restoration and protection projects, the Commission should consider modifying or possibly exempting minimum fill and mitigation requirements, while requiring monitoring that informs the region's understanding of how these projects are responding to sea level rise and adaptation triggers and strategies to ensure the long-term viability of these projects. Consider establishing mitigation credit or other incentives for projects preserving or creating transition zone areas that allow for migration of wetlands into adjacent uplands as sea levels rise.
3. Develop a comprehensive multi-agency permit application and approval process (based on the success of the Long Term Management Strategy and Dredged Materials Management Office (DMMO)) for projects that place fill in the Bay to accelerate the region's resilience, starting with nature-based adaptation solutions.
4. Explore the creation of a Regionwide Permit, pursuant to the Commission's Regulations, for a certain type and scope of habitat restoration and protection projects aimed towards resilience and adaptation to rising sea levels.
5. Consider initiating a San Francisco Bay Plan amendment process to formulate and adopt explicit policy language permitting the use of more than minor amounts of fill for habitat resilience and adaptation projects, including the possibility of designating "resilience and adaptation priority use areas" in Bay Plan maps.
6. Investigate an amendment to the McAteer-Petris Act to adopt explicit language that recognizes the challenges of sea level rise and the need for fill for habitat resilience.

## 2. Fill for Resilience and Adaptation – Innovative Shoreline Solutions

Shoreline protection strategies have predominantly focused on “grey” solutions such as levees, seawalls, revetments and bulkheads. These rigid, structural approaches do not always allow for adaptation to changing Bay conditions and can have significant impacts on the Bay and its shoreline. Additionally, there can be significant consequences if this shoreline protection fails, which is a particular concern for residential development or contaminated lands. Structural solutions also can create unintended negative impacts, for example increasing tidal action and wave erosion at adjacent land uses. Innovative shoreline protection solutions such as wetlands and beaches, wave attenuating organic material berms, living and horizontal levees, oyster reefs and other approaches can be designed to adapt to changing sea level conditions and offer additional benefits besides shoreline protection, such as habitat, public access, and water quality.

The steering committee members pointed out that innovative shoreline protection solutions often require greater amounts of fill than typical grey structural strategies, and can often necessitate repeated applications of fill material. Commission permit applicants who might otherwise consider an innovative approach often face implementation barriers such as:

- A more complex permitting process than required for a grey shoreline solution (e.g. a levee or seawall) requiring less fill;
- Greater mitigation requirements due to the larger amount of fill needed;
- Repeated applications of fill material (e.g. beach nourishment) resulting in the need for multiple permit actions.
- Greater uncertainty in terms of technical feasibility and cost-effectiveness.

In addition, the steering committee members indicated concerns regarding the Commission’s public access requirements for innovative shoreline projects, which can make such projects potentially more expensive and difficult to design and implement since the public access requirements associated with larger projects are generally greater than for smaller projects. Furthermore, some projects have difficulty finding locations for onsite public access that would connect to existing public access but not impact the project; thus requiring projects to go off-site in order to develop public access. Off-site public access can result in increasing the cost and complexity of a project.

### Box 5. Shoreline Key Terms

**Green Shoreline Solutions:** The terms green, nature-based, and nonstructural are used interchangeably in this document and refer to working with natural processes to construct and sustain flood protection strategies such as barrier beaches, wetlands, and tidal creeks.

**Grey Shoreline Solutions:** The terms grey, hard, armoring and structural are used interchangeably in this document and refer to traditional shoreline and flood protection strategies such as tidal barriers, levees, and revetment that are implemented on a project-by-project basis and not integrated with adjacent shoreline protection.

**Innovative Shoreline Solutions:** Innovative shoreline solutions refer to new methods to construct and sustain the shoreline and flood protection, including green solutions and the combination of “green and grey” strategies. Current examples of innovative approaches: wetland restoration in conjunction with shoreline armoring, horizontal levee, alternative engineering designs such as floodable or removable buildings. Per Climate Change Finding (h), “effective, innovative adaptation approaches minimize public safety risks and impacts to critical infrastructure; maximize compatibility with and integration of natural processes; are resilient over a range of sea levels, potential flooding impacts and storm intensities; and are adaptively managed.”

## Current Commission Law and Policy

All fill projects – in the Bay, certain waterways, salt ponds, and managed wetlands – must meet Section 66605 of the McAteer-Petris Act, unless they can be found to be necessary to the health and safety and welfare of the entire Bay Area. The purpose of these provisions is to ensure that no unnecessary fill is placed in the Bay. Staff work with applicants to reduce the amount of fill proposed to the “minimum necessary” to accomplish the goals of the project, whether that project is a pier or a horizontal levee or a restoration of a wetland. The McAteer-Petris Act also requires that projects provide maximum feasible public access.

Climate Change Policy 5 and Shoreline Protection Policy 4 encourage innovative adaptation approaches and nonstructural methods of shoreline protection. These measures are required “whenever feasible and appropriate,” which means that an applicant should explore nonstructural (e.g., innovative) solutions as part of their project design, unless they can show such strategies are infeasible.

### Key Policy Questions:

- How does the Commission define (and limit) what is considered an innovative shoreline protection solution?
- Does Section 66605 of the McAteer-Petris Act allow for innovative shoreline protection solutions if such an approach results in more fill than a grey structural shoreline solution? What does minimum fill necessary mean for innovative shoreline protection?
- Can an innovative shoreline protection solution be permitted without mitigation, or with limited mitigation requirements?
- How can the Commission ensure safety of fills and shoreline protection policies are met while allowing innovative shoreline protection strategies?
- Is it possible for the Commission to develop a permit to address the changing conditions associated with sea level rise so that a separate permit or action isn’t required every time repeated fill is placed to achieve the project’s original intent, or when an adaptive measure must be taken?
- What tools are needed by the Commission staff and applicants to encourage applicants’ consideration of innovative shoreline protection solutions during the permit application stage of project design?
- Should innovative shoreline protection solutions have different public access requirements than other types of projects?

### Steering Committee Observations

- a) The Commission currently applies its laws and policies to approve and permit fill on a case-by-case basis for all projects. However, given that the impact of sea level rise and the necessary interventions to reduce its effects extend beyond any one project, a regional approach is warranted.
- b) There is significant uncertainty for any given site what volume of fill is needed for innovative shoreline protection, the timeframe over which the fill is needed, the number of placement episodes (and related permits), and the likelihood of project success.
- c) Public perception of the Commission fill, mitigation and public access policies can be a barrier to applicants considering innovative shoreline protection solutions, leading project proponents to seek the least amount of fill necessary to protect a site. This often leads to the hardening of the shoreline with structural solutions that can lead to a loss of visual and public access and natural areas.
- d) The public access and mitigation requirements necessary for innovative shoreline protection projects may make them more expensive, difficult to implement, and/or prevent the development of projects.

- e) There is limited experience in permitting large-scale innovative or shoreline protection solutions that address sea level rise adaptation. It is unclear if current Commission law and policies would allow fill on the scale necessary for region-wide adaptation and resilience.

## **POLICY OPTIONS**

1. Organize and work with coastal engineers, planners, and others to develop guidance for local governments and applicants on the design and implementation of innovative shoreline protection solutions to address sea level rise, including volume of fill needed, placement methods, design approaches, land use being protected, implementation timeframe, probability of project success and risk if the project fails.
2. Support the State Coastal Conservancy in initiating and furthering green infrastructure shoreline projects that build on the Baylands Ecosystem Habitat Goals through a “help desk” function that connects project proponents, the Commission and others with technical experts to help design, build, and maintain innovative shoreline protection solutions.
3. Work with stakeholders and partners to create a Regional Shoreline Resilience and Adaptation Plan that identifies key vulnerabilities, establishes policies to implement strategies that result in a comprehensive approach to community resilience, and provides incentives to facilitate green and innovative shoreline solutions.
4. Develop a comprehensive multi-agency permit application and approval process (based on the success of the Long Term Management Strategy and Dredged Materials Management Office (DMMO)) for projects that place fill in the Bay to accelerate the region’s resilience, starting with nature-based adaptation solutions.
5. Consider the creation of a Regionwide Permit, pursuant to the Commission’s regulations, for certain type and scope of innovative shoreline protection projects aimed towards resilience and adaptation to rising sea levels.
6. In updates to the San Francisco Bay Plan, consider modifying fill restrictions, mitigation, and public access requirements for applicants proposing innovative shoreline protection projects while requiring monitoring and adaptation triggers amongst other strategies to ensure the long-term viability of these projects.
7. Review the New Tidal Wetland Regulations for Living Shorelines enacted by the State of Maryland in 2013 to update the Bay Plan’s Climate Change Policy 5 and Shoreline Protection Policy 4 to ensure applicants explore innovative and green shoreline protection solutions before selecting traditional, grey shoreline solutions as the default approach.

### 3. Environmental Justice and Social Equity Policies

Shoreline flooding from sea level rise will affect communities differently depending on their location, resources, and adaptive capacity. Low-income communities may have more difficulty preparing for or responding to flooding, or in relocating from areas that have been flooded. These communities may already be disproportionately exposed to hazards or toxic substances due to proximity to brownfields and industrial sites, and flooding due to sea level rise could exacerbate this risk of exposure and cause pollutants to mobilize.

Case study analysis and discussion by the steering committee highlight concerns that flooding and sea level rise will disproportionately affect vulnerable and disadvantaged communities. In addition, some committee members noted concern that shoreline protection structures developed for properties adjacent to these communities, which may be either unprotected or have ad-hoc protection, may amplify wave reflection and cause shoreline erosion and overtopping at these vulnerable areas. Without resources to match adjacent shoreline protection, disadvantaged communities may experience more flooding. Additionally, some committee members expressed the view that past and current public input processes have not adequately engaged disadvantaged communities in land use planning, project permitting, and other decisions affecting their ability to protect their neighborhoods.

#### Current Commission Laws and Policy

The Commission's current authority and existing policies include limited references to environmental justice. Climate Change Policy 6(g) calls for the development of a regional sea level rise adaptation strategy, in part, to "address environmental justice and social equity concerns," and the policy commits to Commission participation in the development of the regional strategy. The Commission's current ability to address climate justice issues at the local and project level are based upon the Commission's jurisdiction and authority – for example a shoreline protection project within the 100-foot shoreline band jurisdiction, but outside a priority use area, can only be denied a permit if it fails to provide maximum public access. Considering environmental justice concerns is challenging in such cases and the Commission's authority is advisory only. The Commission cannot deny a project based on its failure to consider environmental justice or its disproportionate impacts on disadvantaged communities.

The McAteer-Petris Act and the Bay Plan were developed before environmental justice was recognized at the federal and state level, and prior to current laws, policies, regulations and orders adopted by the state and federal governments. As the Commission has amended and updated the Bay Plan, findings and policies regarding environmental justice have been added to the plan and the Commission is required to implement its laws and policies in ways that are consistent with state and federal laws and policies that prevent discrimination, promote equal access to the Commission's programs, and support fair treatment in the development, adoption and implementation of laws, regulations and policies. The California Environmental Quality Act (CEQA) offers limited opportunity to address environmental justice. Environmental justice communities can raise issues before the Commission related to the Commission's jurisdiction and authority that may not have been raised by other agencies or sufficiently addressed through CEQA. However, the Commission's jurisdiction and authority, having been created without specific consideration of environmental justice, ultimately sets the parameters for how projects are evaluated and approved.

#### Box 6. Environmental Justice Key Terms

##### **Disadvantaged Communities:**

Disadvantaged communities may include, but are not limited to: a) Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects, exposure, or environmental degradation; b) Areas with concentrations of people that are of low-income, high unemployment, low levels of home ownership, high rent burden, sensitive populations, or low levels of educational attainment.

##### **Environmental Justice:** Environmental justice is defined by California state law as:

"The fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."

## Key Policy Questions:

- How can the Commission use existing policies to address environmental justice and social equity issues? What are limits to application of these policies?
- Does the project-by-project approach in the Commission's climate change policies hinder its ability to address the potential impacts that shoreline protection projects may have on disadvantaged communities?
- What other avenues exist to ensure disadvantaged and vulnerable communities are engaged in sea level rise resilience and adaptation public processes, and have equal access to resilience and adaptation project benefits?

## Steering Committee Observations

- a) The project-by-project approach to permitting and the Commission's authority make it difficult to address sea level rise vulnerabilities in disadvantaged communities.
- b) The Bay Plan Shoreline Protection Policy 1 requires permit applicants to integrate their projects with current or planned adjacent shoreline protection measures, in an attempt to create contiguous, effective shoreline protection. However, if the neighboring parcels have inadequate shoreline protection and no plan to improve it, the Commission does not have the authority to compel the creation of contiguous shoreline protection.
- c) The Commission's jurisdiction within the 100-foot shoreline band is limited to determining whether or not the project includes maximum feasible public access, which does not allow for environmental justice and social equity to be more fully considered in project permit review.
- d) Despite the Commission's jurisdiction, it is advancing the consideration of vulnerable and disadvantaged communities by supporting local government agencies in planning for sea level rise through the Adapting to Rising Tides Program, including assessing unique vulnerabilities in environmental justice communities.

## POLICY OPTIONS

1. The Commission should continue to advance the Adapting to Rising Tides Program and the ART Program should continue to support other local adaptation efforts that highlight the direct and indirect sea level rise vulnerability of disadvantaged communities across the region, as well as identify resilience and adaptation actions that can be taken both locally and regionally.
2. The Commission and its staff should actively engage disadvantaged communities in the Commission's planning and permitting processes, and identify means of increasing these communities' participation in public process (e.g. hold meetings around the region and after work hours, target engagement of local organizations in Commission planning and permitting projects where disadvantaged and environmental justice communities may be impacted).
3. Work with stakeholders and community partners to create a Regional Resilience and Adaptation Plan that identifies key community and population vulnerabilities, establishes collaborative policies to address sea level rise environmental justice and social equity issues, and develops appropriate resilience and adaptation strategies.
4. Consider initiating a Bay Plan amendment process to include findings and policies on social equity and environmental justice, in particular with regards to public access, shoreline protection, and climate change. Determine if changes to the McAteer-Petris Act are necessary to adequately address environmental justice in the Bay Plan.

## 4. Adaptive Management Policies

The magnitude and timing of future climate change impacts can make planning for rising sea levels complex and difficult. Adaptive management plans can help projects address the uncertainty inherent in planning for future sea levels by utilizing scenario planning, environmental criteria triggers (e.g. remove facilities or raise shoreline protection when sea level reaches a certain height), and project-specific climate adaptation strategies (e.g. making bayfront recreational facilities moveable or able to withstand periodic flooding). Risk-based assessment is a critical part of adaptive management plans, in that it accounts for factors contributing to the vulnerability of the location and project (e. g. exposure, sensitivity, adaptive capacity); and the consequence resulting if climate impacts occur. For example, two shoreline parks may have the same exposure to sea level rise, but one designed with moveable facilities or materials that can withstand flooding and salt water exposure has lower vulnerability and therefore lower risk. On the other hand, the consequences of a hospital or a residential neighborhood experiencing flooding are much higher than a shoreline park – and thus present a higher risk.

The steering committee case study review and discussion found that while the Commission’s climate change policies require permit applicants for larger projects to have an adaptive management plan and use risk-based assessments, there is no definition, guidance nor requirements that define what should be included in either adaptive management plans or risk-based assessments. Projects with lifetimes beyond 2050 must identify an adaptive management plan, however it is unclear how effective a plan would be given the long-term monitoring, financing and enforcement required. In addition, many adaptive management plans propose actions that would often require an additional permit action by or on behalf of the Commission (for example, raising a levee in response to higher than anticipated sea level rise). The enforcement mechanism is unclear, and it is not obvious how the Commission could compel applicants to employ the adaptive management strategies that are outlined in their original permit, particularly if funding is unavailable or if ownership or management has changed following permit issuance. It is also uncertain if in accepting an adaptive management plan the Commission is limiting its authority to permit only the adaptation identified in the plan, as opposed to future alternatives.

### Current Commission Laws and Policy

Climate Change Policy 3 requires an adaptive management plan for large projects that are likely to “remain in place longer than mid-century” although due to the Commission’s jurisdiction the policy does not apply to projects in the 100-foot shoreline band. If an applicant provides credible evidence that the life of a project would be less than mid-century, then an adaptive management plan is not required, which is often the case for small projects. Shoreline Protection Policy 1 requires “flood protection for the expected life of the project” and Shoreline Protection Policy 4 requires adaptive management whenever feasible and appropriate. The Commission does not, however, pre-approve the proposed activities, including the future fill needed in the adaptive management plan. If adaptive management actions require a permit, the project proponent will likely have to come back to the Commission for approval before implementing the adaptive management plan. At that time, the Commission would have the discretion to approve or deny the proposed project. However, the initial permit could

### Box 7. Adaptive Management Key Terms

**Adaptive Management:** Adaptive management is “a cyclic, learning-oriented approach that is especially useful for complex environmental systems characterized by high levels of uncertainty about system processes and the potential for different ecological, social and economic impacts from alternative management options. Effective adaptive management requires setting clear and measurable objectives, collecting data, reviewing current scientific observations, monitoring the results of policy implementation or management actions, and integrating this information into future action.”

**Risk:** Risk is a function of the likelihood of an impact occurring and the consequence of that impact.

**Risk Assessment:** Climate change risk assessments identify and prioritize issues that can be addressed by adaptation strategies.

be written to provide findings to support or justify approving activities including additional fill as specified in the adaptive management plan.

### **Key Policy Questions:**

- What does the current policy on risk assessments require of applicants and should it be regularly updated to meet current scientific and technical understanding? Do the Commission's policies accurately or effectively define risk-based assessment and adaptive management? How should the policies be updated to address this issue? How should enforcement of the proposed adaptive management actions be included in the plan?
- Are there certain types of projects that should be required to have an adaptive management plan regardless of size or life of the project estimates?

### **Steering Committee Observations**

- a) Due to the size and location of many projects along the shoreline, many vulnerable and potentially high-risk projects are exempt from the Commission's adaptive management plan requirement. For projects within the 100-foot shoreline band, staff is limited to considerations regarding public access in these projects, which is inadequate for ensuring the project will be resilient to sea level rise. For projects outside of the Commission's jurisdiction or smaller projects, there is currently no requirement to consider sea level rise.
- b) BCDC's definition for adaptive management plans, as defined by Climate Change Finding I, should be revised to reflect the current definition accepted in the literature.
- c) Public projects often remain in place beyond the stated expected life, and the Commission should consider this when determining the life of the project and whether to require an adaptive management plan.
- d) The San Francisco Bay Regional Water Quality Control Board now requires permittees of bayfront landfills to develop Long Term Flood Protection Reports, which must account for future flooding and sea level rise. The RWQCB requires these reports as permits come up for review and are to be updated every five years. However, there are still a significant number of contaminated lands along the Bay shoreline that are at risk and need to be adaptively managed and do not have either the plans or permits in place to do so.
- e) Adaptive management plans should analyze and account for impacts on adjacent communities. However, requiring applicants to protect adjacent properties when constructing shoreline protection is not an appropriate strategy. Rather than attempt to protect the region on a project-by-project basis as development occurs, the region should develop a Regional Resilience and Adaptation Plan and identify funding to implement the strategies prioritized in the plan.
- f) There are significant barriers to financing adaptive management solutions, including inflexible capital and operating expenditure cycles, the challenge of integrating iterative and flexible management responsive to environmental conditions.

### **POLICY OPTIONS**

1. The Commission should develop clear and transparent definitions and criteria for adaptive management plans, and criteria for risk assessments that Commission staff can use in reviewing proposed projects, and that local governments and applicants can use in developing permit applications.
2. Work with stakeholders and partners to create a Regional Resilience and Adaptation Plan that identifies key at-risk areas and projects, develops guidance and identifies adaptation strategies to address high-risk sites such as shoreline contaminated lands, provides incentives to overcome financing difficulties, and addresses risk and impacts to adjacent properties.

3. In the development of a Regional Resilience and Adaptation Plan, consider including a pre-banking concept to develop approaches for shoreline areas based on flood risk, ecological factors and neighborhoods and land use, rather than project or property specific areas. This would allow for the consideration and coordination of timing, approach and funding for adaptation strategies.
4. Include key threshold and triggers in permit conditions, e.g., the number of days public access may be closed or the loss of freeboard that is allowable. Require risk assessments and adaptive management plans to consider the potential flood and erosion impacts on adjoining properties or communities and the actions that could be taken to reduce those impacts.
5. The Commission should increase its coordination and collaboration with the San Francisco Bay Regional Water Quality Control Board to ensure projects on and near contaminated lands have an adaptive management plan that is protective of the Bay and human health, including:
  - a. Higher monitoring standards when contaminated lands may pose a threat to humans and natural resources.
  - b. Multiple monitoring areas both underground and at ground level.
  - c. An early warning system to notify nearby communities if contaminants posing a threat to human health or the environment are detected.

# Conclusion

The Policies for a Rising Bay project identified potential changes to the Commission's law, policies and practices to support and facilitate adaptation to sea level rise. The collaborative approach of the Policies for a Rising Bay project led to the development of an array of policy options for Commission consideration. Some actions can be pursued in the short-term, while others will require further analysis and coordination and will need to be implemented over a longer period. In order to prioritize the options, BCDC staff will present the policy options to the Commission for consideration and continue to work with steering committee members and others to refine and implement the prioritized options.

Several policy options from this project were considered by the Commission as part of the Commission Workshop Series on Rising Sea Levels (RSL workshops). The RSL workshops, which occurred monthly from January – May 2016, allowed Commissioners, Alternates, stakeholders and other members of the public to explore issues related to rising sea levels. Commission staff ensured cross-pollination between these workshops and the Policies for a Rising Bay project and will bring policy options from this report before the Commission for consideration in the fall of 2016. Some of the recommendations that the Commission approved at their October 6, 2016 meeting are:<sup>13</sup>

- Discuss possible amendments to BCDC's laws and policies related to rising sea levels
- Create a collaborative and inclusive Regional Adaptation Plan
- Support the State Coastal Conservancy by initiating a Green Shoreline Infrastructure help desk
- Develop a multi-agency permit application and approval process

In addition to the Policies for a Rising Bay project and the RSL workshops, the Commission also has a working group that has been analyzing issues related to Bay fill and sea level rise adaptation. The Bay Fill Working Group (BFWG) will continue to meet over the coming year to further examine BCDC's fill policies. The BFWG is comprised of four Commissioners and meets monthly to hear presentations, analyze issues and discuss options. Under the leadership of the BFWG, BCDC plans to hold workshops on some of the policy options presented in this report, which will provide additional opportunities for public input.

This project allowed staff to engage in an in-depth conversation with key stakeholders about the barriers BCDC's policies and practices may pose to sea level rise adaptation. The report captures a wide array of issues and the creative thinking of steering committee members and staff to address those concerns. While implementation of the policy options presented in this project may take some time, the information regulatory and planning staff learned has been invaluable in improving our interactions with applicants and stakeholders. As noted above, BCDC will continue to pursue a range of strategies to facilitate the region's preparedness to sea level rise and this report provides elements that the Commission can use to craft a roadmap for moving forward.



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<sup>13</sup> Recommendations are listed in abbreviated form, please follow this link to see the full list: <http://www.bcdc.ca.gov/cm/2016/0923Supplemental.html>

## APPENDICES A – G

## Appendix A: Policy Analysis Memo

The Policies for a Rising Bay project (project) is part of the San Francisco Bay Conservation and Development Commission's (BCDC) larger climate change program, which involves building the region's capacity to plan for sea level rise and ensuring that BCDC's laws and policies support and encourage appropriate adaptation. The main goal of this project is to collaboratively evaluate BCDC's fill policies in light of sea level rise and develop guidance for the Commission, staff, and project proponents to promote shoreline resilience.

This memorandum focuses on Step 2 of the project, which starts by evaluating whether and how BCDC's fill laws and policies may affect sea level rise adaptation strategies. BCDC planning staff interviewed regulatory staff to document current interpretations and challenges with existing fill policies. Planning staff also interviewed Steering Committee members to understand their perspectives on how BCDC's fill policies affect adaptation project proposals. Furthermore, in collaboration with regulatory staff, planning staff reviewed existing permits to further investigate the feedback received from the Steering Committee.

### Methodology

The project was designed with the goal of collaborating both between BCDC Planning and Regulatory divisions and with a Steering Committee. Planning staff began this process by interviewing seven Regulatory staff members to gain greater insight into the application of BCDC's laws and policies and the applicant's response. Some of the questions the project team asked in regards to the application of our policies include:

- How are alternative upland locations evaluated?
- How is the minimum amount necessary to achieve the purpose of the fill determined?
- Which tests [in McAteer-Petris Act Section 66605] are the most challenging for applicants to understand and provide appropriate information for?
- What specific issues have applicants raised about the McAteer-Petris Act in regards to Bay fill for adaptation?

The information gathered through these interviews helped staff focus on key issues that would be further investigated in subsequent steps of the project. Since Regulatory staff interact with applicants and apply BCDC's policies on a regular basis, the internal interviews were a foundational element of the project.

Once the initial Steering Committee list was developed, and in preparation for the first meeting, staff interviewed eleven members. These interviews aimed to capture the diverse perspectives of the group, identify common themes, and areas where this project could respond to specific concerns. During the interviews, key issues surfaced regarding BCDC's fill policies, which served as the basis for the policy research and are included in the policy analysis section.

The next step in the process was to incorporate staff and Steering Committee feedback into the evaluation of the Commission's laws and policies. Planning staff embarked on this evaluation by first reviewing relevant permits to understand how the laws and policies are implemented. Staff developed a suite of questions directly informed by the fill issues raised by the Steering Committee and regulated community. Regulatory staff reviewed the questions prior to our investigation, and identified permitted fill projects that could help answer those questions. Below is a sample of the project review questions:

- What was the originally proposed amount of fill and the permitted amount?
- Does the project trade short-term impacts for long-term habitat health?
- What Bay Plan policies could have stalled the project [but did not]?
- Is there a policy basis for "beneficial fill"?

Staff reviewed key projects that permitted fill for habitat restoration and conventional shoreline protection. To understand if and how environmental justice may have been considered in the past, staff also reviewed projects in disadvantaged communities. Additionally, planning staff interviewed the permit analyst that worked on the particular project to clarify any necessary information. As the team moved through this evaluation, planning and regulatory staff met weekly to discuss preliminary findings. The review of these projects facilitated the evaluation of the McAteer-Petris Act and the Bay Plan policies and answered many of the questions that Steering Committee members raised during the interviews. The “Steering Committee Perspectives on BCDC’s Laws and Policies” section below responds to key Steering Committee comments and provides an overview of relevant policies.

## **Steering Committee Perspectives on BCDC’s Laws and Policies**

At the onset of this project, staff interviewed eleven Steering Committee members to understand the range of perspectives on BCDC’s fill laws and policies. Additionally, staff documented concerns raised during the first Steering Committee meeting on March 13, 2015. The following section addresses specific comments and provides an overview of relevant policies.

**Beneficial Fill.** Many Steering Committee members shared the perspective that BCDC should make a policy distinction between fill for restoration and fill for development. Specifically, some stated that the Bay Plan should include policies that designate fill for nonstructural shoreline protection and restoration as “beneficial.” Of course, projects proposing fill for ports, water-related industry, airports, etc., also see their proposed fill as beneficial because it supports economic growth, jobs, and commerce. The McAteer-Petris Act currently does not distinguish the relative benefits of a proposed fill but on consistency with the public trust.

**Public Access and Recreation Policies.** A number of Steering Committee members reported concerns with the Commission’s public access requirements. Public access can be a fill issue because projects are required to provide maximum feasible public access in order to be consistent with the McAteer-Petris Act and Bay Plan policies on public access. The McAteer-Petris Act Section 66632.4 states the Commission’s authority “[w]ithin any portion or portions of the shoreline band that are located outside the boundaries of water-oriented priority land uses, as fixed and established pursuant to Section 66611, the Commission may deny an application for a permit for a proposed project only on the grounds that the project fails to provide maximum feasible public access, consistent with the proposed project, to the bay and its shoreline.” Public Access Policy 1 mandates that “a proposed fill project should increase public access to the Bay to the maximum extent feasible, in accordance with the policies for public access to the Bay,” which provide guidance on the siting, design, and management of the public access. Public access is not limited to shoreline paths, it involves a variety of uses as stated in Public Access finding (e), it includes; “bicycling, fishing, picnicking, nature education, etc.” The Bay Plan also includes recreation policies that govern various public uses on the Bay and along the shoreline, including; marinas, live-aboard boats, launching lanes, non-motorized small boats, fishing piers, beaches, water-oriented recreation, and waterfront parks. For instance, Recreation Policy 3(b)(2) allows fill for marina facilities “provided that the fill in the Bay is the minimum necessary and any unavoidable loss of Bay habitat, surface area, or volume is offset to the maximum amount feasible.” During the interviews, one member noted that the Commission does not account for the cost of providing public access it requires, while others disagreed with the project-by-project approach of implementing this requirement. However, the Commission only has the authority to require public access on a project-by-project basis through its permitting process. Since public access is a core mission of the agency, staff work with project applicants to ensure it is feasible, which includes a consideration of the cost of providing public access in relation to the total cost of the project.

**The Commission’s Laws and Policies on the Economy.** Some Steering Committee members are concerned that economic interests are not on equal footing with the environment. McAteer-Petris Act Section 66605 (a) restricts fill to water oriented uses, which includes fills for the environment and economic purposes “...such as ports, water-related industry, airports, bridges, wildlife refuges, water-oriented recreation, and public assembly, water intake and discharge lines for desalinization plants and power generating plants requiring large amounts of water for cooling purposes...” As a result, Part IV of the Bay Plan - Development of the Bay and Shoreline, Findings and Policies section, includes specific policies on water-related industry, ports, airports, transportation, commercial fishing, fill for bay-oriented commercial recreation and bay-oriented public assembly. Fills in Accord with the Bay Plan Policy 1 describes that, “the filling is in accord with the Bay Plan

policies as to the Bay-related purposes for which filling may be needed ([e.g.] ports, water-related industry, and water-related recreation) and is shown on the Bay Plan maps as likely to be needed.” The Bay Plan maps illustrate the Commission’s jurisdiction and identify priority use areas, where development must be consistent with the Commission’s designated use and applicable policies. These maps also provide additional policies specific to location and uses, as well as provide advisory directives. The Commission regularly approves projects based in part on an economic rationale, particularly for projects located within a relevant priority use area. For example, an economic imperative served as one of the reasons for approving a fill project (BCDC Permit No. 2011.006.02) at the Port of Redwood City’s Wharves 1 and 2 and adjacent upland area. As approved, the project allowed the permittee to better serve its tenants and customers, and achieve its anticipated throughput capacity identified in the Commission’s Seaport Plan, thereby promoting economic growth in the Bay Area and achieving regional benefits.

## Appendix B: Key Commission Policies and Language

This section identifies the fill related laws and policies examined through this project.

Policy	Language
McAteer-Petris Act Section 66605(a)	That further filling of San Francisco Bay and certain waterways specified in subdivision (e) of Section 66610 should be authorized only when public benefits from fill clearly exceed public detriment from the loss of the water areas and should be limited to water-oriented uses (such as ports, water-related industry, airports, bridges, wildlife refuges, water-oriented recreation, and public assembly, water intake and discharge lines for desalinization plants and power generating plants requiring large amounts of water for cooling purposes) or minor fill for improving shoreline appearance or public access to the bay;
McAteer-Petris Act Section 66605(b)	That fill in the bay and certain waterways specified in subdivision (e) of Section 66610 for any purpose should be authorized only when no alternative upland location is available for such purpose;
McAteer-Petris Act Section 66605(c)	That the water area authorized to be filled should be the minimum necessary to achieve the purpose of the fill;
McAteer-Petris Act Section 66605(d)	That the nature, location, and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources, or other conditions impacting the environment, as defined in Section 21060.5 of the Public Resources Code;
McAteer-Petris Act Section 66632, (f)(2)	...the Commission may grant a permit subject to reasonable terms and conditions including the uses of land or structures, intensity of uses, construction methods and methods for dredging or placing of fill.
Fish, Other Aquatic Organisms and Wildlife Policy 5	The Commission may permit a minor amount of fill or dredging in wildlife refuges, shown on the Plan Maps, necessary to enhance fish, other aquatic organisms and wildlife habitat or to provide public facilities for wildlife observation, interpretation and education.
Water Quality Policy 1	Bay water pollution should be prevented to the greatest extent feasible. The Bay's tidal marshes, tidal flats, and water surface area and volume should be conserved and, whenever possible, restored and increased to protect and improve water quality. Fresh water inflow into the Bay should be maintained at a level adequate to protect Bay resources and beneficial uses.
Water Surface Area and Volume Policy 1	The surface area of the Bay and the total volume of water should be kept as large as possible in order to maximize active oxygen interchange, vigorous circulation, and effective tidal action. Filling and diking that reduce surface area and water volume should therefore be allowed only for purposes providing substantial public benefits and only if there is no reasonable alternative.

<p><b>Tidal Marshes and Tidal Flats Policy 1</b></p>	<p>Tidal marshes and tidal flats should be conserved to the fullest possible extent. Filling, diking, and dredging projects that would substantially harm tidal marshes or tidal flats should be allowed only for purposes that provide substantial public benefits and only if there is no feasible alternative.</p>
<p><b>Tidal Marshes and Tidal Flats Policy 3</b></p>	<p>Projects should be sited and designed to avoid, or if avoidance is infeasible, minimize adverse impacts on any transition zone present between tidal and upland habitats. Where a transition zone does not exist and it is feasible and ecologically appropriate, shoreline projects should be designed to provide a transition zone between tidal and upland habitats.</p>
<p><b>Tidal Marshes and Tidal Flats Policy 6</b></p>	<p>Any ecosystem restoration project should include clear and specific long-term and short-term biological and physical goals, and success criteria, and a monitoring program to assess the sustainability of the project. Design and evaluation of the project should include an analysis of: (a) how the system's adaptive capacity can be enhanced so that it is resilient to sea level rise and climate change; (b) the impact of the project on the Bay's sediment budget; (c) localized sediment erosion and accretion; (d) the role of tidal flows; (e) potential invasive species introduction, spread, and their control; (f) rates of colonization by vegetation; (g) the expected use of the site by fish, other aquatic organisms and wildlife; (h) an appropriate buffer, where feasible, between shoreline development and habitats to protect wildlife and provide space for marsh migration as sea level rises; and (i) site characterization. If success criteria are not met, appropriate adaptive measures should be taken.</p>
<p><b>Tidal Marshes and Tidal Flats Policy 8</b></p>	<p>Based on scientific ecological analysis and consultation with the relevant federal and state resource agencies, a minor amount of fill may be authorized to enhance or restore fish, other aquatic organisms or wildlife habitat if the Commission finds that no other method of enhancement or restoration except filling is feasible.</p>
<p><b>Subtidal Areas Policy 1</b></p>	<p>Any proposed filling or dredging project in a subtidal area should be thoroughly evaluated to determine the local and Bay-wide effects of the project on: (a) the possible introduction or spread of invasive species; (b) tidal hydrology and sediment movement; (c) fish, other aquatic organisms and wildlife; (d) aquatic plants; and (e) the Bay's bathymetry. Projects in subtidal areas should be designed to minimize and, if feasible, avoid any harmful effects.</p>
<p><b>Subtidal Areas Policy 2</b></p>	<p>Subtidal areas that are scarce in the Bay or have an abundance and diversity of fish, other aquatic organisms and wildlife (e.g., eelgrass beds, sandy deep water or underwater pinnacles) should be conserved. Filling, changes in use; and dredging projects in these areas should therefore be allowed only if: (a) there is no feasible alternative; and (b) the project provides substantial public benefits.</p>
<p><b>Subtidal Areas Policy 6</b></p>	<p>Based on scientific ecological analysis and consultation with the relevant federal and state resource agencies, a minor amount of fill may be authorized to enhance or restore fish, other aquatic organisms or wildlife habitat if the Commission finds that no other method of enhancement or restoration except filling is feasible.</p>

<p><b>Climate Change Policy 3</b></p>	<p>To protect public safety and ecosystem services, within areas that a risk assessment determines are vulnerable to future shoreline flooding that threatens public safety, all projects—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—should be designed to be resilient to a mid-century sea level rise projection. If it is likely the project will remain in place longer than mid-century, an adaptive management plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century.</p>
<p><b>Climate Change Policy 5</b></p>	<p>Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.</p>
<p><b>Safety of Fills Policy 4</b></p>	<p>Adequate measures should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project. The Commission may approve fill that is needed to provide flood protection for existing projects and uses. New projects on fill or near the shoreline should either be set back from the edge of the shore so that the project will not be subject to dynamic wave energy, be built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project, be specifically designed to tolerate periodic flooding, or employ other effective means of addressing the impacts of future sea level rise and storm activity. Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.</p>
<p><b>Protection of the Shoreline Finding e.</b></p>	<p>Addressing the impacts of sea level rise and shoreline flooding may require large-scale flood protection projects, including some that extend across jurisdictional or property boundaries. Coordination with adjacent property owners or jurisdictions to create contiguous, effective shoreline protection is critical when planning and constructing flood protection projects. Failure to coordinate may result in inadequate shoreline protection (e.g., a protection system with gaps or one that causes accelerated erosion in adjacent areas).</p>
<p><b>Protection of the Shoreline Policy 1 (c), (d), (e)</b></p>	<p>New shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if: ... (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account; (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; and (e) the protection is integrated with current or planned adjacent shoreline protection measures.</p>
<p><b>Protection of the Shoreline Policy 4</b></p>	<p>Whenever feasible and appropriate, shoreline protection projects should include provisions for nonstructural methods such as marsh vegetation and integrate shoreline protection and Bay ecosystem enhancement, using adaptive management. Along shorelines that support marsh vegetation, or where marsh establishment has a reasonable chance of success, the Commission should require that the design of authorized protection projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever feasible.</p>
<p><b>Dredging Policy 5</b></p>	<p>...dredging projects should maximize use of dredged material as a resource consistent with protecting and enhancing Bay natural resources, such as creating, enhancing, or restoring tidal and managed wetlands, creating and maintaining levees and dikes, providing cover and sealing material for sanitary landfills, and filling at approved construction sites.</p>

<p><b>Dredging Policy 11</b> <b>(b)</b></p>	<p>To ensure protection of Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, except for projects using a minor amount of dredged material, until:</p> <p>(1) Objective and scientific studies have been carried out to evaluate the advisability of disposal of dredged material in the Bay and certain waterways for habitat creation, enhancement and restoration. Those additional studies should address the following:</p> <p>a. The Baywide need for in-Bay habitat creation, enhancement and restoration, in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species; and</p> <p>b. The need to use dredged materials to improve Bay habitat, the appropriate characteristics of locations in the Bay for such projects, and the potential short-term and cumulative impacts of such projects; and</p> <p>(2) The Commission has adopted additional Baywide policies governing disposal of dredged material in the Bay and certain waterways for the creation, enhancement and restoration of Bay habitat, which narratively establish the necessary biological, hydrological, physical and locational characteristics of candidate sites; and</p> <p>(3) The Oakland Middle Harbor enhancement project, if undertaken, is completed successfully.</p>
<p><b>Public Access Policy 5</b></p>	<p>Public access should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding.</p>
<p><b>Public Access Policy 6</b></p>	<p>Whenever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed... Any public access provided as a condition of development should either be required to remain viable in the event of future sea level rise or flooding, or equivalent access consistent with the project should be provided nearby.</p>
<p><b>Mitigation Policy 1</b></p>	<p>Projects should be designed to avoid adverse environmental impacts to Bay natural resources such as to water surface area, volume, or circulation and to plants, fish, other aquatic organisms and wildlife habitat, subtidal areas, or tidal marshes or tidal flats. Whenever adverse impacts cannot be avoided, they should be minimized to the greatest extent practicable. Finally, measures to compensate for unavoidable adverse impacts to the natural resources of the Bay should be required. Mitigation is not a substitute for meeting the other requirements of the McAteer-Petris Act.</p>

## Appendix C: Ground Transportation Case Study

Steering Committee and External Volunteers

**Primary Contributors:** Kristina Hill, UC Berkeley; Peter Baye; Jim McGrath

**Reviewers:** Jim Allison, Capitol Corridor; Richard Sinkoff, Port of Oakland; Salote Soqo, Environmental Justice Coalition for Water; Dilip Trivedi, Moffatt & Nichol; Paloma Pavel, Breakthrough Communities.

This hypothetical case study is for policy planning purposes only and should not be interpreted as a real or proposed project.

A. Proposal Description

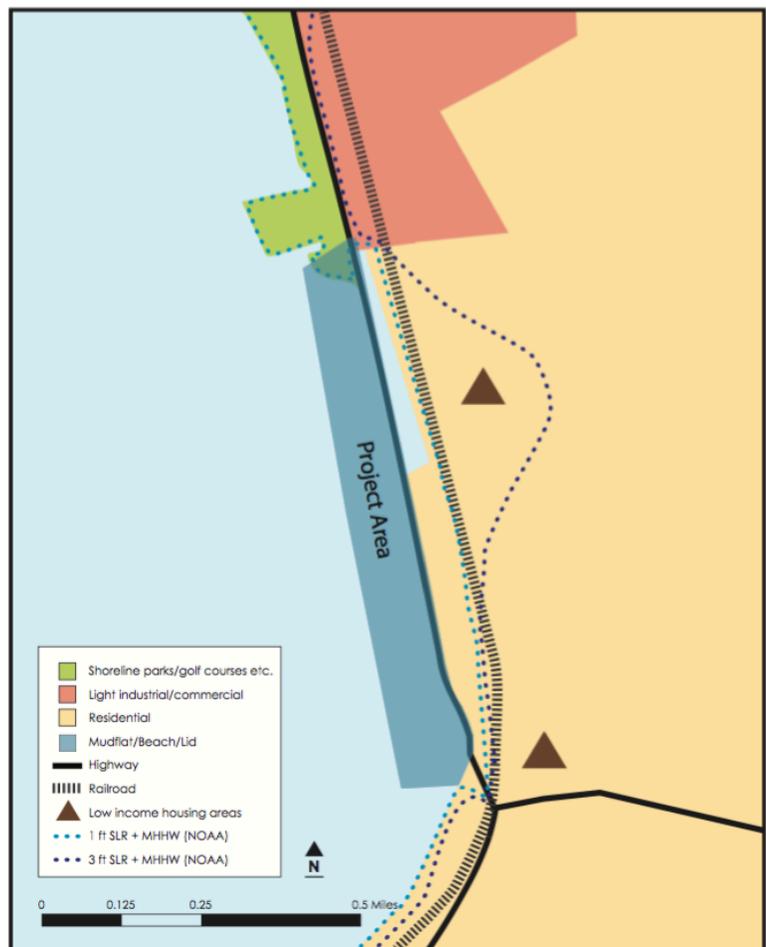
**Applicant:** State and regional transportation management agencies supported by the County, and adjacent cities.

**Funding:** State, Federal, and a County sales tax.

**1. Project purpose and anticipated benefits:** The purpose of this proposal is to maintain ground transportation, shoreline habitat and recreation resources, and protect the surrounding community from future flooding. The existing highway provides critical goods and commuter movement and is vulnerable to coastal flooding. The Bay Trail and Shoreline Road about the highway on the Bay side and on the eastern side is Access Drive. The area adjacent to the 13,000 linear feet project site is mostly residential on the southeastern half, and on the northeastern part of the facility is a recreational lake. The highway is in the 100-year and 500-year floodplains and also at risk of future flooding and storm events throughout the project area, as shown on the map. Any disruption to this segment of this regionally important highway, which serves as a major truck route and carries an average of 225,000 vehicles per day, could impact traffic flows at a regional scale. This highway is critical to goods movement in the region and California and carries a large share of the region's domestic trade with 21% of all goods moving through this corridor. Traffic analysis indicates that the highway cannot be abandoned because there are not sufficient feasible alternate routes. The highway sits on top of a berm and currently provides protection up to a 50-year storm, and therefore also acts as incidental flood protection for the residential communities behind it but it will be quickly overtopped by 2050 as sea level rises. Given the scale of this project and considering at least a 15-year planning horizon, it is necessary to begin the permitting process today.

### 2. Design considerations and alternatives:

Traffic analysis indicates that the highway cannot be abandoned because there are not sufficient alternate routes. Several alternatives were considered to protect the highway. Given its heavy traffic use, it was determined that construction on the highway to raise it within its current corridor would be difficult because it would cause significant, unacceptable disruptions. Raising the berm that the highway sits on top of might require constructing additional lanes for use while each portion of the berm is being raised and this might require large amounts of fill from the highway into the Bay. Given the high land values around the highway, it would be cost-prohibitive to acquire the adjacent developed land. The only undeveloped land available for



constructing these new lanes would be the Bay adjacent to the existing roadway. However, constructing lanes either on a levee or causeway in the Bay raises a number of concerns, including cost, impacts to Bay resources and associated high mitigation costs, complex engineering and construction in Bay Mud.

The preferred alternative is a multi-benefit project that includes flood protection, habitat and recreational elements. The project involves construction of a seawall with a lid over the highway to protect it, and the adjacent communities from flooding. The seawall would be 30 feet high to both ensure the project is built to last beyond 100 years and to accommodate the vehicle clearance within the new enclosure. The lid over the highway will include a park and the Bay Trail, which will be accessible to the public through a network of stairways and elevators at least every 500 feet on both sides of the highway. The park will include swales and a stormwater system to convey rainwater away from the lid. The park will be landscaped primarily with native vegetation. To mitigate emissions the project includes pollution abatement technology.

A significant project purpose is to modify this transportation corridor in a way that factors in the interests of the adjacent community. If the area behind the highway was tidal marsh or a park that can tolerate flooding, then the adaptation strategy could have involved elevating the road on a viaduct in its current alignment. Elevating the highway on a viaduct over the old road would require less fill but it would leave the adjacent community vulnerable to flooding because the berm that the road sits on top of was not designed to provide the necessary level of flood protection. As such, improving the berm so that it meets current and future flood risk standards would constitute a separate project in addition to the viaduct construction.

The project is located in a unique sediment transport setting with high wave energy and sediment deposition. Mudflat recharge and creation of a beach is proposed to provide wave attenuation and recreational benefits, and preserve mudflat habitat that would otherwise be eroded with the increased reflectivity of the wall. The existing offshore habitat is marginal and would be enhanced through the proposed recharge. The beach would be accessible to the public through stairs and ramps from the top of the lid and at grade level from either end of the project site. The beach and mudflat recharge construction would occur in phases as sea level rises. A beach would be built from material dredged from flood control channels in the region. The initial placement of fill for mudflat recharge and the beach is 98 acres of sediment (medium to fine grain) over 13,000 linear feet. Sediment would be placed from about five feet above mean higher high water and tapering linearly for about 400 feet into the Bay. Sediment will be acquired from a commercial dredger and transported by barge to the site. Some sediment movement and deposition away from the site is expected. Siltation will be mitigated with the use of properly designed groins to deflect and redirect wave and current movement. Additionally, beach nourishment would likely occur every 10 years to continue providing wave attenuation and recreational benefits at least to 2100. Although nourishment would have to occur to preserve the beach and protect the seawall, this alternative could provide public access that will be lost once the existing Bay Trail is flooded.

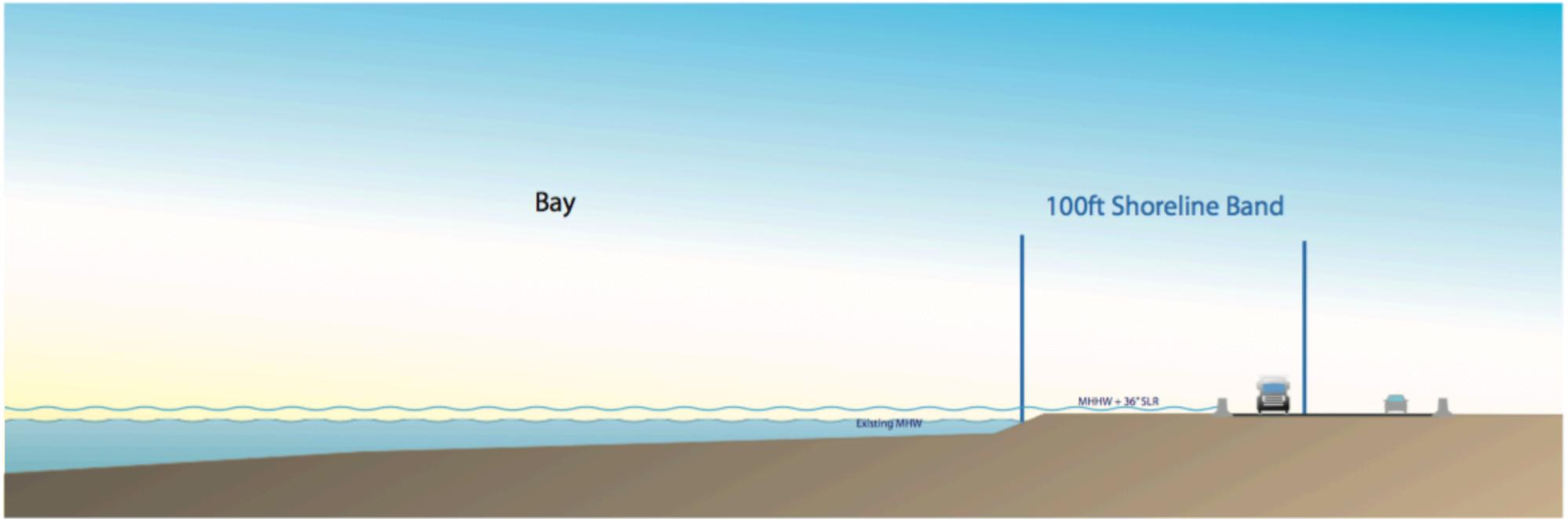
The preferred alternative, a seawall coupled with mudflat recharge and a beach, represents a more desirable fill alternative. The site characteristics are such that simply building a sea wall would require enlarging the existing shoreline riprap to protect the toe of the wall and riprap would have to be added continuously over time as sea level rises and wave heights increases. The riprap and seawall offer little to no habitat value. Although this project proposal does not “minimize fill” per 66605, it is more desirable fill than riprap since the fill proposed (sand and mud) has significant habitat value and because of its slope and wave dampening characteristics, serves as effective shoreline protection. At a height of 30 feet, the seawall provides protection to 5.5 feet of sea level rise (SLR) above the 100-year storm and likely for years beyond 2100. The proposed shoreline protection will be integrated with the high points of the land at either end of the project site to ensure continuous protection throughout the shoreline in this area.

Total Fill in the Bay: 98 acres over 13,000 linear feet

Fill for beach and mudflat nourishment: 647,443 cubic yards of sediment (medium to fine grain)

Total Fill in the Shoreline Band: 21 acres over 13,000 linear feet

Beach creation: 315,519 cubic yards of sediment (medium grain) and 31,551 cubic yards of groins



### 3. Anticipated short- and long-term impacts:

- Temporary impacts during seawall construction – increased traffic due to reduced access, dust, and noise. A stormwater pollution prevention plan would be developed and would include best management practices to control construction related runoff.
- Temporary impacts during mudflat/beach construction and maintenance – turbidity near the discharge location from the barge and pumping of sand.

#### Natural Resources

- Habitat – The area proposed to be filled with sediment will result in buried fauna and biota. Increased turbidity and grain size alterations may also impact fauna. Nesting sites for indigenous species may be lost in the interim. However, the existing offshore habitat is marginal and over the long-run new habitat would be created and biodiversity would increase.
- Beach Habitat Benefits – Without the beach, reflectivity from the seawall would result in erosion of offshore mudflats and result in expansion of subtidal benthic habitat. While some shorebird feeding and nesting areas, shellfish beds and waterfowl feeding areas may be lost in the interim, bird nesting, and foraging areas would be available over the long-run.
- Siltation – Movement of sediment into intertidal and mudflat habitats may have significant adverse impacts. Groins will be placed to reduce the rate of siltation in nearby areas.
- Lake – Lake visitors will experience temporary impacts related to reduced access, dust, and noise during construction.
- Wildlife – Avoidance and minimization measures will be implemented to reduce impacts to wildlife in the project area. All environmentally sensitive areas (ESAs) within the project area will be delineated by biology staff and appropriate restrictions of construction activity in these areas will be set.
- Mudwaves – Lightweight materials will be used so that the weight of the seawall and landscape ramp will not create mudwaves.
- Bay views – Views of the Bay by areas landside of the highway and those by motorists will be obstructed by the 30 feet tall sea wall and lid. The area directly adjacent to the freeway is predominantly low-rise, low-density residential, therefore their views of the Bay are obstructed by the freeway. Views of the Bay from some landside open spaces may be impacted by the elevated structure, mainly truncation of the foreground portion of some views. Bay views from the lake will also be blocked by the new construction.
- Public access – The existing public access along the shoreline will be relocated to the lid where a park will be constructed and it will be accessible to adjacent communities east of the freeway via stairs, and elevators. Additionally, park visitors will be able to access the beach through a network of stairs and ramps and through entrances either end of the project site.
- Shoreline impacts on neighbors – The potential for downstream erosion is uncertain but likely to be minimal since the site is located in an embayment.
- Stormwater – The existing stormwater channels will be modified in the project area and pumps will be installed to protect the lid and the communities behind it. Additionally, the County will begin exploring upper watershed solutions and management options to increase detention capacity at the lake.
- Environmental justice – Disadvantaged communities nearby will have increased access to shoreline amenities such as the park and the beach, which are currently lacking in this area. Subsistence

fishers would continue to have access to the shoreline once construction concludes.

4. Maintenance, monitoring, and adaptive management:

- The seawall and lid will be built to last beyond 100 years with expected sea level rise.
- As sea level rises, the mudflat will be recharged and the beach constructed to attenuate waves. Additionally, beach nourishment would likely occur every 10 years thereafter.
- The enclosed roadway would include electrical and mechanical safety monitoring devices and equipment to ensure that these systems are protected from contact with water from storm events, flooding, sea level rise, and groundwater and salt water intrusion.
- Through a cooperative agreement, the adjacent cities, in partnership with state and regional park agencies, have agreed to maintain the park and public access on both sides of the lid.

B. Assumptions:

- 66605 – (b) There is no alternative location for the purpose of this project.
- 66605 – (e) The project will be constructed according to sound safety standards.
- 66605 – (g) The applicant has valid title to the site.
- This is not a scenic highway, which would otherwise require views of the Bay from the highway.

## Ground Transportation Case Study - BCDC Staff Analysis

This is an analysis of the Transportation Case Study for the Policies for a Rising Bay Project, applying McAtteer-Petris Act issues and San Francisco Bay Plan policies to the case study. It may not raise every possible issue relevant to the case study. This review of a hypothetical case study should not be interpreted as commenting on a real or proposed project and is for policy planning purposes only.

### 1. Minimum Fill Issues:

The current proposal involves a substantial amount of fill to place the mudflat, the beach and groins to protect the beach. Fill would be required over a long period of time to recharge the beach. The project would need to evaluate whether a proposal with less fill, such as a riprap shoreline or a flood wall, could provide the same protection without the fill. In addition, the impact to habitat from the alternatives would have to be determined, in order to demonstrate that the mudflat/beach proposal has an additional habitat benefit over the alternatives. For example, it has not been established that a seawall or riprap revetment alternative would have fewer habitat impacts than this large fill project.

The slope for the mudflat must be justified to demonstrate it is the minimum necessary to provide the flood protection benefits and is structurally sound. The proposal would have to show that the beach would actually function as proposed. For example, the wave reflection from rising sea levels and storms may operate to break down the beach very often, which is a likely scenario in a high wave environment. In fact, if the high wave energy system is consistently undermining the mudflat and beach, perhaps this is not an appropriate long-term solution for this area.

### 2. Use Issues:

The fill proposed in this project is for flood protection to a road and existing neighborhood. The transportation policies and the shoreline protection policies do not prohibit filling to protect roads from flooding. New shoreline protection can be approved to protect proposed development so long as that development is “consistent with other Bay Plan policies” (Shoreline Protection 1).

### 3. Public Benefits v. Public Detriments:

The public benefits to the fill include flood protection to the important highway, flood protection to the community, and increased public access. Detriments here include substantial habitat loss that will continue over a long-time period considering the adaptation strategy proposed, and loss of open water area. The project would have to determine the beneficial effects of the new mudflat habitat relative to the detriments to the loss of existing habitat.

### 4. Impacts to Habitat:

The substantial impacts to habitat from the fill itself and the barrier beach, as well as the increase in sedimentation and wave deflection from these measures are covered by the following policies:

Subtidal Policy 1 (determine impacts through Baywide effects) and 2 as well as Tidal Marsh and Tidal Flat Policies 1 state that filling should be allowed only where there is no feasible alternative and substantial public benefits. BCDC would also be concerned about the substantial increase in sedimentation from the beaches – likely through our McAtteer-Petris Act authority 66605(d). BCDC would want to know where the sedimentation is going. Furthermore, the effects of the fill on other areas of the Bay, in terms of changes in wave dynamics, would need to be analyzed.

Water Quality Policy 2 – it is important to note that there are a number of other agencies<sup>14</sup> having authority over a project like this, including the Regional Water Quality Control Board. Policies 6 and 7 would support stormwater swales and native vegetation proposed for the project to protect the adjacent community from pollution.

Fish, Other Aquatic Organisms and Wildlife Policies 1, 2, 3, 4(b). The fish and wildlife policies promote the conservation and restoration of subtidal habitat, mudflats, and tidal marshes. If this project would impact any special-status species, BCDC must coordinate with the state and federal wildlife agencies to protect those species and their habitat.

Water Surface Area and Volume 1, 2. The project proposes a massive amount of fill over a large area, which would reduce the Bay open water area. The policies in the Bay Plan promote open water for its benefits to tidal action and oxygen interchange. Filling should only be allowed for purposes of providing substantial public benefits where there is no reasonable alternative. Furthermore, water circulation should be maintained. The large amount of fill could have impacts on water circulation throughout the Bay.

### **5. Shoreline Protection:**

Shoreline Protection policy 1(e) requires the flood control solution to be incorporated with adjacent solutions. This is not described in the proposal but it is assumed the project would connect with the high points of the adjacent land. This project does get the benefit of Shoreline Protection Policy 4, which encourages “soft shoreline” solutions for flood protection. However, because of the size of the project, the impact of the project on other flood protection mechanisms either adjacent to the site or even in other areas of the Bay would need to be evaluated.

### **6. Climate Change:**

The current proposal is to build a mudflat and adapt to erosional threats as sea levels rise by constructing a beach. This approach would have to show 1) that the beach is actually necessary under 66605(c), 2) that the mudflat is actually at threat of erosion as sea levels rise to 2050, 3) that the beach would provide protection to the end of century.

### **7. Public Access:**

This case study has built in a substantial public access component. The proposed elevators may not necessary satisfy our policies for barrier-free access as they may be impractical (Public Access Policy 7). Additionally, potential public health and safety issues associated with the stairwells and elevators are not anticipated or addressed. It is questionable whether the new public access amenities would be viable as sea levels rise and whether the long-term maintenance plan is fundable. An underserved community would gain a rather large waterfront park.

Views are an issue: The project would remove views completely from any public road and from the landside neighborhoods (Appearance Design and Scenic Views 14). There would obviously be views from the levee top.

### **8. Environmental Justice:**

Under the analysis required in McAteer-Petris Act 66605(a), the adjacent disadvantaged communities would primarily benefit from the flood protection provided as well as public access benefits of the project.

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<sup>14</sup> Refer to Appendix G for a summary of Federal and State Fill policies

Additionally, some of the Water Quality policies protect the adjacent community from pollution from stormwater, although that is the primary jurisdiction of the Regional Water Quality Control Board.

#### **9. Mitigation:**

The project will require substantial mitigation and such a large site would be difficult to find along the Bay shoreline and the current proposal is silent on the mitigation components that would be included to offset the amount of fill proposed. Mitigation should be sited as close to the project as possible (Mitigation Policy 2). The mitigation should also be provided concurrently with the impacts (Mitigation Policy 6). It would be very unlikely that the Commission would accept a fee-based mitigation for something of this size, in part because it would be difficult for the Commission to find a site of adequate size (see Policy 11). A proposal may be considered “self-mitigating” to the extent that the habitat value of the fill is greater than the present habitat values of the site and the impacts of construction. However, this proposal is not “self-mitigating” because the habitat value of the mudflat may not be sufficient to offset the loss of the more valuable subtidal habitats (Mitigation Policy 4, indicating type of habitat impacted and provided by mitigation should be aligned). Mitigation Policies 4 and 7 require that the time delay between the impact and the functioning mitigation must be considered, the fact that the beaches would need to be replenished over time may complicate meeting these policies. In part, this is because the duration of the impact (the incidents of replenishment) may not be predictable. As a result, additional supplemental mitigation to offset impacts from beach replenishment may be necessary over the life of the project.

## Appendix D: Shoreline Community Case Study

### Steering Committee & External Volunteers

**Primary Contributors:** Roger Leventhal, Senior Engineer, Marin County Flood Control & Water Conservation District; Donna Ball, Save The Bay; Kelly Malinowsky, Coastal Conservancy; Jeremy Lowe, San Francisco Estuary Institute.

**Reviewers:** Brad Benson, Port of San Francisco; John Bourgeois, South Bay Salt Pond Restoration Project; Amy Hutzler, California Coastal Conservancy; Anne Morkill, U.S. Fish and Wildlife Service; Salote Soqo, Environmental Coalition for Water Justice.

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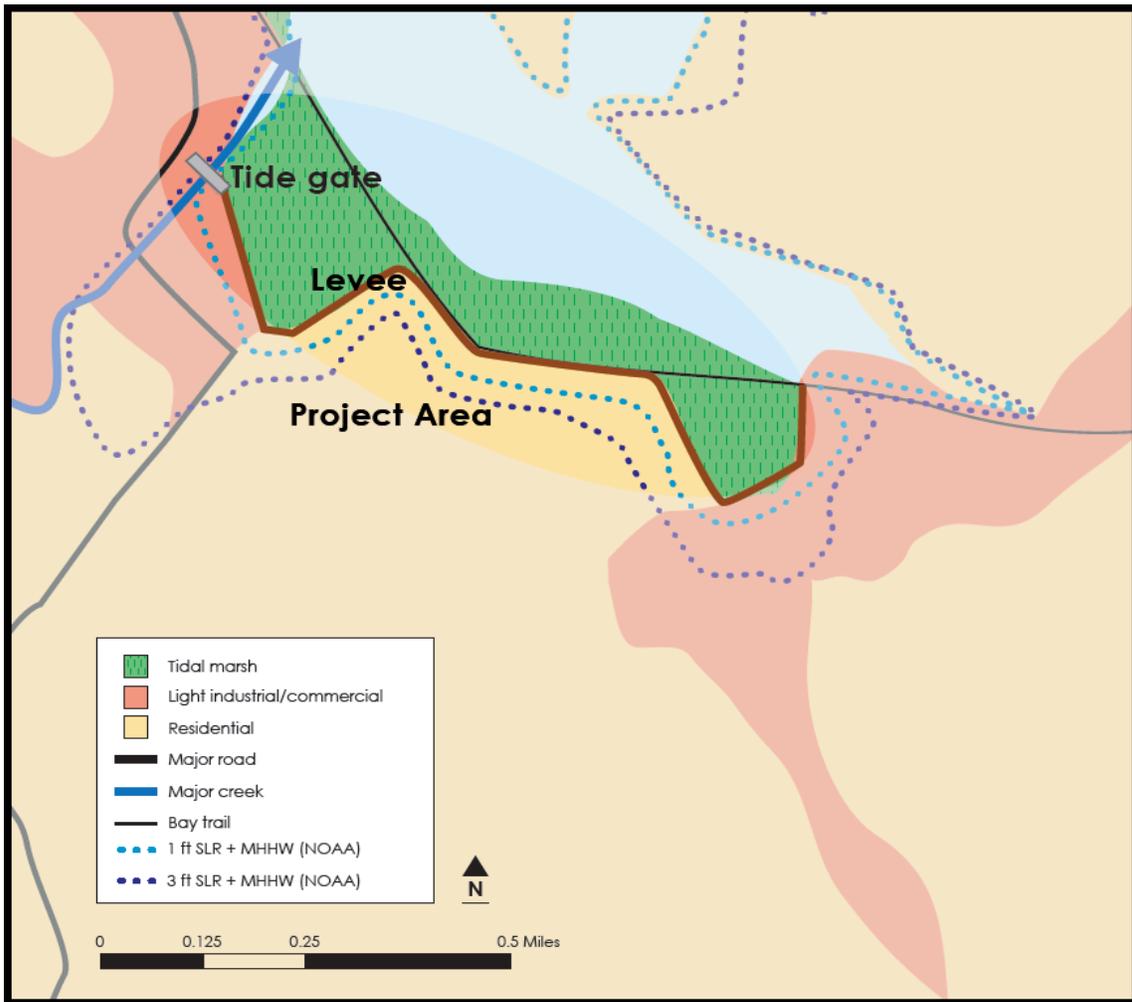
### A. Proposal Description

Applicant: Flood Control Agency

**1. Project purpose and anticipated benefits:** Flood protection for residential and commercial property, and transportation; augmentation of sediment supply to existing marsh.

The purpose of this proposal by the local flood control agency (FCD) is to reduce flood risk for the community and protect other important assets in the area by implementing three sea level rise (SLR) adaptation measures, a high tide gate across the creek; building a horizontal levee at the back of the marsh; and augmenting the sediment supply to the marsh. The tide gate would result in impacts to passage of aquatic species when the gate is closed and the movement of storm water and sediment flows in and out of the creek. The horizontal levee would impact the existing tidal wetlands, as would the sediment augmentation. The FCD intends to protect the low-lying shoreline community and the infrastructure it relies on for public safety during storm events by enhancing the resilience of existing high-quality marsh to sea level rise impacts over time and by building up the levee behind the existing wetland.

This shoreline community includes a large number of residential and commercial properties highly vulnerable to both riverine and coastal flooding. The existing creek levee system of low, earthen berms provides only moderate flood protection (currently providing around the 10-year storm level of protection depending on tide levels) to the adjacent businesses. The lower reaches of the creek are subject to tidal influence and there is an existing narrow fringing tidal marsh along the river bank and a large marsh complex at its mouth and along the Bay front that extends south and north along the Bay shoreline. The marsh is located adjacent to light industrial, commercial and residential areas and thus has no room to migrate landward as sea levels rise. Marsh drowning would impact several listed species (Ridgway Rail, Pt. Reyes bird's-beak and salt marsh harvest mouse). Because much of the development was built on top of former marshland, the streets and houses have subsided up to several feet below high tide elevations and roadways are currently below King Tide elevations at several locations along the shoreline. Outside of the leveed off development, there are large county and regional scale assets that are highly vulnerable to sea level rise including local roadways, water and wastewater infrastructure. As such, the community is highly vulnerable to sea level rise conditions.



**2. Design considerations and alternatives:** To address both immediate and long term flooding concerns along the creek and the shoreline as well as to prepare for a rising Bay, the applicant proposes a) to install a high tide gate in the creek at the upstream end of the existing tidal marsh system; b) build a horizontal flood protection levee; and c) place sediments on top of existing marsh to augment sediment supply to the marsh.

Tide Gate:

The local flood control district has a right of way for levee maintenance along the creek but does not own the levees. Preliminary cost estimates to acquire right of way and raise/build levees and floodwalls along the creek are very high and likely unaffordable by the local community. Furthermore, it is unclear if all property owners will provide right of way for a floodwall. Since flood protection strategies need to be continuous, if even one person does not agree to provide right of way, that makes the floodwall/levee option unworkable. Similarly, land-acquisition to enable channel widening is not viable in this highly developed area where the median home price is over one million dollars. Another option, channel deepening, is not an environmentally desirable option since a deepened channel would change the tidal prism and result in erosion and bank incision. Given these constraints, a tide gate is proposed as a viable alternative to raising/building levees and floodwalls along both sides of the creek, channel widening, and channel deepening. Installing a gate structure in the lower portion of the creek just upstream of where it enters the marsh would prevent the highest tides from migrating up the channel.

The proposed tide gate is a concrete structure with gated culverts that can be manually closed when tides exceed a specified elevation (i.e. elevation 7 ft. NAVD88); the top of the gate (headwall) is proposed at roughly elevation 11 ft. NAVD88. The tide gate will be designed to provide protection up to 3 feet of sea level rise above the MHHW tide with 2 feet of freeboard (i.e. with 3 feet of SLR, the new MHHW tide is equal to 9 ft. NAVD88). The gate would remain closed until the outgoing tide drops to the specified elevation (typically in a few hours). As sea level rises, the gate would close more often

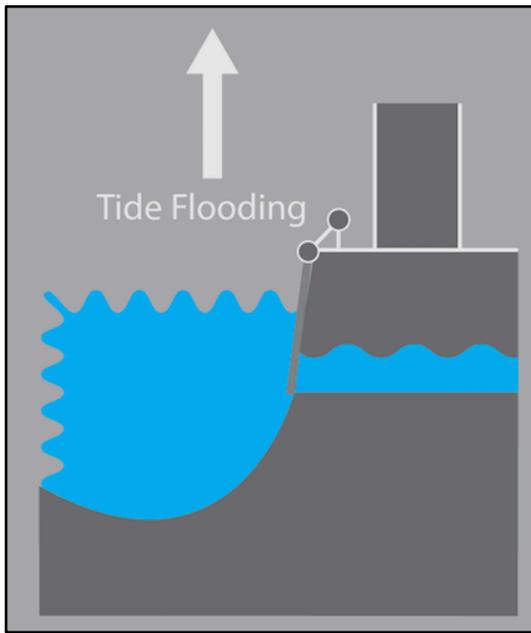


Figure 1: Closed tide gate at flood tide  
Figures adapted from Giannico and Souder.15

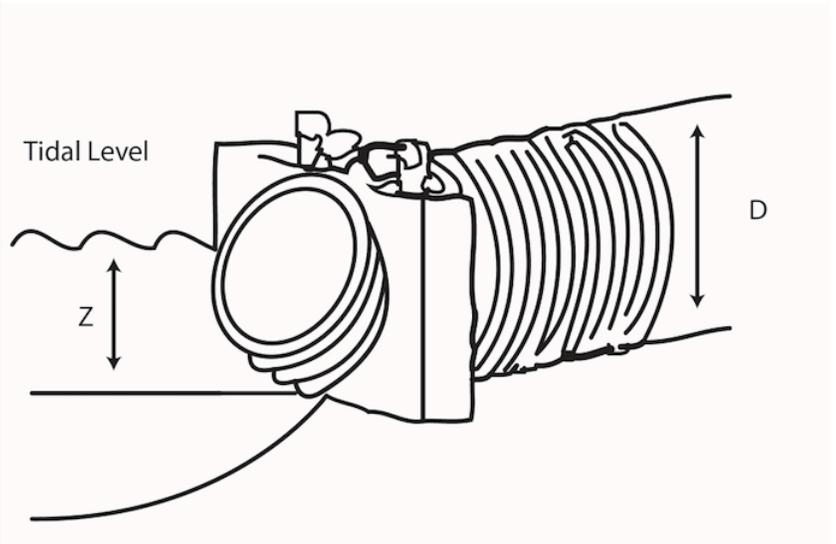


Figure 2: Top hinged tide gate

Scenario	Number of Tide Gate Closures Annually (tides above 7ft. NAVD88*)
Existing conditions	33
12-inches SLR	249
24-inches SLR	569
36-inches SLR	718

\*Analysis based on actual 2014 measured tide data at NOAA GG tide station; 365 gate closures correspond to roughly once a day, whereas 730 gate closures correspond to roughly twice a day

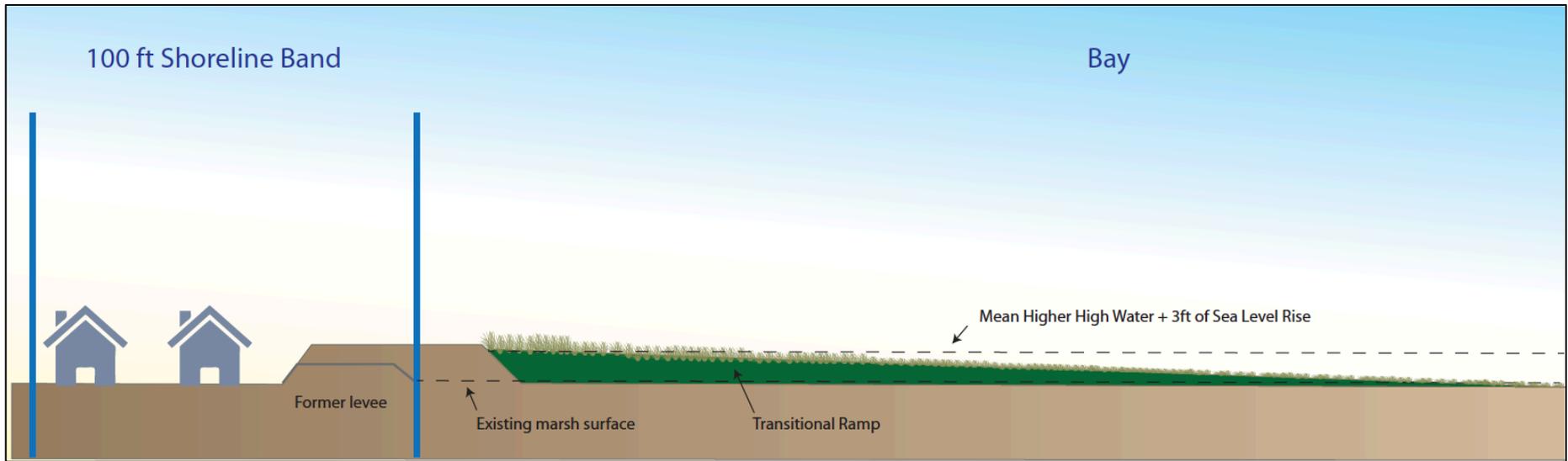
While the creek's watershed size and therefore runoff volume are small, as the gate closes more often, the chances that the closure coincides with a storm event increases. Given the highly developed landscape and a very narrow valley, there is insufficient space for upstream detention. Future flood protection would have to be provided with a series of larger stormwater pumps and possible acquisition of right of way for detention.

Horizontal Levee: A horizontal levee combines an earthen levee that provides flood protection with the enhancement of existing tidal marsh to enable adaptation to sea level rise. The marsh in the project area is currently a healthy and functioning marsh and supports marsh plant species. However, the marsh is showing significant areas of erosion along the outer edge and ponding of some areas due to drowning under current high tide conditions. A preliminary vulnerability analysis by the local flood control district staff shows large areas of significant coastal flooding even under low to moderate scenarios of sea level rise (i.e. 12 inches). Therefore, the existing tidal marsh is highly vulnerable to excessive inundation, loss of habitat and conversion to mudflats, as it has no room to migrate inland. Flood risk is expected to significantly worsen under mid to end-of-century scenarios of sea level rise. It is expected that the marsh would become mudflat at < 3 feet of sea level rise without intervention because of increased water levels and low sediment supply. The community currently pays roughly a million dollars every four years to dredge clean sediment from the creek and haul it to a landfill. The FCD can use the dredged sediment from the creek for the proposed project and to maintain marsh plain elevations.

To protect the development from 3 feet of sea level rise, the FCD will import fill as needed to build a horizontal levee across the landside of the marsh. The horizontal levee would cover sixty-nine acres (using 555,555 cubic yards) of fill over 10,000 linear feet along the adjoining flood protection levee. The 69 acres of fill includes 6 acres of fill (46,296 cubic yards) to construct the new-engineered levee to 16 feet NAVD88. The levee and transitional ramp will have a 30:1 slope, and fill will be placed over 300 feet from the landward edge of the existing marsh towards the Bay. It is estimated that at least 25% of the marsh will be impacted by the horizontal levee. The site will be actively seeded and it is expected that the raised areas of tidal marsh would revegetate completely and come back to improved health and function along the new high marsh and transition zone as sea level rises.

Sediment Augmentation: In an effort to increase sediment supply to the marsh and reuse sediment dredged from the creek, on a biannual basis, sediment would be placed on the marsh from the bayward edge inboard to increase the vertical accretion of the marsh within the tidal frame. It is anticipated that the tides will redistribute the sediments along the outer portion of the marsh.

Public Access: Eventually the much used bike and pedestrian pathway will be rebuilt and possibly relocated on top of the new-engineered structure behind the transition zone. We anticipate that public access will remain viable over the sediment placement period though restrictions on pathway usage will be needed. Eventually sea level rise impacts may require relocation of the pathway.



### 3. Anticipated short- and long-term impacts:

Tide gate impacts: Once the gate is in place, upstream and downstream impacts to natural resources are expected. Once sea level rise is higher than 2 feet, gate closure will be more frequent and could result in more significant impacts, and fluvial flooding.

- Hydrology: When the gate is closed, it will reduce the brackish transition zone between the riparian habitat and the salt marsh and result in vegetation loss. It will also affect the exchange of fresh and salt water, and sediments, changing the associated local water circulation patterns. Moreover, the pattern of freshwater discharge, velocity, turbidity, nutrient loading and water temperatures will also change. The temperature difference can vary from 5-15 degrees below and above the gate, which represents a barrier for fish. Disruption of fish passage will only be an issue while the gate is closed, which early on would be a short period of time. Operational strategies will be implemented to reduce the number of gate closures.
- Water quality: Restriction of tidal inflow may result in short-term water quality problems. While the gate is closed, the reduction of brackish water in the upland channel may result in salinity differences.
- Habitat & wildlife: The changes in salinity, sediment deposits and temperature will alter the habitat, and may cause vegetative change and/or loss. The closure of the tide gate would impact species that transition between these areas, and will likely affect the juvenile species that use these areas. Additionally, there are eelgrass beds in the adjacent mudflats and subtidal shoals. While all the eel grass in the area is outside of the tidal barrier and will not be affected by the tide gate, the loss of sediment to the mudflats may over time reduce subtidal elevations so that eel grass may become less viable. The building of the gate could result in the removal of portions of the marsh.
- Sediment transport: Gate closures could result in more upstream sedimentation and sediment loss downstream and in the marsh. However, this is also an impact of a higher bay tide level.

Horizontal levee impacts: The project is designed to beneficially reuse dredged material to promote habitat to assist the higher marsh in reaching appropriate elevations to adapt to sea level rise but short-term impacts are expected.

- Habitat: The project would result in a temporary net loss of marsh depending on fill thickness placement depths and the marsh vegetation response.
- Wildlife: Raising the levee will result in a substantial physical barrier along the shoreline resulting in loss of connectivity between habitats. The marsh currently provides habitat for marsh-dependent species, such as the Ridgway Rail and salt marsh harvest mouse. The levee and transition habitat may increase predator access to the marsh. Avoidance and minimization measures will be implemented to reduce impacts, including conducting all construction activities within the species-specific and in-water construction windows. Since it is expected that without intervention the marsh will drown, this project provides the opportunity to maintain species habitat over a longer period of time.
- Public access: Raising the levee will result in a substantial physical barrier along the shoreline resulting in loss of connectivity and visual access to the shoreline. The slow rise in bay tide levels allows the project to more slowly build the levee in phases over time. During construction, the existing public access along the shoreline will be relocated temporarily and eventually the bike and pedestrian pathway will be rebuilt and relocated on top of the newly engineered structure behind the transition zone. The details of this transition have to be worked out with the community and Parks

district.

#### 4. Maintenance, monitoring, and adaptive management:

- Tide gate: The tide gate will be designed to provide protection to 3 feet of sea level rise above the MHHW tide with 2 feet of freeboard. Since the gate cannot be easily adapted for higher water levels, when additional flood protection is necessary, a planning process would begin to address those needs.
- Horizontal levee: The levee system will be built gradually using dredged sediment and import fill. An adaptive management plan will be developed identifying monitoring activity, restoration targets, expected time frames for decision-making, and management triggers to determine when restoration activities are not performing as expected. Some issues that may require adaptive management include vegetation establishment, invasive species, erosion, flooding, and others. Adequate measures will be undertaken to control and eradicate invasive plant species.

#### B. Assumptions

- The amount of fill to be placed would be larger than BCDC has previously permitted for these types of projects.
- 66605 – (b) There is no alternative location for the purpose of this project.
- 66605 – (e) The project will be constructed according to sound safety standards.
- 66605 – (g) The applicant has valid title to the site.

## Shoreline Community Case Study – BCDC Staff Analysis

This is an analysis of the Shoreline Community Case Study for the Policies for a Rising Bay Project, applying the McAteer-Petris Act and San Francisco Bay Plan policies to the case study and identifying issues that may arise in complying with these laws and policies. This analysis raises the primary policy challenges and does not address every possible policy issue. This review of a hypothetical case study should not be interpreted as commenting on a real or proposed project and is for policy planning purposes only. It should be noted that in this scenario, as with all BCDC review, marsh habitat is viewed as “Bay” and therefore is subject to Bay jurisdiction and policies rather than shoreline band.

### Summary of Policy Analysis

This summary focuses on key policy issues and is followed by a detailed description of how the Commission’s laws and policies may apply to the case study. The sea level rise strategy in this case study includes three components: a high tide gate, a horizontal levee, and augmentation of the marsh plain with dredged sediments from the creek.

The purpose of the tide gate is to protect light industrial and commercial properties along the creek from flooding. The high tide gate would impact the exchange of fresh and salt water, impede sediment flows, and result in significant impacts on wildlife connectivity and processes that support healthy habitats. This strategy is at odds with the Bay Plan Policies that call for the protection of species, habitat, and physical processes. Moreover, it is difficult to justify the projected impacts for near-term flood protection benefits, as it is unlikely that the tide gate is a viable strategy in the long-term. It is likely that mitigation would be required for the unavoidable impacts of the gate.

The horizontal levee would provide flood protection and adds transitional habitat to the back quarter of the marsh to provide vertical elevation capital for sea level rise impacts. This proposal would impact 69 acres of existing healthy marsh, which would be in conflict with the Bay Plan policies that call for the preservation of existing habitat, including tidal marsh and endangered species habitat. Given the impacts to existing habitat and expected time lag in habitat development, the project may not be considered self-mitigating, and as such would result in required mitigation.

The scenario also includes sediment augmentation of the marsh by reusing dredged sediments from the creek. This component would be viewed as beneficial reuse of sediment but there may be concerns regarding the temporal loss of habitat within the creek. Sediment augmentation may qualify as self-mitigating as it would enhance habitat and allow for adaptation to sea level rise while providing immediate habitat benefits.

Numerous Bay Plan policies would apply to this case study but policy consistency would depend on the details of the project and how it would be implemented. A project that proposes strategies of this nature would need to provide more in depth information to accurately weigh the flood protection benefits against the short-term and long-term detriments to area and the Bay as a region.

**Applicable BCDC Laws and Policies:**

McAteer Petris Act Sections 66601, 66605, and 66632  
Relevant San Francisco Bay Plan Policies  
Fish, Other Aquatic Organisms and Wildlife (1, 2, & 4)  
Water Quality (1, & 2)  
Water Surface Area and Volume (1, 2 & 3)  
Tidal Marsh and Tidal Flats (1, 2, 3, 5, 6 & 8)  
Climate Change (1, 2, 3, 5 & 7)  
Safety of Fill (1, 2, & 4)  
Shoreline Protection (1, 3, 4, & 5)  
Dredging (2, 3, 4, & 11)  
Public Access (1, 2, 5)  
Appearance, Design and Scenic Views (2)  
Fill in Accord with the Bay Plan (1)  
Mitigation (All)

**Tide Gate:** In this scenario, a tide gate is proposed across a creek bed adjacent to a marsh. Currently, there are low earthen berms along either side of the creek. According to the scenario, the creek already floods on a regular basis. The purpose of the tide gate is to reduce flooding of commercial and light industrial properties adjacent to the creek. The local flood protection agency has an easement along the creek, but does not own the property where a floodwall or larger levee system would be helpful.

The primary issues associated with this portion of the project consist of impacts to physical processes that create and maintain habitat features. As reviewed, flow of fresh and salt water as well as sediment would be initially reduced under existing conditions, and then greatly reduced over time (See tide gate closure chart). The initial reduction would cut off the highest tides of the year, affecting brackish habitat upstream. Under current conditions with an El Nino year, the tide gate closures would be nearly identical to one foot of sea level rise, and as a result would cut off the highest tide on a nearly daily basis. By two feet of sea level rise, both high tides would be eliminated approximately two-thirds of the time, and by three feet, there would be almost no tidal influence in this creek. The results of this flow impediment would reduce sediment flow both to the creek from the Bay, and to the existing marsh and adjacent mudflats, compounding the shore and marsh erosion issues. Further, dissolved oxygen and nutrient flow would also be affected, at an increasing rate over time. It should also be noted that the tide gate would likely fail over time and significant flooding could occur, and as sea level rises, the tide gate and adjacent flood protection systems would need to continue to grow.

BCDC Bay Plan policies that address this type of scenario include Fish, Other Aquatic Organisms and Wildlife; Tidal Marshes and Tidal Flats; Water Quality; Water Surface Area and Volume; Climate Change; Shoreline Protection; and Mitigation. In reviewing the relevant policies for this portion of the project, it does not appear that this would be an innovative measure to protect from sea level rise, but rather a strategy that has been in place for quite some time and has been recognized to have significant impacts both on wildlife connectivity and physical processes that support healthy habitats, particularly in the transition between fresh and marine waters that is important to specific species and portions of life cycles. Specific Bay Plan policies

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. Laws and policies referenced here are included at the end of this document

direct the Commission to protect species and habitat, as well as physical processes that ensure ecological functions.

On water quality, the creek and adjacent marsh are likely brackish oriented habitat. Putting in place a barrier, such as a tide gate, would likely create more lagoon-like conditions over time, with associated lower dissolved oxygen, and higher nutrient loading from the creek with little output, potentially causing algal blooms. It is also likely that the barrier would increase sedimentation on the creek side, creating the need for additional dredging of the creek. Less sediment would be able to pass through the tide gate, creating a sediment deficit on the Bay side of the structure that could lead to more erosion of the marsh and mudflats and adjacent shoreline. As understanding of the need for watershed connectivity to the Bay is improved, managers are recognizing the need for fluvial sediment supply connections to the marsh. This connectivity allows for sediments to be deposited within the marsh.

In addition, this appears to be a stop-gap measure as sea level rise would likely make this project obsolete within a few decades or a larger tide gate would be necessary in the future. Also, there does not appear to be any tie in to existing shoreline, so it is questionable how effective it will be. The community would need to consider managed retreat along the creek bed where the head of tide interfaces with the riparian flow. There are also concerns that large precipitation events could overwhelm the tide gate from the landside, causing flooding of the residences along the creek, separate from the tidal flow.

Regarding mitigation, because this portion of the scenario would impact tidal habitat, and thereby species, it is likely that the Commission would seek mitigation for the impacts that cannot be avoided or minimized. This could prove challenging, as discussed above, creek/bay interfaces are limited and difficult to create and/or mitigate for.

During the discussion with the subcommittee, it was noted by members that they felt that Water Surface Area and Volume policy 1 is antiquated due to sea level rise issues.

**Horizontal Levee:** This aspect of the scenario involves building a flood protection levee to protect a mixed commercial and residential community behind a healthy marsh. The proposal places a horizontal levee that provides transitional habitat into the existing marsh where none currently exists. In building this scenario, 69 acres of marsh would be impacted, which equates to approximately twenty-five percent of the total existing marsh. The height of the levee would be fifteen feet NAVD88. Because the existing community was built on historic marshlands, it is subsided and below sea level now. The public access trail runs through the marsh and currently floods during higher tides.

BCDC Bay Plan policies that address this portion of the scenario include Fish, Other Aquatic Organisms and Wildlife; Tidal Marshes and Tidal Flats; Water Surface Area; Water Quality; and Volume; Climate Change; Safety of Fills; Shoreline Protection; Appearance, Design, and Scenic Views; Fill in Accord with the Bay Plan; and Mitigation.

The main driver in this portion of the scenario would be the loss of existing tidal marsh habitat where the horizontal levee and transition zone would cover existing vegetation and habitat. It is recognized that over an undefined period of time, sea level will rise and create more marsh along the gradient of the transitional slope. However, the loss of very limited marsh and endangered species habitat at the outset is a key issue in this proposal. Water surface area and volume, water quality, tidal marsh and fish and wildlife policies all direct the Commission to preserve existing habitat and specifically call out tidal marsh and endangered species habitat.

Further, while the shoreline protection policies support new protection projects that protect existing communities they also direct the Commission to ensure the proposed project is appropriate for the specific

site; it is integrated with the existing program and that it avoids and minimizes impacts to natural resources at the site. Destruction of existing habitat would likely result in required mitigation for the loss, unless the project was considered self-mitigating. Both the shoreline protection policies and the mitigation policies require mitigation when impacts cannot be avoided. Due to the likely timeframe of habitat development along the transition zone, it is possible that this portion of the scenario would not be considered self-mitigating.

The horizontal levee concept is consistent with shoreline protection policies that encourage “soft shoreline” solutions for flood protection, as well as innovative climate changes solutions. Tidal Marsh Policy 3 supports the development of transition habitat, but encourages its placement between tidal and upland habitats. This scenario places the transitional habitat within the tidal frame. For this reason, and the requirement to seek other alternative locations, other solutions would need to be evaluated.

The horizontal levee proposed in this scenario would eliminate views completely from the residential and commercial area and the public road (Appearance, Design and Scenic Views 2 & 14). While flood protection is an extremely important feature of any community, the scenic views to the Bay are highly valued as reflected in property values of those with views to the Bay, and should be considered in such proposal. Once the trail is relocated to the levee top, there would be views to the Bay from there.

During the subcommittee discussion, a member asked whether a phased approach to building the levee would work better with the policies? There was a limited discussion in response, and it is possible that phasing may be a better approach over time, the question of impacting existing habitat and providing the appropriate level of flood protection remains. An analysis of costs and impacts over time would need to be developed. Consideration of managed retreat would also need to be considered in this regard.

**Sediment Augmentation:** As part of this scenario, the marsh plain would be augmented with sediments dredged from the creek on a multi-year basis (once every four years). This would both assist the marsh in keeping up with sea level rise and provide a potentially less expensive disposal option for the flood protection agency. According to the scenario, the sediment would be placed along the bay side of the marsh and be allowed to move with tidal action into adjacent portions of the marsh.

BCDC Bay Plan policies that address this portion of the scenario include Fish, Other Aquatic Organisms and Wildlife; Tidal Marshes and Tidal Flats; Water Quality; Climate Change; Dredging; Shoreline Protection; Fill in Accord with the Bay Plan; and Mitigation. The biggest questions here are: (1) how much sediment would be placed; (2) at what thickness; (3) over how large of an area; and (4) whether the quality of the sediment is appropriate for this setting, both in grain size and chemical composition. These answers to these questions inform how the policies would be applied in this scenario. The tidal marsh policies allow for a “minor amount of fill” for habitat purposes, and in this scenario the sediment augmentation may fit the finding of minor fill. It appears clear that the reason for placing the fill in the marsh is to both assist the marsh in adapting to sea level rise and providing some high tide refugia for species. The placement method may be specified to be in thin layers, thin enough to allow marsh vegetation and benthic community to “dig out” or spring back from the initial burial. In addition, the volume would need to be deemed minor by the Commission and this analysis is fairly project specific, including the overall acreage affected, time necessary to recover, persistence of the sediment and other factors.

The Water Quality and Dredging Policies would come into play in the dredging of the creek and beneficial reuse of the sediment. The Commission would likely view this component as a clear beneficial reuse, as long as the sediment has appropriate physical and chemical composition. Because the sediment would be placed in an aquatic environment, it would need to be tested to show that it was free from elevated levels of contaminants that would affect the ecology of the marsh. There may be some concern regarding the

temporal loss of habitat within the creek itself, so measures may be required to reduce impacts, such as planting vegetation after the creek is dredged.

There is some question as whether or not mitigation would be required for this portion of the project. Because it is enhancing existing habitat, as well as providing an adaptation measure for sea level rise, it would likely be viewed as self-mitigating.

**Public Access:** While not a highlighted feature of this scenario, public access would need to be addressed. As the scenario is described, the trail currently runs through the marsh and floods periodically. In building the horizontal levee there does not appear to be any impact to the trail. However, as sea level rises, the trail would likely need to be re-routed to a new alignment. This alignment may be on top of the levee, and therefore should be planned as a component of the scenario. If this is the case, there may need to be some additional access points to the top of the levee from the adjacent landside properties. If it is realigned to a different location, perhaps behind the levee, there may be view impacts associated with putting the trail behind a high level.

Consideration of the public access in this scenario would involve Public Access; and Appearance, Design, and Scenic Views policies. During the discussion with the small workgroup, concern was expressed that BCDC should consider revising public access policies in light of the need to breach salt ponds and other baylands, which in some cases results in reductions in existing public access to the Bay, but provides wildlife benefits.

In discussions with the Steering Committee subcommittee, the members noted that the Public Access policies represent a barrier for restoration work, particularly when breaching existing levees where there is existing public access. When a levee is breached, either it is not possible to bridge the levee to continue the access or due to the restoration work, there may be conflicts with wildlife use of the area and public access (e.g. salt pond project). In these instances, there may be a net reduction of public access. This concern led some Steering Committee members to recommend that BCDC take a harder look at the Public Access policies in light of sea level rise.

**Public Benefits v. Public Detriment:** This test stems directly from the McAteer-Petris Act, and is initially found in Section 66605, but then is further described in Section 66632(f), which states: “A permit shall be granted for a project if the commission finds and declares that the project is either (1) necessary to the health, safety or welfare of the public in the entire bay area, or (2) of such a nature that it will be consistent with the provisions of this title and with the provisions of the San Francisco Bay Plan then in effect.” This means that either a project is fully consistent with the Commission’s laws and policies as in (2); or the importance of the project is such that it may not be fully consistent with the laws and policies, but should be authorized for the benefit of the region, as in (1). In many cases, readers consider the public benefits at the site, or community level, but the test is actually at the regional level. Is it so important to protect this area, that the region is willing to lose a percentage of existing tidal marsh? Or is managed retreat a reasonable option here, such that the marsh can be protected? And if yes to either, are there other locations in the Bay that would similarly be important to protect either the community asset or the habitat asset? How, then does the Commission decide when it is ok to reduce the remaining marsh habitat in favor of protecting housing or commercial properties, when sea level rise would likely continue to impact these areas? This is where the larger regional planning becomes an important piece prior to impacting either habitat or communities. In this scenario, the public benefits of a horizontal levee include flood protection for residents and commercial property in an affluent area. Detriments here include substantial habitat loss of an extremely limited habitat that has endangered species. The transition zone would provide limited habitat benefit initially, but over time may

provide additional habitat benefits. At what point and how much marsh habitat would be provided is somewhat unknown.

The sediment augmentation portion of the scenario, if placed gradually has more likelihood that it would improve marsh habitat over time, providing limited high tide refugia initially, but then as it is reworked by the tides, provide elevation capital as sea level rises. This may not be viewed as a detriment even in the initial placement due to the recognized need for high tide refugia and additional sediment supply to the marsh.

**Mitigation** (all policies appear applicable to this project): The project will require mitigation for loss of 69 acres of existing tidal marsh and some acreage of marsh along the creek, as well as creek bed impacts, which are unknown at this time. BCDC normally requires in-kind mitigation for impacts to marshes at a rate of 3:1, which may be difficult for this project to provide. Policies also require that mitigation should be sited as close to the project as possible and be provided prior to or concurrently with the project to reduce loss of marsh overall. The project itself does not currently propose mitigation components, but some discussion/consideration could be given for the marsh that would be developed over time, but this is challenging analysis as there is little way of determining how much marsh would develop and when. It would be very unlikely that the Commission would accept a fee-based mitigation for something of this size, in part because most of the available land is already in restoration processes. The proposal is not necessarily “self-mitigating” because the horizontal levee may not be sufficient to offset the loss of the more valuable existing marsh habitat. At least a portion of the project would likely be upland for quite some time. Because there is no information regarding the physical space and impacts the tide gate will create, it is difficult to assess the potential mitigation for this portion of the project at this time.

It is important to note that the Regional Water Quality Control Board, Army Corps of Engineers, U.S. Fish and Wildlife and California Fish and Wildlife all have jurisdiction in this area and would need to provide a permit for this work as well.

Other Points of Discussion: Along with the discussion points embedded above, subcommittee members also discussed the following questions:

How do you balance among the different policies? Does one policy trump another?

Staff responded that the relevant policies are applied to the project and there is no inherent hierarchy of the policies. Staff does the best it can to balance the policy review in light of benefits and detriments of the proposed projects, and present the Commission with the rationale and policy basis for the recommendations provided. The Commission has to make the final decision regarding whether the staff provided the right balance and approach to the proposed project.

This analysis does not reflect whether the staff would recommend changing the policies discussed, but simply that there is a potential issue with the proposed scenario.

**Additional Information Needed:** Prior to reviewing the project for policy issues, the technical details of the project description were explored. Because this project is only a scenario, it is understood that some details must be imagined but due to the nature of this project, technical details are extremely important to the policy analysis. The following list represents information needed to process such a project. While an attempt was made to be thorough, there maybe other information needed should a project like this come before the Commission.

1. The project description needs to be clarified - As written, it is still unclear how the horizontal levee will be built, and what role the sediment augmentation has
2. Clarify datum used & relationship between the landscape and proposed project elevation

3. Determine location of head of tide & BCDC jurisdiction within the project and creek
4. Provide creek hydrographs and predictions under rising seas, storm surge and increased precipitation, both with and without project
5. Wildlife presence and use of habitat
6. Sediment transport and water flux
7. Geotechnical analysis of proposed levee, especially the ability of soft Bay muds to support fill
8. Construction phasing
9. Equipment use
10. Seasonal limitations for work
11. Periods of addition of sediment placement either to transition zone and/or marsh edge
12. Volume of sediment dredged and placed
13. Sediment quality (physical & chemical) of sediments proposed for use in the marsh

#### **Applicable BCDC Laws and Policies:**

##### McAteer-Petris Act

66601. Findings and Declarations as to Threat of Uncoordinated, Haphazard Filling. The Legislature further finds and declares that uncoordinated, haphazard filling in San Francisco Bay threatens the bay itself and is therefore inimical to the welfare of both present and future residents of the area surrounding the bay; that while some individual fill projects may be necessary and desirable for the needs of the entire bay region, and while some cities and counties may have prepared detailed master plans for their own bay lands, a governmental mechanism must exist for evaluating individual projects as to their effect on the entire bay; and that further piecemeal filling of the bay may place serious restrictions on navigation in the bay, may destroy the irreplaceable feeding and breeding grounds of fish and wildlife in the bay, may adversely affect the quality of bay waters and even the quality of air in the bay area, and would therefore be harmful to the needs of the present and future population of the bay region.

66605. Findings and Declarations as to Benefits, Purposes and Manner of Filling. The Legislature further finds and declares:

- (a) That further filling of San Francisco Bay and certain waterways specified in subdivision (e) of Section 66610 should be authorized only when public benefits from fill clearly exceed public detriment from the loss of the water areas and should be limited to water-oriented uses (such as ports, water-related industry, airports, bridges, wildlife refuges, water-oriented recreation, and public assembly, water intake and discharge lines for desalinization plants and power generating plants requiring large amounts of water for cooling purposes) or minor fill for improving shoreline appearance or public access to the bay;
- (b) That fill in the bay and certain waterways specified in subdivision (e) of Section 66610 for any purpose should be authorized only when no alternative upland location is available for such purpose;
- (c) That the water area authorized to be filled should be the minimum necessary to achieve the purpose of the fill;
- (d) That the nature, location, and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources, or other conditions impacting the environment, as

defined in Section 21060.5 of the Public Resources Code;

(e) That public health, safety, and welfare require that fill be constructed in accordance with sound safety standards which will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters;

(f) That fill should be authorized when the filling would, to the maximum extent feasible, establish a permanent shoreline;

(g) That fill should be authorized when the applicant has such valid title to the properties in question that he or she may fill them in the manner and for the uses to be approved.

66632. Permit for Fill, Extraction of Materials, or Substantial Change in Use of Land, Water, or Structure; Application for Permits....

(f) The commission shall take action upon an application for a permit, either denying or granting the permit, within 90 days after it files the application. The permit shall be automatically granted if the commission shall fail to take specific action either denying or granting the permit within the time period specified in this section. A permit shall be granted for a project if the commission finds and declares that the project is either (1) necessary to the health, safety or welfare of the public in the entire bay area, or (2) of such a nature that it will be consistent with the provisions of this title and with the provisions of the San Francisco Bay Plan then in effect. To effectuate those purposes, the commission may grant a permit subject to reasonable terms and conditions including the uses of land or structures, intensity of uses, construction methods and methods for dredging or placing of fill.

Fish, Other Aquatic Organisms and Wildlife (1, 2 & 4)

1. To assure the benefits of fish, other aquatic organisms and wildlife for future generations, to the greatest extent feasible, the Bay's tidal marshes, tidal flats, and subtidal habitat should be conserved, restored and increased.

2. Specific habitats that are needed to conserve, increase or prevent the extinction of any native species, species threatened or endangered, species that the California Department of Fish and Game has determined are candidates for listing as endangered or threatened under the California Endangered Species Act, or any species that provides substantial public benefits, should be protected, whether in the Bay or behind dikes.

4. The Commission should:

(a) Consult with the California Department of Fish and Game and the U.S. Fish and Wildlife Service or the National Marine Fisheries Service whenever a proposed project may adversely affect an endangered or threatened plant, fish, other aquatic organism or wildlife species;

(b) Not authorize projects that would result in the "taking" of any plant, fish, other aquatic organism or wildlife species listed as endangered or threatened pursuant to the state or federal endangered species acts, or the federal Marine Mammal Protection Act, or species that are candidates for listing under the California Endangered Species Act, unless the project applicant has obtained the appropriate "take" authorization from the U.S. Fish and Wildlife Service, National Marine Fisheries Service or the California Department of Fish and Game; and

(c) Give appropriate consideration to the recommendations of the California Department of Fish and Game, the National Marine Fisheries Service or the United States Fish and Wildlife Service in order to avoid possible adverse effects of a proposed project on fish, other aquatic organisms and wildlife habitat.

#### Water Quality (1 & 2)

1. Bay water pollution should be prevented to the greatest extent feasible. The Bay's tidal marshes, tidal flats, and water surface area and volume should be conserved and, whenever possible, restored and increased to protect and improve water quality. Fresh water inflow into the Bay should be maintained at a level adequate to protect Bay resources and beneficial uses.

2. Water quality in all parts of the Bay should be maintained at a level that will support and promote the beneficial uses of the Bay as identified in the San Francisco Bay Regional Water Quality Control Board's Water Quality Control Plan, San Francisco Bay Basin and should be protected from all harmful or potentially harmful pollutants. The policies, recommendations, decisions, advice and authority of the State Water Resources Control Board and the Regional Board, should be the basis for carrying out the Commission's water quality responsibilities.

#### Water Surface Area and Volume (1, 2 & 3)

1. The surface area of the Bay and the total volume of water should be kept as large as possible in order to maximize active oxygen interchange, vigorous circulation, and effective tidal action. Filling and diking that reduce surface area and water volume should therefore be allowed only for purposes providing substantial public benefits and only if there is no reasonable alternative.

2. Water circulation in the Bay should be maintained, and improved as much as possible. Any proposed fills, dikes, or piers should be thoroughly evaluated to determine their effects upon water circulation and then modified as necessary to improve circulation or at least to minimize any harmful effects.

3. Because further study is needed before any barrier proposal to improve water circulation can be considered acceptable, the Bay Plan does not include any barriers. Before any proposal for a barrier is adopted in the future, the Commission will be required to replan all of the affected shoreline and water area.

#### Tidal Marsh and Tidal Flats (1, 2, 3, 5, & 8)

1. Tidal marshes and tidal flats should be conserved to the fullest possible extent. Filling, diking, and dredging projects that would substantially harm tidal marshes or tidal flats should be allowed only for purposes that provide substantial public benefits and only if there is no feasible alternative.

2. Any proposed fill, diking, or dredging project should be thoroughly evaluated to determine the effect of the project on tidal marshes and tidal flats, and designed to minimize, and if feasible, avoid any harmful effects.

3. Projects should be sited and designed to avoid, or if avoidance is infeasible, minimize adverse impacts on any transition zone present between tidal and upland habitats. Where a transition zone does not exist and it is feasible and ecologically appropriate, shoreline projects should be designed to provide a transition zone between tidal and upland habitats.

5. The Commission should support comprehensive Bay sediment research and monitoring to understand sediment processes necessary to sustain and restore wetlands. Monitoring methods should be updated periodically based on current scientific information.

8. Based on scientific ecological analysis and consultation with the relevant federal and state resource agencies, a minor amount of fill may be authorized to enhance or restore fish, other aquatic organisms or wildlife habitat if the Commission finds that no other method of enhancement or restoration except filling is feasible.

## Climate Change (1, 2, 3, 5, & 7)

1. The Commission intends that the Bay Plan Climate Change findings and policies will be used as follows:

(a) The findings and policies apply only to projects and activities located within the following areas: San Francisco Bay, the 100-foot shoreline band, salt ponds, managed wetlands, and certain waterways, as these areas are described in Government Code section 66610, and the Suisun Marsh, as this area is described in Public Resources Code section 29101;

(b) For projects or activities that are located partly within the areas described in subparagraph a and partly outside such area, the findings and policies apply only to those activities or that portion of the project within the areas described in subparagraph a;

(c) For the purposes of implementing the federal Coastal Zone Management Act, the findings and policies do not apply to projects and activities located outside the areas described in subparagraph a, even if those projects or activities may otherwise be subject to consistency review pursuant to the federal Coastal Zone Management Act; and

(d) For purposes of implementing the California Environmental Quality Act, the findings and policies are not applicable portions of the Bay Plan for purposes of CEQA Guideline 15125(d) for projects and activities outside the areas described in subparagraph a and, therefore, a discussion of whether such proposed projects or activities are consistent with the policies is not required in environmental documents.

2. When planning shoreline areas or designing larger shoreline projects, a risk assessment should be prepared by a qualified engineer and should be based on the estimated 100-year flood elevation that takes into account the best estimates of future sea level rise and current flood protection and planned flood protection that will be funded and constructed when needed to provide protection for the proposed project or shoreline area. A range of sea level rise projections for mid-century and end of century based on the best scientific data available should be used in the risk assessment. Inundation maps used for the risk assessment should be prepared under the direction of a qualified engineer. The risk assessment should identify all types of potential flooding, degrees of uncertainty, consequences of defense failure, and risks to existing habitat from proposed flood protection devices.

3. To protect public safety and ecosystem services, within areas that a risk assessment determines are vulnerable to future shoreline flooding that threatens public safety, all projects—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—should be designed to be resilient to a mid-century sea level rise projection. If it is likely the project will remain in place longer than mid-century, an adaptive management plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century.

5. Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.

7. Until a regional sea level rise adaptation strategy can be completed, the Commission should evaluate each project proposed in vulnerable areas on a case-by-case basis to determine the project's public benefits, resilience to flooding, and capacity to adapt to climate change impacts. The following specific types of projects have regional benefits, advance regional goals, and should be encouraged, if their regional benefits and their advancement of regional goals outweigh the risk from flooding:

(a) remediation of existing environmental degradation or contamination, particularly on a closed military base;

(b) a transportation facility, public utility or other critical infrastructure that is necessary for existing development or to serve planned development;

(c) a project that will concentrate employment or housing near existing or committed transit service (whether by public or private funds or as part of a project), particularly within those Priority Development Areas that are established by the Association of Bay Area Governments and endorsed by the Commission, and that includes a financial strategy for flood protection that will minimize the burdens on the public and a sea level rise adaptation strategy that will adequately provide for the resilience and sustainability of the project over its designed lifespan; and

(d) a natural resource restoration or environmental enhancement project.

The following specific types of projects should be encouraged if they do not negatively impact the Bay and do not increase risks to public safety:

(e) repairs of an existing facility;

(f) a small project;

(g) a use that is interim in nature and either can be easily removed or relocated to higher ground or can be amortized within a period before removal or relocation of the proposed use would be necessary; and

(h) a public park.

#### Safety of Fills (1, 2, & 4)

1. The Commission has appointed the Engineering Criteria Review Board consisting of geologists, civil engineers specializing in geotechnical and coastal engineering, structural engineers, and architects competent to and adequately empowered to: (a) establish and revise safety criteria for Bay fills and structures thereon; (b) review all except minor projects for the adequacy of their specific safety provisions, and make recommendations concerning these provisions; (c) prescribe an inspection system to assure placement and maintenance of fill according to approved designs; (d) with regard to inspections of marine petroleum terminals, make recommendations to the California State Lands Commission and the U.S. Coast Guard, which are responsible for regulating and inspecting these facilities; (e) coordinate with the California State Lands Commission on projects relating to marine petroleum terminal fills and structures to ensure compliance with other Bay Plan policies and the California State Lands Commission's rules, regulations, guidelines and policies; and (f) gather, and make available performance data developed from specific projects. These activities would complement the functions of local building departments and local planning departments, none of which are presently staffed to provide soils inspections.

2. Even if the Bay Plan indicates that a fill may be permissible, no fill or building should be constructed if hazards cannot be overcome adequately for the intended use in accordance with the criteria prescribed by the Engineering Criteria Review Board.

4. Adequate measures should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project. The Commission may approve fill that is needed to provide flood protection for existing projects and uses. New projects on fill or near the shoreline should either be set back from the edge of the shore so that the project will not be subject to dynamic wave energy, be built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project, be specifically designed to tolerate periodic flooding, or employ other effective means of addressing the impacts of future sea level rise and storm activity. Rights-of-way for levees or other structures protecting inland areas from tidal flooding should

be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.

#### Shoreline Protection (1, 3, 4, & 5)

1. New shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if: (a) the project is necessary to provide flood or erosion protection for (i) existing development, use or infrastructure, or (ii) proposed development, use or infrastructure that is consistent with other Bay Plan policies; (b) the type of the protective structure is appropriate for the project site, the uses to be protected, and the erosion and flooding conditions at the site; (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account; (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; and (e) the protection is integrated with current or planned adjacent shoreline protection measures. Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design.

3. Authorized protective projects should be regularly maintained according to a long-term maintenance program to assure that the shoreline will be protected from tidal erosion and flooding and that the effects of the shoreline protection project on natural resources during the life of the project will be the minimum necessary.

4. Whenever feasible and appropriate, shoreline protection projects should include provisions for nonstructural methods such as marsh vegetation and integrate shoreline protection and Bay ecosystem enhancement, using adaptive management. Along shorelines that support marsh vegetation, or where marsh establishment has a reasonable chance of success, the Commission should require that the design of authorized protection projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever feasible.

5. Adverse impacts to natural resources and public access from new shoreline protection should be avoided. Where significant impacts cannot be avoided, mitigation or alternative public access should be provided.

#### Dredging (2, 3, 4, & 11)

2. Dredging should be authorized when the Commission can find: (a) the applicant has demonstrated that the dredging is needed to serve a water-oriented use or other important public purpose, such as navigational safety; (b) the materials to be dredged meet the water quality requirements of the San Francisco Bay Regional Water Quality Control Board; (c) important fisheries and Bay natural resources would be protected through seasonal restrictions established by the California Department of Fish and Game, the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service, or through other appropriate measures; (d) the siting and design of the project will result in the minimum dredging volume necessary for the project; and (e) the materials would be disposed of in accordance with Policy 3.

3. Dredged materials should, if feasible, be reused or disposed outside the Bay and certain waterways. Except when reused in an approved fill project, dredged material should not be disposed in the Bay and certain waterways unless disposal outside these areas is infeasible and the Commission finds: (a) the volume to be disposed is consistent with applicable dredger disposal allocations and disposal site limits adopted by the Commission by regulation; (b) disposal would be at a site designated by the Commission; (c) the quality of the material disposed of is consistent with the advice of the San Francisco Bay Regional Water Quality Control Board and the inter-agency Dredged Material Management Office (DMMO); and (d) the period of

disposal is consistent with the advice of the California Department of Fish and Game, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service.

4. If an applicant proposes to dispose dredged material in tidal areas of the Bay and certain waterways that exceeds either disposal site limits or any disposal allocation that the Commission has adopted by regulation, the applicant must demonstrate that the potential for adverse environmental impact is insignificant and that non-tidal and ocean disposal is infeasible because there are no alternative sites available or likely to be available in a reasonable period, or because the cost of disposal at alternate sites is prohibitive. In making its decision whether to authorize such in-Bay disposal, the Commission should confer with the LTMS agencies and consider the factors listed in Policy 1.

11. (a) A project that uses dredged material to create, restore, or enhance Bay or certain waterway natural resources should be approved only if:

1. The Commission, based on detailed sitespecific studies, appropriate to the size and potential impacts of the project, that include, but are not limited to, site morphology and physical conditions, biological considerations, the potential for fostering invasive species, dredged material stability, and engineering aspects of the project, determines all of the following:

(a) the project would provide, in relationship to the project size, substantial net improvement in habitat for Bay species;

(b) no feasible alternatives to the fill exist to achieve the project purpose with fewer adverse impacts to Bay resources;

(c) the amount of dredged material to be used would be the minimum amount necessary to achieve the purpose of the project;

(d) beneficial uses and water quality of the Bay would be protected; and

(e) there is a high probability that the project would be successful and not result in unmitigated environmental harm;

2. The project includes an adequate monitoring and management plan and has been carefully planned, and the Commission has established measurable performance objectives and controls that would help ensure the success and permanence of the project, and an agency or organization with fish and wildlife management expertise has expressed to the Commission its intention to manage and operate the site for habitat enhancement or restoration purposes for the life of the project;

3. The project would use only clean material suitable for aquatic disposal and the Commission has solicited the advice of the San Francisco Bay Regional Water Quality Control Board, the Dredged Material Management Office and other appropriate agencies on the suitability of the dredged material;

4. The project would not result in a net loss of Bay or certain waterway surface area or volume. Any offsetting fill removal would be at or near as feasible to the habitat fill site;

5. Dredged material would not be placed in areas with particularly high or rare existing natural resource values, such as eelgrass beds and tidal marsh and mudflats, unless the material would be needed to protect or enhance the habitat. The habitat project would not, by itself or cumulatively with other projects, significantly decrease the overall amount of any particular habitat within the Suisun, North, South, or Central Bays, excluding areas that have been recently dredged;

6. The Commission has consulted with the California Department of Fish and Game, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service to ensure that at least one of these agencies supports the proposed project; and

7. After a reasonable period of monitoring, if either:

(a). the project has not met its goals and measurable objectives, and attempts at remediation have proven unsuccessful, or

(b). the dredged material is found to have substantial adverse impacts on the natural resources of the Bay, then the dredged material would be removed, unless it is demonstrated by competent environmental studies that removing the material would have a greater adverse effect on the Bay than allowing it to remain, and the site would be returned to the conditions existing immediately preceding placement of the dredged material.

b.To ensure protection of Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, except for projects using a minor amount of dredged material, until:

(1) Objective and scientific studies have been carried out to evaluate the advisability of disposal of dredged material in the Bay and certain waterways for habitat creation, enhancement and restoration. Those additional studies should address the following:

(a) The Baywide need for in-Bay habitat creation, enhancement and restoration, in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species; and

(b) The need to use dredged materials to improve Bay habitat, the appropriate characteristics of locations in the Bay for such projects, and the potential short-term and cumulative impacts of such projects; and

(2) The Commission has adopted additional Baywide policies governing disposal of dredged material in the Bay and certain waterways for the creation, enhancement and restoration of Bay habitat, which narratively establish the necessary biological, hydrological, physical and locational characteristics of candidate sites; and

(3) The Oakland Middle Harbor enhancement project, if undertaken, is completed successfully.

Public Access (1, 2 & 5)

1. A proposed fill project should increase public access to the Bay to the maximum extent feasible, in accordance with the policies for Public Access to the Bay.

2. In addition to the public access to the Bay provided by waterfront parks, beaches, marinas, and fishing piers, maximum feasible access to and along the waterfront and on any permitted fills should be provided in and through every new development in the Bay or on the shoreline, whether it be for housing, industry, port, airport, public facility, wildlife area, or other use, except in cases where public access would be clearly inconsistent with the project because of public safety considerations or significant use conflicts, including unavoidable, significant adverse effects on Bay natural resources. In these cases, in lieu access at another location preferably near the project should be provided.

5. Public access should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding.

## Appearance, Design, and Scenic Views (2)

2. All bayfront development should be designed to enhance the pleasure of the user or viewer of the Bay. Maximum efforts should be made to provide, enhance, or preserve views of the Bay and shoreline, especially from public areas, from the Bay itself, and from the opposite shore. To this end, planning of waterfront development should include participation by professionals who are knowledgeable of the Commission's concerns, such as landscape architects, urban designers, or architects, working in conjunction with engineers and professionals in other fields.

## Fills in Accord with the Bay Plan (1)

The Commission's decisions on permit matters are governed by the provisions of the McAteer-Petris Act and the policies of the Bay Plan. The Commission should approve a permit application if it specifically determines that a proposed project meets the following conditions, each of which is necessary for effectively carrying out the Bay Plan.

1. Fills in Accord with Bay Plan. A proposed project should be approved if the filling is the minimum necessary to achieve its purpose, and if it meets one of the following three conditions:

a. The filling is in accord with the Bay Plan policies as to the Bay-related purposes for which filling may be needed (ie., ports, water-related industry, and water-related recreation) and is shown on the Bay Plan maps as likely to be needed; or

b. The filling is in accord with Bay Plan policies as to purposes for which some fill may be needed if there is no other alternative (ie., airports, roads, and utility routes); or

c. The filling is in accord with the Bay Plan policies as to minor fills for improving shoreline appearance or public access.

## Mitigation (1, 2, 3, 4, 5, 6, 7)

1. Projects should be designed to avoid adverse environmental impacts to Bay natural resources such as to water surface area, volume, or circulation and to plants, fish, other aquatic organisms and wildlife habitat, subtidal areas, or tidal marshes or tidal flats. Whenever adverse impacts cannot be avoided, they should be minimized to the greatest extent practicable. Finally, measures to compensate for unavoidable adverse impacts to the natural resources of the Bay should be required. Mitigation is not a substitute for meeting the other requirements of the McAteer-Petris Act.

2. Individual compensatory mitigation projects should be sited and designed within a Baywide ecological context, as close to the impact site as practicable, to: (1) compensate for the adverse impacts; (2) ensure a high likelihood of long-term ecological success; and (3) support the improved health of the Bay ecological system. Determination of the suitability of proposed mitigation locations should be guided in part by the information provided in the Baylands Ecosystem Habitat Goals report.

3. When determining the appropriate location and design of compensatory mitigation, the Commission should also consider potential effects on benefits provided to humans from Bay natural resources, including economic (e.g., flood protection, erosion control) and social (e.g., aesthetic benefits, recreational opportunities).

4. The amount and type of compensatory mitigation should be determined for each mitigation project based on a clearly identified rationale that includes an analysis of: the probability of success of the mitigation project; the expected time delay between the impact and the functioning of the mitigation site; and the type and quality of the ecological functions of the proposed mitigation site as compared to the impacted site.

5. To increase the potential for the ecological success and long-term sustainability of compensatory mitigation projects, resource restoration should be selected over creation where practicable, and transition zones and buffers should be included in mitigation projects where feasible and appropriate. In addition, mitigation site selection should consider site specific factors that will increase the likelihood of long-term ecological success, such as existing hydrological conditions, soil type, adjacent land uses, and connections to other habitats.

6. Mitigation should, to the extent practicable, be provided prior to, or concurrently with those parts of the project causing adverse impacts.

7. When compensatory mitigation is necessary, a mitigation program should be reviewed and approved by or on behalf of the Commission as part of the project. Where appropriate, the mitigation program should describe the proposed design, construction and management of mitigation areas and include:

a. Clear mitigation project goals;

b. Clear and measurable performance standards for evaluating the success of the mitigation project, based on measures of both composition and function, and including the use of reference sites;

c. A monitoring plan designed to identify potential problems early and determine appropriate remedial actions. Monitoring and reporting should be of adequate frequency and duration to measure specific performance standards and to assure long-term success of the stated goals of the mitigation project;

d. A contingency plan to ensure the success of the mitigation project, or provide means to ensure alternative appropriate measures are implemented if the identified mitigation cannot be modified to achieve success. The Commission may require financial assurances, such as performance bonds or letters of credit, to cover the cost of mitigation actions based on the nature, extent and duration of the impact and/or the risk of the mitigation plan not achieving the mitigation goals; and

e. Provisions for the long-term maintenance, management and protection of the mitigation site, such as a conservation easement, cash endowment, and transfer of title.

8. Mitigation programs should be coordinated with all affected local, state, and federal agencies having jurisdiction or mitigation expertise to ensure, to the maximum practicable extent, a single mitigation program that satisfies the policies of all the affected agencies.

9. If more than one mitigation program is proposed, the Commission should consider the cost of the alternatives in determining the appropriate program.

10. To encourage cost effective compensatory mitigation programs, especially to provide mitigation for small fill projects, the Commission may extend credit for certain fill removal and allow mitigation banking provided that any credit or resource bank is recognized pursuant to written agreement executed by the Commission. Mitigation bank agreements should include: (a) financial mechanisms to ensure success of the bank; (b) assignment of responsibility for the ecological success of the bank; (c) scientifically defensible methods for determining the timing and amount of credit withdrawals; and (d) provisions for long-term maintenance, management and protection of the bank site. Mitigation banking should only be considered when no mitigation is practicable on or proximate to the project site.

11. The Commission may allow fee-based mitigation when other compensatory mitigation measures are infeasible. Fee-based mitigation agreements should include: (a) identification of a specific project that the fees will be used for within a specified time frame; (b) provisions for accurate tracking of the use of funds; (c) assignment of responsibility for the ecological success of the mitigation project; (d) determination of fair and

adequate fee rates that account for all financial aspects of the mitigation project, including costs of securing sites, construction costs, maintenance costs, and administrative costs; (e) compensation for time lags between the adverse impact and the mitigation; and (f) provisions for long-term maintenance, management and protection of the mitigation site.

## Appendix E: Airport Case Study

Steering Committee & External Volunteers

**Primary Contributors:** Dilip Trivedi, Moffat & Nichol; John Bourgeois, South Bay Salt Pond Restoration Project; Brenna Rudd, California Coastal Conservancy; Letitia Grenier, San Francisco Estuary Institute.

This hypothetical case study is for policy planning purposes only and should not be interpreted as a real or proposed project.

### Proposal Description

Applicant: Airport Authority

#### 1. Project Description and Purpose:

The airport needs to fortify its perimeter dike to meet current flood risk standards and is vulnerable to increased flood risk in the future as sea levels rise. Located along the shoreline, the airport is surrounded by light industrial uses on the west, a residential area on the north and a small marsh on the southern end. The airport proposes to address height deficiencies and gaps in the perimeter dike. Raising the levee is the most appropriate shoreline protection due to dispersive nearshore sediment transport. The airport also plans to improve stability and reduce water seepage through the dike by installing new embankments and deep cement-soil mix walls as well as strengthen the dike against liquefaction by installing underground rock columns. This proposal involves very limited Bay fill because the dike improvements can be achieved by implementing operational changes on the landside of the levee to make room for laying back the levee banks to provide more efficient wave attenuation and for increasing the height of the structure now and in the future. The purpose of this proposal is to make the airport resilient to 2050 by providing protection up to 1 foot of sea level rise above the 100-year flood event (with 1 foot of sea level rise, the new MHHW tide is 11 ft. NAVD88). The total design elevation with 2 feet of freeboard would be 13 feet NAVD88 and an adaptive management plan is outlined below to maintain the airport's functionality through 2100.

#### 2. Maintenance and Adaptive Management:

The airport can improve its existing flood infrastructure by raising and stabilizing the perimeter dike. To prevent flooding as sea levels rise, the airport plans to add additional riprap and raise dike heights over time. However, if adjacent residential development and golf courses are not protected, the airport will flood beyond 2050 from the northwestern portion of the airport (residential, light industrial). To make the airport resilient to 2100, the existing perimeter dike and neighboring levees would have to be raised to 15 feet NAVD88. The airport plans to begin exploring options for onsite protection as well as a long-term strategy to address flood vulnerabilities in conjunction with neighboring land uses.

#### 3. Probable Environmental Effects:

This project is anticipated to examine the following probable environmental effects:

- Air Quality
- Biological Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hydrology and Water Quality
- Land Use and Planning
- Noise and Vibration
- Public Services, Utilities and Recreation
- Population and Housing

## Airport Case Study – BCDC Staff Analysis

This analysis of the Airport Case Study is based on the McAteer-Petris Act and the San Francisco Bay Plan (Bay Plan) policies. The described case study is hypothetical and not an actual project. The purpose of developing this case study is to highlight the potential impacts that sea level rise may have on an airport, the possible actions that could be taken to address the impacts and how BCDC's current laws and policies would apply in this scenario. The following comments are not intended to be comprehensive but to focus on the primary issues raised by the case study. Projects approved by the Commission must be consistent with the McAteer-Petris Act and the Bay Plan.

The Airport Case Study is located within a site designated by the Bay Plan as an airport priority use area. Located along the shoreline, the airport is surrounded by light industrial uses on the west, a residential area on the north and a marsh on the southern end. The airport proposes to address height deficiencies and gaps in the perimeter dike. The airport also plans to improve stability and reduce water seepage through the dike by installing new embankments and deep cement-soil mix walls as well as strengthen the dike against liquefaction by installing underground rock columns.

**Climate Change.** Sea level risk assessments are required when planning shoreline areas or designing larger shoreline projects. The Bay Plan policies on Climate Change state, in part, that: “all projects—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—should be designed to be resilient to a mid-century sea level rise projection. If it is likely the project will remain in place longer than mid-century, an adaptive management plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century.”

This project should consider the effects of projected sea level rise combined with flooding from storms and be integrated with adjacent shoreline protection in order to be consistent with Bay Plan policies on Climate Change, Shoreline Protection, and Safety of Fills.

**Safety of Fills.** The Bay Plan Safety of Fills Policy 4 states, in part; “Adequate measures should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project... Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.”

The Airport proposes to raise the perimeter dike to 13 feet NAV88 but this elevation does not account for storm waves (up to 4 feet) or El Niño events (up to 1.5 feet). As currently proposed, the project is not consistent with Safety of Fills Policy 4 as the Airport's margin of safety would decrease over time. Although the Airport proposes an adaptive management plan that includes raising dike heights over time, it is not specified how long the dikes can be raised before it is no longer feasible given Federal Aviation Administration standards. The Airport should include the water level at which raising dike heights will no longer be viable and the measures it plans to implement to maintain the airport's function.

**Shoreline Protection.** The Bay Plan policies on Shoreline Protection state, in part: “new shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if... the type of the protective structure is appropriate for the project site, the uses to be protected, and... the protection is integrated with current or planned adjacent shoreline protection measures.”

As currently proposed, the project would create interim shoreline protection but considering the life of the project, it is not an appropriate long-term solution as the airport can flood from neighboring land uses by 2050. The adaptive management plan is not well defined and proposes to explore onsite protections but the applicant should demonstrate the project is integrated with current or planned shoreline protection measures as required by the policies. The airport's project should be studied to ensure it does not worsen flood risk on neighboring land uses.

**Water Quality.** Bay Plan policies on water quality state, in part, that “new projects should be sited, designed, constructed and maintained to prevent or, if prevention is infeasible, to minimize the discharge of pollutants into the Bay.”

The Airport is anticipated to examine probable environmental effects on hydrology and water quality. The Airport should work with the Regional Water Quality Control Board and other relevant resource agencies to protect against impacts to the Bay and surrounding wetlands, mudflats, and subtidal communities.

**Fish, Other Aquatic Organisms and Wildlife and Tidal Marshes and Tidal Flats Policies.** Bay Plan policies state, in part that, “specific habitats that are needed to conserve, increase or prevent the extinction of any native species, species threatened or endangered...or any species that provides substantial public benefits, should be protected, whether in the Bay or behind dikes.” The Bay Plan policies on Tidal Marshes and Tidal Flats state, in part, that: “Filling, diking, and dredging projects should be allowed only for purposes that provide substantial public benefits and only if there is no feasible alternative.”

The project is anticipated to examine probable environmental effects on biological resources. The Airport should work with the relevant resource agencies to ensure Project activities sufficiently reduce impacts to the adjacent marsh, to fish, other aquatic organisms and wildlife. The Airport should discuss the relevant Bay Plan policies protective of biological resources and how the proposed project will be consistent with these policy requirements.

## Appendix F: Contaminated Lands Case Study

This hypothetical case study is for policy planning purposes only and should not be interpreted as a real or proposed project. However, the case study was developed to be similar to many of the contaminated lands sites along the Bay shoreline in order to demonstrate the real issues and impacts that these sites and the lands surrounding them will have to address as sea levels rise.

Applicant: Local government

### 1. Project Description and Purpose:

A local government agency proposes to replace degrading shoreline erosion protection for a Bay-front former landfill with engineered shoreline protection to address ongoing erosion caused by tidal and wind wave energy. The existing loosely constructed concrete rubble revetment ranges in elevation from 6.6 feet to 8.75 feet (NAVD88), and protects a closed, lined and capped landfill composed of a Class I hazardous waste landfill inside of a larger surrounding Class II municipal waste landfill. The landfill has been converted to a park and sits in front of a light commercial zone inland, with adjacent tidal marsh to the south and a low-income residential area to the north.

The project would remove the existing degraded concrete, and replace it with a graded engineered rocky revetment with riprap on top. The new revetment would be raised to 10.75 feet NAVD88 to protect the landfill from a 100-year flood event plus one foot sea level rise, which is the most likely projection for 2050. This project would achieve improved shoreline erosion protection, maintain existing public access, and minimize impacts to sensitive land uses and habitats surrounding the landfill through 2050.

### 2. Maintenance and Adaptive Management:

As part of the Regional Water Quality Control Board's mandated Waste Discharge Requirements (WDRs), leachate, groundwater, stormwater, and levee condition are currently monitored on a semi-annual basis. This monitoring will be used to evaluate effectiveness of the new revetment in preventing erosion from higher sea levels. When additional erosion protection is necessary, supplementary graded material will be added to the revetment to increase its height another two feet to 12.75 feet NAVD88 to provide protection until 2100. If the toe of the revetment begins to fail, the revetment will be replaced with a seawall or other engineered solution.

In addition, if monitoring results indicate that groundwater levels are rising due to a higher Bay, or if saltwater begins to intrude, a cutoff slurry wall will be installed at the revetment toe. A cutoff slurry wall would require excavating a trench about ten feet wide and fifteen feet deep, into which concrete walls reinforced with rebar would be installed with a slurry mix fill. The slurry wall would be located underground between the shoreline and landfill, and extend approximately the entire shoreline fronting the landfill. Leachate collection, pumping, and treatment will also be adapted to future stormwater and leachate conditions when they occur.

### 3. Probable Environmental Effects:

This project is anticipated to examine the following probable environmental effects:

Air Quality, Biological Resources, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Hydrology and Water Quality, Land Use and Planning, Noise and Vibration, Public Services, Utilities and Recreation

## Contaminated Lands Case Study – BCDC Staff Analysis

This analysis of the Contaminated Lands Case Study is based on the McAteer-Petris Act and the San Francisco Bay Plan (Bay Plan) policies. The case study described is not an actual project. It is a hypothetical case study that is similar to many contaminated lands sites around the bay. The purpose of developing this case study is to highlight the potential impacts that sea level rise may have on contaminated lands sites around the bay, the possible actions that could be taken to address the impacts and how BCDC's current laws and policies would apply in this scenario. The following comments are not intended to be comprehensive, but to focus on the primary issues raised by the case study. Projects approved by the Commission must be consistent with the McAteer-Petris Act and the Bay Plan.

The Contaminated Lands Case Study is located along the Bay shoreline within a site designated by the Bay Plan as Waterfront Park. The site was closed, lined and capped in the 1980s and composed of a Class I hazardous waste landfill inside of a Class II municipal waste landfill. The landfill has been converted to a park and sits in front of a light commercial zone inland, with adjacent tidal marsh to the south and a residential area to the north. The site is currently the responsibility of the local city, which owns the site and operates the park.

**Shoreline Protection and Safety of Fills.** The Bay Plan policies on Shoreline Protection state, in part, that: "New shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if: (a) the project is necessary to provide flood or erosion protection... (b) "the type of protective structure is appropriate for the location, uses to be protected, and local conditions at the site... (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account; (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; and (e) the protection is integrated with current or planned adjacent shoreline protection measures." Safety of Fills Policies state, in part, that: "adequate measures should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project..."

The project proposes to install engineered rocky revetment to provide erosion protection for the 100-year flood event plus one foot of sea level rise, and has proposed to increase the height of the revetment up to an additional two feet as necessary. The project proponent should specify what the expected life of the project is, and should demonstrate that the proposed shoreline protection is integrated with adjacent protection measures, which may require working with neighboring landowners. In addition, the riprap revetment materials and placement should meet sound engineering criteria, and be regularly maintained with long-term monitoring. Furthermore, the applicant should assess whether the proposed shoreline protection may cause unintended detrimental consequences on the adjacent land uses, including the adjacent residential area.

**Climate Change.** The Bay Plan policies on Climate Change state, in part, that: "all projects—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—should be designed to be resilient to a mid-century sea level rise projection. The Bay Plan policies on Climate Change state, in part, that: "If it is likely the project will remain in place longer than mid-century, an adaptive management plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century."

Climate Change Policy 4 states, in part, that: "undeveloped areas that are both vulnerable to future flooding and currently sustain significant habitats or species, or possess conditions that make the areas especially

suitable for ecosystem enhancement, should be given special consideration for preservation and habitat enhancement.”

Climate Change Policy 5 states: “wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.”

The current adaptive management plan includes increasing the height of the revetment to 12.75 feet NAVD88 and potentially installing a cutoff slurry wall. The applicant should conduct a risk assessment to support the development of the proposed adaptive management plan in order to determine the most appropriate course of action. For example, the applicant should consider exploring innovative sea level rise adaptation strategies, such as “grey to green,” nature-based, and soft shoreline approaches that would help reduce erosion due to tidal and wind wave energy and at the same time provide habitat enhancements, and protect adjacent areas including the tidal marsh to the south.

**Fish, Other Aquatic Organisms and Wildlife, and Tidal Marshes and Tidal Flats Policies.** The Bay Plan policies on Fish, Other Aquatic Organisms and Wildlife state, in part, that: “the Bay’s tidal marshes, tidal flats, and subtidal habitat should be conserved, restored, and increased.” The Bay Plan policies on Tidal Marshes and Tidal Flats state, in part, that “any proposed filling, diking, or dredging projects should be thoroughly evaluated to determine the effect of the project on tidal marshes and tidal flats, and designed to minimize and if feasible, avoid any harmful effects.”

The applicant is anticipated to examine probable environmental impacts of the proposed shoreline protection on biological resources, including the adjacent tidal marsh. Changes in local wind wave and tidal dynamics from the new revetment should be identified to determine impacts on the adjacent tidal marsh. The applicant should work with relevant resource agencies to ensure the project will minimize impacts to species and habitat.

**Water Quality.** Bay Plan policies on Water Quality state, in part, that: “Bay water pollution should be prevented to the greatest extent feasible... [and] new projects should be sited, designed, constructed and maintained to prevent or, if prevention is infeasible, to minimize the discharge of pollutants into the Bay... When approving a project in an area polluted with toxic or hazardous substances, the Commission should coordinate with appropriate local, state and federal agencies to ensure that the project will not cause harm to the public, to Bay resources, or to the beneficial uses of the Bay.”

The applicant is anticipated to examine probable environmental effects on hydrology and water quality. The Commission cannot issue a permit until the applicant has acquired the necessary approvals from the Regional Water Quality Control Board. The applicant’s monitoring and adaptive management plan should detail how pollutants will be prevented from entering the Bay or endangering the neighboring community and marsh. The efficacy of the proposed cutoff slurry wall should be discussed as well as alternative solutions for preventing the discharge of pollutants due to changing groundwater levels, flow direction and rates, and salinity as sea levels rise.

**Public Access.** Bay Plan policies on Public Access state, in part, that: “Public access should be sited, designed, managed, and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding. Whenever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed”.

The applicant should assess if future sea level rise could impact the existing public access at the project site, and explain how the project will continue providing public access that is consistent with the Commission’s Bay Plan policies.

## Appendix G: Federal and State Fill Policies Memo

### Bay Fill and Clean Water Act Sections 401 and 404 Policies

#### Introduction

This policy analysis of the Clean Water Act (CWA) Sections 401 and 404 relating to fill permitting is for Policies for a Rising Bay project, which aims to build the region’s capacity to plan for sea level rise and ensure that BCDC’s laws and policies support and encourage appropriate adaptation. This policy memo examines how CWA policies are applied in the evaluation of Bay fill.

#### Background & History

The Rivers and Harbors Act of 1899 (Act) was the first federal law applicable to fill, with the purpose to prevent unauthorized obstruction or alteration of any navigable water. Section 10 of the Act is triggered by work over, through, and under navigable waters<sup>16</sup> of the United States, but it is generally processed in conjunction with the CWA Section 404 permit. If a project has no CWA nexus, then US Army Corps of Engineers (USACE) policy directs them to “follow the Department of the Army General/Standard Processes.” The Clean Water Act was passed in 1977, and its overall objective is to “restore and maintain the chemical, physical, and biological integrity of the nation’s waters”.

Clean Water Act Section 404 applies to discharge of dredged or fill material in waters of the United States. This includes wetlands and tributaries to navigable waters such as rivers and creeks; ephemeral and intermittent streams, lakes and ponds and “special aquatic sites” such as mudflats, vegetated shallows, riffle/pool complexes, and coral reefs<sup>17</sup>. For the CWA 404 permitting program, the division of responsibilities between the USEPA and USACE are detailed in a 1989 Memorandum of Agreement.<sup>18</sup>

In July 2015 the Clean Water Rule was published in the *Federal Register*<sup>19</sup> and took effect in August 2015. The stated intention of the Clean Water Rule was to “reduce the complexity governing protection of streams and wetlands,” and it clarifies certain definitions in the Clean Water Act relevant to USACE/Environmental Protection Agency’s (EPA) authority – for example defining a “tributary of traditionally navigable waters”, which wasn’t defined previously. Other changes include amended definitions of adjacent wetlands and waters, isolated or “other” waters, and new exclusions.<sup>20</sup> Generally USACE oversees permitting administration and enforcement, jurisdictional determinations, and develops policy and guidance. The EPA oversees environmental criteria policy development and guidance, geographic jurisdiction and exemption applicability, State and tribal assumption, and permit review and enforcement.<sup>21</sup>

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16 Navigable waters are defined as waters subject to the ebb and flow of the tide; and/or waters that are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce.

17 United States Army Corps of Engineers, San Francisco Division. (January 2016). Overview of the Corps Regulatory Program. Retrieved from [http://www.sfn.usace.army.mil/Portals/68/docs/regulatory/Media/2\\_Jurisdiction\\_PermitTypes.pdf](http://www.sfn.usace.army.mil/Portals/68/docs/regulatory/Media/2_Jurisdiction_PermitTypes.pdf)

18 United States Environmental Protection Agency. (n.d.). MEMORANDUM Between The Department of the Army and The Environmental Protection Agency. Retrieved from <https://www.epa.gov/cwa-404/federal-enforcement-section-404-program-clean-water-act>

19 Clean Water Rule: Definition of “Waters of the United States”, 80 C.F.R. §36054 (2015).

20 United States Environmental Protection Agency (n.d.). Clean Water Rule Factsheet. Retrieved from [https://www.epa.gov/sites/production/files/2015-05/documents/fact\\_sheet\\_summary\\_final\\_1.pdf](https://www.epa.gov/sites/production/files/2015-05/documents/fact_sheet_summary_final_1.pdf)

21 United States Environmental Protection Agency. (n.d.). Section 404 Permit Program. Retrieved from <https://www.epa.gov/cwa-404/section-404-permit-program>



10 if the water is navigable) jurisdictional limit is the “Ordinary High Water, the line on the shore established by the fluctuations in water level”. The USACE jurisdiction includes wetlands.<sup>27</sup>

As a regulatory authority, USACE issues two types of 404 permits: General Permits and Standard Permits. General Permits are issued for activities with minimal adverse environmental effects, and include nationwide, regional and programmatic general permits that are “tiered for little or no review.”<sup>28</sup> For example, USACE Nationwide Permit (NWP) 27 covers a wide range of projects designed to enhance and restore natural hydrology and ecology of streams, rivers, and wetlands.<sup>29</sup> Other examples of NWPs include minor dredging, removal of vessels, modifications of existing marinas, repair of uplands damaged by discrete events. Standard Permits include individual permits and “letters of permission” (LOPs). Individual permits require CEQA/NEPA compliance, a 404(b)(1) Alternatives Analysis, and a public review process. LOPs are developed after coordination with Federal and State Fish and Wildlife Agencies and completion by USACE staff of a “public interest evaluation”<sup>30</sup> in lieu of a public review process. LOPs are for minor projects that – in the USACE district engineer’s opinion – would have no significant environmental impacts and should have no appreciable opposition<sup>31</sup>.

#### Permit Evaluation

A “public interest review” is done by USACE staff on all permit actions, in order to evaluate the balance of public benefits and detriments for the project proposed. USACE can deny permit based on the proposal being “contrary to the public interest”. 404 permits are required to: a) demonstrate the proposal is the least environmental damaging practicable alternative (avoidance and minimization measures); b) adhere to other laws (e.g. ESA, CWA 401, etc.); c) show it cannot mitigate to the least environmentally damaging practicable alternative (LEDPA); and d) show it is utilizing all appropriate and practicable mitigation.<sup>32</sup> Individual 404 permits are reviewed by USACE for the environmental criteria set forth in CWA Section 404(b)(1) guidelines.

CWA Section 404(q) and the 1989 Memorandum of Agreement allow the EPA to request that certain permit applications receive a higher level of review by USACE, when EPA determines that issuing the permit will result in “unacceptable adverse effects to Aquatic Resources of National Importance.”<sup>33</sup> There is a seven-

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27 United States Army Corps of Engineers, San Francisco Division. (January 2016). Overview of the Corps Regulatory Program. Retrieved from [http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2\\_Jurisdiction\\_PermitTypes.pdf](http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2_Jurisdiction_PermitTypes.pdf)

28 United States Army Corps of Engineers, San Francisco Division. (January 2016). Overview of the Corps Regulatory Program. Retrieved from [http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2\\_Jurisdiction\\_PermitTypes.pdf](http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2_Jurisdiction_PermitTypes.pdf)

29 United States Army Corps of Engineers Nation-Wide Permit #27 can’t be used to convert one wetland type to another (e.g. a stream to a wetland), although changes in plant communities due to changes in hydrology are not considered conversion. Activities under this permit do not require compensatory mitigation.

30 This is a list of over a dozen factors that USACE evaluates for a project, including “Conservation, Economics, Fish & Wildlife values, shore erosion & accretion, etc. Source: United States Army Corps of Engineers. (n.d.). U.S. Army Corps of Engineers Permitting Process Information. Retrieved from <http://www.lrl.usace.army.mil/Portals/64/docs/regulatory/Permitting/PermittingProcessInformation.pdf>

31 United States Army Corps of Engineers. (n.d.). U.S. Army Corps of Engineers Permitting Process Information. Retrieved from <http://www.lrl.usace.army.mil/Portals/64/docs/regulatory/Permitting/PermittingProcessInformation.pdf>

32 United States Army Corps of Engineers, San Francisco Division. (January 2016). Overview of the Corps Regulatory Program. Retrieved from [http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2\\_Jurisdiction\\_PermitTypes.pdf](http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2_Jurisdiction_PermitTypes.pdf)

33 Defined as a “resource-based threshold” using factors such as economic importance, rarity or uniqueness, and/or importance of the aquatic resource to protection, maintenance, or enhancement of the quality of the Nation’s waters. Examples of ARNIs include the Chesapeake Bay, vernal pools, bottomland hardwoods, sub-alpine fens, bogs, and coastal

step procedure for this process, beginning with the EPA notifying USACE via a letter during the public notice comment period, and possibly ending with EPA deciding to initiate a Section 404(c) “veto” action if the Assistant Secretary of the Army (Civil Works) decides to issue the permit over EPA’s objections. As of January 2011, the EPA had requested a higher level of review by USACE in 11 permit cases, with an additional 8 permit cases resolved during the process<sup>34</sup>. The MOA also grants EPA the authority to review Section 404 program policies and procedures, as well as the authority to prohibit, deny, or restrict the use of any defined area as a disposal site (Section 404(c))<sup>35</sup>.

The EPA is required per their fiscal appropriations to submit regular reports to Congress regarding review of public notices issued by the U.S. Army Corps of Engineers for proposed Clean Water Act Section 404 standard permit actions. The report lists all of the public notices for proposed standard permit actions received by EPA, the location of the project, the extent of the EPA review and the number of days under review for each project where EPA sent a letter<sup>36</sup>.

404 permit exemptions (404(f)) include “normal” farming, silviculture and ranching activities; maintenance, farm/stock ponds, irrigation and drainage ditches, temporary sedimentation basins, state approved 208(b)(4) activities, and farm and forest roads<sup>37</sup>.

#### Compensatory Mitigation

For 404 permitted projects requiring mitigation, there are three mechanisms outlined in the Section 404(b)(1) guidelines: mitigation banks, in-lieu fee programs, and permittee-responsible mitigation. In 2008 the EPA and USACE jointly promulgated regulations revising and clarifying compensatory mitigation requirements, which indicate banks as the preferred mechanism and permittee mitigation as the least preferred<sup>38</sup>.

#### Water Quality Control Board & Section 401 of the Clean Water Act

The purpose of Section 401 of the Clean Water Act is to ensure projects which *may* result in discharge to, or placement of, fill materials (soil, gravel, pilings, culverts, etc.) in surface waters comply with state water quality standards.<sup>39</sup> After public review of a project’s Draft EA/EIR, the permittee submits an application to the Regional Water Board for a Section 401 Water Quality Certification (WQC).<sup>40</sup> During review of CWA 401 applications the RWQCB can impose conditions to mitigate potential impacts, and by federal law these

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marshes. Source: United States Environmental Protection Agency. (n.d.). Clean Water Act Factsheet: Section 404(q) Dispute Resolution Process. Retrieved from <https://www.epa.gov/sites/production/files/2015-05/documents/404q.pdf>

34 United States Environmental Protection Agency. (n.d.). Clean Water Act Factsheet: Section 404(q) Dispute Resolution Process. Retrieved from <https://www.epa.gov/sites/production/files/2015-05/documents/404q.pdf>

35 United States Environmental Protection Agency. (n.d.). Section 404 Permit Program. Retrieved from <https://www.epa.gov/cwa-404/section-404-permit-program>

36 United States Environmental Protection Agency. (n.d.). Section 404 Permit Program. Retrieved from <https://www.epa.gov/cwa-404/section-404-permit-program>

37 United States Army Corps of Engineers, San Francisco Division. (January 2016). Overview of the Corps Regulatory Program. Retrieved from [http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2\\_Jurisdiction\\_PermitTypes.pdf](http://www.spn.usace.army.mil/Portals/68/docs/regulatory/Media/2_Jurisdiction_PermitTypes.pdf)

38 United States Environmental Protection Agency. (n.d.). Compensatory Mitigation. Retrieved from <https://www.epa.gov/cwa-404/compensatory-mitigation>

39 California State Water Resources Control Board. (n.d.). California Water Boards. Retrieved from [http://www.waterboards.ca.gov/board\\_reference/majorfunctions/dredge\\_fill.pdf](http://www.waterboards.ca.gov/board_reference/majorfunctions/dredge_fill.pdf)

40 United States Army Corps of Engineers, San Francisco Bay Regional Water Quality Control Board. (2015). Final Environmental Assessment/Environmental Impact Report: Maintenance Dredging of the Federal Navigation Channels in the San Francisco Bay Fiscal Years 2015-2024.

conditions must be included in the USACE CWA 404 permit.<sup>41</sup> The RWQCB 401 application asks permittees to include copy of California Department of Fish and Wildlife's (CDFW) Stream or Lakebed Alteration Agreement.<sup>42</sup>

CWA 401 certification must comply with the Basin Plan, the Clean Water Act for point source discharges to waters of the United States, and statewide plans and policies, for example Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Water in California," which generally restricts dischargers from degrading water quality. As a federal agency, USACE is not required to apply for WDRs; however, the Regional Water Board may issue WDRs with the WQC.<sup>43</sup> Projects outside of the Clean Water Act's jurisdiction (e.g. projects in State waters, or "isolated waters") still can be regulated under the Porter-Cologne Act and RWQCB's Basin Plan, and may be covered under a General Waste Discharge Report (WDR)<sup>44</sup> or through the RWQCB's authority under the California Porter-Cologne Act<sup>45</sup>. The RWQCB Executive Officer approves 401 certifications, but the Regional Board approves WDRs or WDR waivers. Most projects covered under a USACE nationwide permit need an individual 401 certification, but not all<sup>46</sup>.

Compensatory Mitigation - A minimum of 1.5:1 mitigation ratio is required.<sup>47</sup> A study of 401 permit compensatory mitigation projects between 1991-2002 showed that though wetland mitigation acreage compliance was met, wetland losses still occurred due to poor health<sup>48</sup>.

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41 Certification, 33 U.S.C. §1341(d) (1948).

42 California State Water Board. (n.d.). Instructions for Completing the Application for

Clean Water Act §401 Water Quality Certification and/or Waste Discharge Requirements for Projects Involving Discharge of Dredged and/or Fill Material To Waters of the U.S. and/or Waters of the State. Retrieved from [http://www.waterboards.ca.gov/lahontan/water\\_issues/programs/clean\\_water\\_act\\_401/docs/401instructions2app.pdf](http://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/docs/401instructions2app.pdf)

43 United States Army Corps of Engineers, San Francisco Bay Regional Water Quality Control Board. (2015). Final Environmental Assessment/Environmental Impact Report: Maintenance Dredging of the Federal Navigation Channels in the San Francisco Bay Fiscal Years 2015-2024.

44 California State Water Resources Control Board. (n.d.). Instructions for Completing the Application for

Clean Water Act §401 Water Quality Certification and/or Waste Discharge Requirements for Projects Involving Discharge of Dredged and/or Fill Material To Waters of the U.S. and/or Waters of the State. Retrieved from [http://www.waterboards.ca.gov/lahontan/water\\_issues/programs/clean\\_water\\_act\\_401/docs/401instructions2app.pdf](http://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/docs/401instructions2app.pdf)

45 California State Water Resources Control Board. (n.d.). California Water Boards. Retrieved from [http://www.waterboards.ca.gov/board\\_reference/majorfunctions/dredge\\_fill.pdf](http://www.waterboards.ca.gov/board_reference/majorfunctions/dredge_fill.pdf)

46 California State Water Resources Control Board. (n.d.). Water Quality Certification for Discharges of Dredged or Fill Materials Under CWA Section 401. Retrieved from [http://www.waterboards.ca.gov/lahontan/water\\_issues/programs/clean\\_water\\_act\\_401/docs/401pamphlet.pdf](http://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/docs/401pamphlet.pdf)

47 California State Water Resources Control Board. (n.d.). Instructions for Completing the Application for

Clean Water Act §401 Water Quality Certification and/or Waste Discharge Requirements for Projects Involving Discharge of Dredged and/or Fill Material To Waters of the U.S. and/or Waters of the State. Retrieved from [http://www.waterboards.ca.gov/lahontan/water\\_issues/programs/clean\\_water\\_act\\_401/docs/401instructions2app.pdf](http://www.waterboards.ca.gov/lahontan/water_issues/programs/clean_water_act_401/docs/401instructions2app.pdf)

48 California State Water Resources Control Board. (n.d.). California Water Boards. Retrieved from [http://www.waterboards.ca.gov/board\\_reference/majorfunctions/dredge\\_fill.pdf](http://www.waterboards.ca.gov/board_reference/majorfunctions/dredge_fill.pdf)

Table 1: Applicable Laws, Permits, Policies and Agencies

Permits/Approvals	Regulatory Agency	Law/Policy
404 permit	USACE	Clean Water Act
401 Water Quality Certification	RWQCB, USEPA oversight	Clean Water Act
Section 7 Consultation	USFWS, NMFS	Federal Endangered Species Act
Essential Fish Habitat Consultation	NMFS	Magnuson-Stevens Act, Sections 305(b)(1)(D) and 305(b)(2-4)
ESA coordination <sup>a</sup>	CDFW	California Endangered Species Act
Coastal Zone Management Act Consistency Determination, Section 307 of CZMA	BCDC	MacAteer-Petris Act, SF Bay Plan
Section 102	USACE, USEPA concurrence/waiver	Marin Protection, Resources and Sanctuaries Act
Section 10 permit	USACE	Rivers and Harbors Act
CEQA	Varies	California Environmental Quality Act
NEPA	Varies	National Environmental Policy Act
Stream and Lakebed Alteration Agreement	CDFW	California Fish and Game Code Section 1602
"Grading" permits	County/City Government	Varies

<sup>a</sup>Applicable to RWQCB but not USACE<sup>49</sup>

49 United States Army Corps of Engineers, San Francisco Bay Regional Water Quality Control Board. (2015). Final Environmental Assessment/Environmental Impact Report: Maintenance Dredging of the Federal Navigation Channels in the San Francisco Bay Fiscal Years 2015-2024.

