SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION
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October 14, 2009

TO: Commissioners, Alternates and Interested Parties

FROM: Will Travis, Executive Director (415/352-3653 travis@bcdc.ca.gov)
Joe LaClair, Chief Planner (415/352-3656 joel@bcdc.ca.gov)

SUBJECT: Draft BCDC Staff Report and Preliminary Recommendations on Adapting to Climate Change
(For Commission consideration on October 21, 2010)

Recommendation

The staff recommends that the Commission endorse the approach described below to encourage additional public input on proposed Bay Plan Amendment No. 1-08 dealing with climate change. The approach includes three components: (1) a comment form for providing recommendations on alternative Bay Plan language; (2) a public workshop; and (3) a special meeting of the Commission for receiving additional public input and discussing the proposed Bay Plan amendments with the public.

Staff Report

On September 3, 2010, the staff mailed, emailed and web-posted its third preliminary recommendation on Bay Plan Amendment No. 1-08. As required by the Commission's regulations regarding Bay Plan amendments, the material included a notice for the October 7, 2010 public hearing on proposed Bay Plan Amendment 1-08 concerning climate change. At the conclusion of the October 7, 2010 public hearing, the Commission directed the staff to develop means to gather additional input from the public on alternative language for the proposed Bay Plan findings and policies.

The staff recommends that the Commission encourage additional public input on proposed Bay Plan Amendment No. 1-08 by: (1) providing a comment form to allow members of the public to easily offer their recommendation for alternative Bay Plan language; (2) host a public workshop that would be conducted by the staff; and (3) hold a special meeting of the Commission to receive additional public input and discuss the proposed Bay Plan amendments with the public.

Attached is a comment form that members of the public can use to provide input to the Commission on recommended language changes that a member of the public believes the Commission should adopt. The first column includes the existing Bay Plan language. The second column shows the changes proposed in the staff's third preliminary recommendation on Bay Plan Amendment No. 1-08. The third column, entitled "Alternative Language," shows any proposed additions, deletions and revisions to the current findings and policies provided by the public during the public comment period, from September 3, 2010 to October 7, 2010. A blank space is provided next to each finding and policy for additional recommended language changes if anyone would like to propose alternative language.

The staff will hold a public workshop on Friday, October 29, 2010 from 1:00 to 5:00 pm at the Commission's offices to provide local governments and the public with an opportunity to ask questions about the proposed amendments and to provide recommendations for changes to the proposed language. The staff will brief attendees on the proposed Bay Plan changes followed with question and answers, suggestions and a general discussion.

The staff also recommends that the Commission hold a special meeting of the " BCDC committee of the whole." All members, Commissioners and alternates, would be invited to attend, but a quorum of the Commission will not be necessary to conduct the committee meeting. All interested parties, including local governments, regional agencies, advocacy organizations and the general public would be invited to participate in a dialogue rather than just staff presentations and public testimony. A date and venue will be announced at the October 21, 2010 Commission meeting, posted on BCDC's website, emailed and mailed to interested parties on Friday October 22, 2010. The meeting will occur before November 4, 2010.

The staff also recommends that the Commission keep the public hearing on Bay Plan Amendment No. 1-08 open until November 4, 2010 to ensure everyone who wants to comment has had a chance to do so. In advance of that meeting, on October 29, 2010, the staff will mail out an updated version of the comment form. At the October 21, 2010 and November 4, 2010 public hearings, the Commission can provide the staff with direction on how to resolve any outstanding policy issues. The staff will take all this information into account and develop a final recommendation, which would be mailed out on November 24, 2010 for a vote by the Commission at its December 2, 2010 meeting.

Fill-in and Print form. Comments cannot be saved using Adobe Reader.

Tidal Marshes and Tidal Flats		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
g. The Baylands Ecosystem Habitat Goals report provides a regional vision of the types, amounts, and distribution of wetlands and related habitats that are needed to restore and sustain a healthy Bay ecosystem, including restoration of 65,000 acres of tidal marsh.	**Add underlined language and delete struck-through language as follows**: g. The Baylands Ecosystem Habitat Goals report provides a regional vision of the types, amounts, and distribution of wetlands and related habitats that are needed to restore and sustain a healthy Bay ecosystem, including restoration of 65,000 acres of tidal marsh. These recommendations were based on conditions of tidal inundation, salinity, and sedimentation in the 1990s. While achieving the regional vision would help promote a healthy, resilient Bay ecosystem, global climate change and sea level rise are expected to alter ecosystem processes in ways that require new, regional targets for types, amounts, and distribution of habitats.	
i. Tidal marshes are an interconnected and essential part of the Bay's food web. Decomposed plant and animal material and seeds from tidal marshes wash onto surrounding tidal flats and into subtidal areas, providing food for numerous animals, such as the Northern pintail. In addition, tidal marshes provide habitat for insects, crabs and small fish, which in turn, are food for larger animals, such as the salt marsh song sparrow, harbor seal and great blue heron.	**Add underlined language and delete struck-through language as follows**: i. Tidal marshes are an interconnected and essential part of the Bay's food web. Decomposed plant and animal material and seeds from tidal marshes wash onto surrounding tidal flats and into subtidal areas, providing food for numerous animals, such as the Northern pintail. In addition, tidal marshes provide habitat for insects, crabs and small fish, which in turn, are food for larger animals, such as the salt marsh song sparrow, harbor seal and great blue heron. Diking and filling have fragmented the remaining tidal marshes, degrading the quality of habitat and resulting in a loss of species and an altered community structure.	

Tidal Marshes and Tidal Flats		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
	Add underlined language as follows: k. Landward marsh migration may be necessary to sustain marsh acreage around the Bay as sea level rises. As sea level rises, high-energy waves erode inorganic mud from tidal flats and deposit that sediment onto adjacent tidal marshes. Marshes trap sediment and contribute additional material to the marsh plain as decaying plant matter accumulates. Tidal habitats respond to sea level rise by moving landward, a process referred to as transgression or migration. Low sedimentation rates, natural topography, development, and shoreline protection can block wetland migration.	
k. Sedimentation is an essential factor in the creation, maintenance and growth of tidal marsh and tidal flat habitat. However, scientists studying the Bay estimate that sedimentation will not be able to keep pace with accelerating sea level rise, due largely to declines in sediment entering the Bay from the Sacramento and San Joaquin Delta, thus potentially exacerbating shoreline erosion and adversely affecting the sustainability of future wetland restoration projects.	**Add underlined language and delete struck-through language as follows**: ~~k~~ l. Sedimentation is an essential factor in the creation, maintenance and growth of tidal marsh and tidal flat habitat. ~~However,~~ S~~s~~cientists studying the Bay ~~estimate~~ observed that ~~sedimentation will not be able to keep pace with accelerating sea level rise, due largely to declines in~~ the volume of sediment entering the Bay annually from the Sacramento and San Joaquin Delta is declining. As a result, the importance of sediment from local watersheds as a source of sedimentation in tidal marshes is increasing. As sea level rise accelerates, the erosion of tidal flats may also accelerate, thus potentially	

Tidal Marshes and Tidal Flats		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
	exacerbating shoreline erosion and adversely affecting the ecosystem and the sustainability of ~~future wetland~~ ecosystem restoration projects. An adequate supply of sediment is necessary to ensure resilience of the Bay ecosystem as sea level rise accelerates.	
	Add underlined language as follows: m. Human actions, such as dredging, disposal, ecosystem restoration, and watershed management, can affect the distribution and amount of sediment available to sustain and restore wetlands. Research on Bay sediment transport processes is needed to understand the volume of sediment available to wetlands, including sediment imported to and exported from the Bay. Monitoring of these processes can inform management efforts to maintain an adequate supply of sediment for wetlands.	**California Coastkeeper Alliance suggestion:** m. Human actions, such as dredging, disposal, ecosystem restoration, and watershed management, can affect the distribution and amount of sediment available to sustain and restore wetlands. Dams, culverts, levees and other barriers that inhibit the natural flow of sediments also affect the delivery of sediment to tidal wetlands. Research on Bay sediment transport processes is needed to understand the volume of sediment available to wetlands, including sediment imported to and exported from the Bay. Monitoring of these processes can inform management efforts to maintain an adequate supply of sediment for wetlands. **Alternative language—finding m.**

Tidal Marshes and Tidal Flats		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
	Add underlined language as follows: n. Buffers are areas established adjacent to a habitat to reduce the adverse impacts of surrounding land use and activities. Buffers also minimize additional loss of habitat from shoreline erosion resulting from accelerated sea level rise and allow tidal habitats to move landward. Buffer areas may be critical for achieving the regional goals for the types, amounts, and distribution of habitats in the Baylands Ecosystem Habitat Goals report or future updates to these targets.	
l. Plant and animal species not present in San Francisco Bay prior to European contact in the late 18th century, known as non-native species, which thrive and reproduce outside of their natural range have made vast ecological alterations to the Bay and have contributed to the serious reduction of native regulations of certain plants and animals through: (1) predation; (2) competition for food, habitat, and other necessities; (3) disturbance of habitat; (4) displacement; or (5) hybridization. Many non-native species enter the Bay from commercial ship ballast water that is discharged into the Bay. Approximately 170 species have invaded the Bay since 1850, and possibly an additional 115 species have been deliberately introduced. By 2001, over 1,200 acres of recently restored tidal marshes have been invaded by introduced cordgrass species, such as salt meadow cordgrass, dense-flowered cordgrass, English cordgrass and smooth cordgrass. At present an average of one new non-native species establishes itself in the Bay every 14 weeks. Control or eradication is a critical step in reducing the harm associated with non-native species.	~~l.~~ o.Plant and animal species not present in San Francisco Bay prior to European contact in the late 18th century, known as non-native species, which thrive and reproduce outside of their natural range have made vast ecological alterations to the Bay and have contributed to the serious reduction of native regulations of certain plants and animals through: (1) predation; (2) competition for food, habitat, and other necessities; (3) disturbance of habitat; (4) displacement; or (5) hybridization. Many non-native species enter the Bay from commercial ship ballast water that is discharged into the Bay. Approximately 170 species have invaded the Bay since 1850, and possibly an additional 115 species have been deliberately introduced. By 2001, over 1,200 acres of recently restored tidal marshes have been invaded by introduced cordgrass species, such as salt meadow cordgrass, dense-flowered cordgrass, English cordgrass and smooth cordgrass. At present an average of one new non-native species establishes itself in the Bay every 14 weeks. Control or eradication is a critical step in reducing the harm associated with non-native species.	

Tidal Marshes and Tidal Flats		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
m. Fill material, such as rock and sediments dredged from the Bay, can enhance or benefIcially contribute to the restoration of tidal marsh and tidal flat habitat by: (1) raising areas diked from the Bay to an elevation that will help accelerate establishment of tidal marsh; and (2) establishing or recreating rare Bay habitat types.	~~m.~~p. Fill material, such as rock and sediments dredged from the Bay, can enhance or beneficially contribute to the restoration of tidal marsh and tidal flat habitat by: (1) raising areas diked from the Bay to an elevation that will help accelerate establishment of tidal marsh; and (2) establishing or recreating rare Bay habitat types.	
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
	Policies 1 through 3—no changes	
4. Where and whenever possible, former tidal marshes and tidal flats that have been diked from the Bay should be restored to tidal action in order to replace lost historic wetlands or should be managed to provide important Bay habitat functions, such as resting, foraging and breeding habitat for fish, other aquatic organisms and wildlife. As recommended in the Baylands Ecosystem Habitat Goals report, around 65,000 acres of areas diked from the Bay should be restored to tidal action. Further, local government land use and tax policies should not lead to the conversion of these restorable lands to uses that would preclude or deter potential restoration. The public should make every effort to acquire these lands from willing sellers for the purpose of restoration.	**Add underlined language and delete struck-through language as follows:** 4. Where ~~and whenever possible~~ feasible, former tidal marshes and tidal flats that have been diked from the Bay should be restored to tidal action in order to replace lost historic wetlands or should be managed to provide important Bay habitat functions, such as resting, foraging and breeding habitat for fish, other aquatic organisms and wildlife. As recommended in the Baylands Ecosystem Habitat Goals report, around 65,000 acres of areas diked from the Bay should be restored to tidal action to maintain a healthy Bay ecosystem on a regional scale. Regional ecosystem targets should be updated periodically to guide conservation, restoration, and management efforts that result in a Bay ecosystem resilient to climate change and sea level rise. Further, local government land use and tax policies should not lead to the conversion of these restorable lands to uses that would preclude or deter potential restoration. The public should make every effort to acquire these lands ~~from willing sellers~~ for the purpose of habitat restoration and wetland migration.	

Tidal Marshes and Tidal Flats		
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
	Add underlined language and delete struck-through language as follows: 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.	
5. Any tidal 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) the effects of relative sea level rise; (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; and (h) site characterization. If success criteria are not met, appropriate corrective measures should be taken.	**Add underlined language and delete struck-through language as follows:** ~~5~~ 6. Any ecosystem ~~tidal~~ 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) ~~the effects of relative~~ 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; ~~and~~ (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 ~~corrective~~ adaptive measures should be taken.	

Climate Change		
(There are no existing Bay Plan findings and policies on climate change.)	**Staff's Proposed Findings**	**Alternative Language**
	Add underlined language as follows: a. Greenhouse gases naturally reside in the earth's atmosphere, absorb heat emitted from the earth's surface and radiate heat back to the surface causing the planet to warm. This natural process is called the "greenhouse effect." Human activities since industrialization have increased the emissions of greenhouse gases through the burning of fossil fuels. The accumulation of these gases in the atmosphere is causing the planet to warm at an accelerated rate.	
	Add underlined language as follows: b. The future extent of global warming is uncertain. It will be driven largely by future greenhouse gas emissions levels, which will depend on how global development proceeds. The United Nations Intergovernmental Panel on Climate Change (IPCC) developed a series of global development scenarios and greenhouse gas emissions scenarios for each development scenario. These emissions scenarios have been used in global models to develop projections of future climate, including global surface temperature and precipitation changes.	

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: c. Global surface temperature increases are accelerating the rate of sea level rise worldwide through thermal expansion of ocean waters and melting of land-based ice (e.g., ice sheets and glaciers). Bay water level is likely to rise by a corresponding amount. In the last century, sea level in the Bay rose nearly eight inches. Current science-based projections of global sea level rise over the next century vary widely. As new information on climate change becomes available and factors that have regional effects on sea level rise, such as the Pacific Decadal Oscillation, are better understood, future sea level rise projections are likely to change. Using IPCC greenhouse gas emissions scenarios, the California Climate Action Team developed sea level rise projections (relative to sea level in 2000) for the state that range from 11 to 18 inches at mid-century and 23 to 55 inches at the end of century. Although these are currently the best science-based sea level rise projections for California, recent observations of global greenhouse gas emissions show higher trajectories than the IPCC's most intensive emissions scenario. Moreover, melting of the Greenland and Antarctic ice sheets is not currently well reflected in sea level rise projections. Therefore, to minimize flood risk, it is prudent to rely on higher projections in the range of possible future sea level rise.	**Treasure Island Development Authority's suggestion:** c. Global surface temperature increases are accelerating the rate of sea level rise worldwide through thermal expansion of ocean waters and melting of land-based ice (e.g., ice sheets and glaciers). Bay water level is likely to rise by a corresponding amount. In the last century, sea level in the Bay rose nearly eight inches. Current science-based projections of global sea level rise over the next century vary widely. As new information on climate change becomes available and factors that have regional effects on sea level rise, such as the Pacific Decadal Oscillation, are better understood, future sea level rise projections are likely to change. Using IPCC greenhouse gas emissions scenarios, the California Climate Action Team developed sea level rise projections (relative to sea level in 2000) for the state that range from 11 to 18 inches at mid-century and 23 to 55 inches at the end of century. Although these are currently the best science-based sea level rise projections for California, recent observations of global greenhouse gas emissions show higher trajectories than the IPCC's most intensive emissions scenario. Moreover, melting of the Greenland and Antarctic ice sheets is not currently well reflected in sea level rise projections. Therefore, to minimize flood risk, it is prudent to rely on scientifically based higher projections when establishing a reasonable range of possible future sea level rise.

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
		Alternative Language-Finding c.
	Add underlined language as follows: d. Climate change will alter key factors that contribute to shoreline flooding, including sea level and storm frequency and intensity. During a storm, low air pressure can cause storm surge (a rapid rise in water level) and increased wind and wave activity can cause wave run up, which will be higher as sea level rises. These storm events can be exacerbated by El Niño events, which generally result in persistent low air pressure, greater rainfall, high winds and higher sea level. The coincidence of intense winter storms, extreme high tides, and high runoff, in combination with higher sea level, will increase the frequency and duration of shoreline flooding long before areas are permanently inundated by sea level rise alone.	

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: e. Shoreline areas currently vulnerable to a 100-year flood event may be subjected to inundation by high tides at mid-century. Much of the developed shoreline may require new or upgraded shoreline protection to reduce damage from flooding. Shoreline areas that have subsided are especially vulnerable to sea level rise and may require more extensive shoreline protection. The Commission, along with other agencies, is responsible for protecting the public and the Bay ecosystem from flood hazards. This can be best achieved by using higher emissions scenarios, which correspond to higher rates of sea level rise. In planning and designing projects for the Bay shoreline, it is prudent to rely on the most current science-based and regionally specific projections of future sea level rise, develop strategies and policies that can accommodate sea level rise over a specific planning horizon (i.e., adaptive management strategies), and preclude development that cannot be adapted to sea level rise.	**Baykeeper's suggestion:** e. Shoreline areas currently vulnerable to a 100-year flood event may be subjected to inundation by high tides at mid-century. Much of the developed shoreline may require new or upgraded shoreline protection to reduce damage from flooding. Shoreline areas that have subsided are especially vulnerable to sea level rise and may require more extensive shoreline protection. The Commission, along with other agencies, is responsible for protecting the public and the Bay ecosystem from flood hazards. This can be best achieved by using higher emissions scenarios, which correspond to higher rates of sea level rise. In planning and designing projects for the Bay shoreline, it is prudent to rely on the most current science-based and regionally specific projections of future sea level rise, develop strategies and policies that can accommodate sea level rise over a specific planning horizon (i.e., adaptive management strategies), and preclude development requiring new shoreline structures for flood protection or developments that exacerbate existing flood risk through net loss of flood storage capacity.
		Alternative Language-Finding e.

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: f. Natural systems and human communities are considered to be resilient when they can absorb and rebound from the impacts of weather extremes or climate change and continue functioning without substantial outside assistance. Systems that are currently under stress often have lower adaptive capacity and may be more vulnerable or susceptible to harm from climate change impacts. Human communities with adaptive capacity can adjust to climate change impacts by taking actions to reduce the potential damages, taking advantage of new opportunities arising from climate change, and accommodating the impacts. Understanding vulnerabilities to climate change is essential for assessing climate change risks to a project, the Bay or the shoreline. Risk is a function of the likelihood of an impact occurring and the consequence of that impact. Climate change risk assessments identify and prioritize issues that can be addressed by adaptation strategies.	
	Add underlined language as follows: g. In the context of climate change, mitigation refers to actions taken to reduce greenhouse gas emissions, and adaptation refers to actions taken to address potential or experienced impacts of climate change that reduce risks. Adaptation actions can include relocating structures out of flood and inundation zones, protecting shorelines, and designing new construction to be resilient to sea level rise. Some actions can integrate adaptation and mitigation strategies, such as restoring tidal marshes that both sequester carbon and provide flood protection. Adaptation and mitigation measures that are implemented before sea level rises may be cost effective and may protect lives, property and ecosystems.	

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: h. In the context of sea level rise adaptation, innovative approaches will likely include financing mechanisms, design concepts and land management practices. Effective, innovative adaptation approaches minimize public safety risks; maximize compatibility with and integration of natural processes; are resilient over a range of sea level, potential flooding impacts and storm intensities; and are adaptively managed. Developing innovative adaptation approaches will require financial resources, testing and refinement to ensure that they effectively protect the Bay ecosystem and public safety before they are implemented on a large scale.	
	Add underlined language as follows: i. 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 actions.	
	Add underlined language as follows: j. The principle of sustainability embodies values of equity, environmental and public health protection, economic vitality and safety. The goal of sustainability is to conduct human endeavors in a manner that will avoid depleting natural resources for future generations and producing no more than can be assimilated through natural processes. Efforts to improve the sustainability of natural systems and human communities can improve their resilience to climate change by increasing their adaptive capacity.	

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: k. Shoreline development and infrastructure, critical to public and environmental health and the region's economic prosperity, are vulnerable to flooding from sea level rise and storm activity. Public safety may be compromised and personal property may be damaged or lost during floods. Important public shoreline infrastructure and facilities, such as airports, ports, regional transportation facilities, landfills, contaminated lands and wastewater treatment facilities are at risk of flood damage that could require costly repairs, result in the interruption or loss of vital services or degraded water quality. A lack of funding to address projected impacts from sea level rise will limit the Bay Area's ability to meet environmental, public health, equity and economic goals.	**California Coastkeeper Alliance suggestion:** k. Shoreline development and infrastructure, critical to public and environmental health and the region's economic prosperity, are vulnerable to flooding from sea level rise and storm activity. Public safety may be compromised and personal property may be damaged or lost during floods. Important public shoreline infrastructure and facilities, such as airports, ports, regional transportation facilities, landfills, contaminated lands and wastewater treatment facilities are at risk of flood damage that could require costly repairs, result in the interruption or loss of vital services or degraded water quality. There may be inadequate funding available to protect all developed areas that are vulnerable to sea level rise and storm surge, and some developed areas may be suitable for ecosystem restoration if existing development is removed and the Bay is allowed to migrate inland. **Alternative Language-Finding k.**

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: l. Waterfront parks, beaches, public access sites, and the Bay Trail are particularly vulnerable to flooding from sea level rise and storm activity because they are located immediately adjacent to the Bay. Flooding of, or damage to these areas would adversely affect the region's quality of life, if important public spaces and recreational opportunities are lost.	
	Add underlined language as follows: m. The Bay ecosystem contains diverse and unique plants and animals and provides many benefits to humans. For example, tidal wetlands provide critical flood protection, improve water quality, and sequester carbon. Tidal high marsh and adjacent ecotones are essential to many tidal marsh species, including endangered species. The Bay ecosystem is already stressed by human activities that lower its adaptive capacity, such as diversion of freshwater inflow and loss of tidal wetlands. Climate change will further alter the ecosystem by inundating or eroding wetlands and ecotones, changing sediment dynamics, altering species composition, raising the acidity of Bay waters, changing freshwater inflow or salinity, altering the food web, and impairing water quality, all of which may overwhelm the system's ability to rebound and continue functioning. Moreover, further loss of tidal wetlands will increase the risk of shoreline flooding.	
	Add underlined language as follows: n. Some Bay Area residents, particularly those with low incomes or disabilities and the elderly, may lack the resources or capacity to respond effectively to the impacts of sea level rise and storm activity. Financial and other assistance is needed to achieve regional equity goals and help everyone be part of resilient shoreline communities.	

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: o. Approaches for ensuring public safety in developed vulnerable shoreline areas include: (1) protecting existing development; (2) accommodating flooding by building structures that are resilient (3) discouraging permanent new development; (4) allowing only interim new uses that can be removed or phased out as inundation threats increase; and (5) removing existing development.	**Treasure Island Development Authority's suggestion:** o. Approaches for ensuring public safety in developed vulnerable shoreline areas require adaptive management strategies that include: (1) protecting existing development; (2) accommodating flooding by building structures or infrastructure systems that are resilient and adaptable over time (3) discouraging permanent new development when adaptive management strategies cannot protect public safety in vulnerable shoreline areas; (4) allowing ~~only~~ interim and permanent new uses that can be adapted to protect public safety in vulnerable shoreline areas, or that can be removed or phased out if adaptive management strategies are not available as inundation threats increase; and (5) removing existing development that does not ensure public safety in vulnerable shoreline areas through adaptive management strategies. **Alternative Language-Finding o.**

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: p. Infill development is the economic use of underutilized or vacant land, or the rehabilitation of existing structures or infrastructure located in an area where supporting infrastructure is in place and that is surrounded by existing development that either is or will be served by transit. Infill development has been identified as an important strategy for reducing greenhouse gas emissions in the Bay Area by providing jobs and housing in locations and at densities	**California Coastkeeper Alliance suggestion:** *Note: Do not include proposed finding p.*
	that can be served by transit. Some vulnerable shoreline areas are already improved with development that has regionally significant economic, cultural or social value, and can accommodate infill development.	
	Add underlined language as follows: q. When planning or regulating development within areas vulnerable to flooding from sea level rise, allowing small projects, such as minor repairs of existing facilities, and interim uses may be acceptable if they do not significantly increase overall risks to public safety.	
	Add underlined language as follows: r. In some cases, the regional goals of encouraging infill development, remediating environmentally degraded land, redeveloping closed military bases and concentrating housing and job density near transit may conflict with the goal of minimizing flood risk by avoiding development in low-lying areas vulnerable to flooding. To minimize this conflict, infill or redevelopment in low-lying areas can be clustered on a portion of the property to reduce the area that must be protected; an adaptation strategy for dealing with rising sea level and shoreline flooding can be formulated with definitive goals and an adaptive management plan for addressing key uncertainties for the life of the project; measures can be incorporated that will achieve resilience and sustainability in all elements of	**California Coastkeeper Alliance suggestion:** *Note: Do not include proposed finding r.* **Treasure Island Development Authority's suggestion:** r. In some cases, the regional goals of encouraging infill development, remediating environmentally degraded land, redeveloping closed military bases and concentrating housing and job density near transit may conflict with the goal of minimizing flood risk by avoiding development in low-lying areas vulnerable to flooding. To minimize this conflict, infill or redevelopment in low-lying areas can be clustered on a portion of the property to reduce the area that must be protected; an adaptation strategy for dealing with rising sea level and shoreline flooding can be formulated with definitive goals and an adaptive management plan for

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	the project; and a permanent financial strategy can be developed to guarantee that the general public will not be burdened with the cost of protecting the project from any sea level rise or storm damage in the future.	addressing key uncertainties for the life of the project; measures can be incorporated that will achieve resilience and sustainability in all elements of the project; and a permanent financial strategy can be developed to guarantee that the general public will not be burdened with the cost of protecting the project from sea level rise or storm damage caused by sea level rise in the future. **Alternative Language-Finding r.**
	Add underlined language as follows: s. Some undeveloped low-lying areas that are vulnerable to shoreline flooding contain critical habitat or provide opportunities for habitat enhancement. Allowing development in these areas would preclude important habitat enhancement opportunities. Some developed areas may be suitable for ecosystem restoration if existing development is removed to allow the Bay migrate inland, although relocating communities is very costly and may result in the displacement of neighborhoods.	
	Add underlined language as follows: t. There are multiple local, state, federal, and regional government agencies with authority over the Bay and shoreline. Local governments have broad authority over shoreline land use, but limited resources to address climate change adaptation. Working collaboratively can optimize scarce resources and create the flexibility needed to plan amidst a high degree of uncertainty.	

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
	Add underlined language as follows: u. Government jurisdictional boundaries and authorities in the Bay Area are incongruent with the regional scale and nature of climate-related challenges. The Joint Policy Committee, which is comprised of regional agencies, provides a framework for regional decision-making to address climate change through consistent and effective regionwide policy and to provide local governments with assistance and incentives for addressing climate change.	
	Add underlined language as follows: v. The Commission's current legal authority and regulatory jurisdiction, which were created to allow the Commission to advance the State goals of preventing unnecessary filling of the Bay and increasing public access to the Bay shoreline, limit the Commission's ability to successfully conserve the Bay and guide the wise development of the Bay and its shoreline in the face of current and future rates of sea level rise. However, through its Bay Plan policies the Commission can provide guidance to developers, the general public, local governments, and other governmental agencies that have broader authority over the use and development of areas that are vulnerable to inundation.	
		Save the Bay's first suggested additional finding: The 2009 California Climate Adaptation Strategy (CAS), adopted pursuant to Executive Order S-13-08 establishes avoiding future hazards and protecting critical habitat as a top priority action to combat the impacts of sea level rise. The CAS says that "State agencies should consider project alternatives that avoid significant new development in areas that cannot be adequately protected (planning, permitting,

Climate Change		
	Staff's Proposed Findings	Alternative Language
		development, and building) from flooding or erosion due to climate change. The most risk-averse approach for minimizing the adverse effects of sea level rise and storm activities is to carefully consider new development within areas vulnerable to inundation and erosion, and to consider prohibiting development of undeveloped, vulnerable shoreline areas containing critical habitat or opportunities for habitat creation. State agencies should generally not plan, develop, or build any new significant structure in a place where that structure will require significant protection from sea-level rise, storm surges, or coastal erosion during the expected life of the structure. However, vulnerable shoreline areas containing existing development or proposed for new development that has or will have regionally significant economic, cultural, or social value may have to be protected, and in-fill development in these areas should be closely scrutinized. State agencies should incorporate this policy into their decisions, and other levels of government are also encouraged to do so."
		Save the Bay's second suggested additional finding: The CAS recommends that "If agencies do plan, permit, develop or build any new structures in hazard zones, agencies should employ or encourage innovative engineering and design solutions so that the structures are resilient to potential flood or erosion events or can be easily relocated or removed to allow for progressive adaptation to sea level rise, flooding, and erosion."

Climate Change		
	Staff's Proposed Findings	**Alternative Language**
		Save the Bay's third suggested additional finding: To promote habitat protection in the face of sea level rise, the CAS says "The state should identify priority conservation areas and recommend lands that should be considered for acquisition and preservation. The state should consider prohibiting projects that would place development in undeveloped areas already containing critical habitat, and those containing opportunities for tidal wetland restoration, habitat migration, or buffer zones. The strategy should likewise encourage projects that protect critical habitats, fish, wildlife and other aquatic organisms and connections between coastal habitats. The state should pursue activities that can increase natural resiliency, such as restoring tidal wetlands, living shoreline, and related habitats; managing sediment for marsh accretion and natural flood protection; and maintaining upland buffer areas around tidal wetlands. For these priority conservation areas, impacts from nearby development should be minimized, such as secondary impacts from impaired water quality or hard protection devices."
		Save the Bay's fourth suggested additional finding: The CAS recommends that by September 2010 BCDC and "state agencies responsible for the management and regulation of resources and infrastructure subject to potential sea-level rise should prepare agency-specific adaptation plans, guidance, and criteria, as appropriate. Agencies with overlapping jurisdictions in the coastal zone will coordinate when drafting these plans to reduce or eliminate conflicting approaches." The CAS says that BCDC "should: a. Consider requiring applicants to address how sea-level rise will affect their project, include design features that will ensure that the project objectives are feasible and that the project will not be rendered unusable or inoperable over its lifespan, that critical habitat is protected, and that public access is provided, where appropriate."

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	Add underlined language as follows: 1. When planning shoreline areas or designing larger shoreline projects, a risk assessment should be prepared, based on the estimated 100-year flood elevations that take future sea level rise into account. A range of sea level rise projections for mid-century and end of century, including at least one high estimate, that is based on the best science-based projections currently available, should be used in the risk assessment.	**Treasure Island Development Authority's suggestion:** 1. When planning shoreline areas or designing larger shoreline projects, a risk assessment should be prepared, based on the estimated 100-year flood elevations that take future sea level rise into account. A reasonable 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.
		Baykeeper's suggestion: 1. For any project located within an area potentially subject to sea-level rise at the 2100 time horizon, a site-specific flood risk assessment must be prepared to identify all potential flood mechanisms, degrees of uncertainty, and consequences of defense failure. Site-specific risk assessments should demonstrate that the project shall maintain resiliency to gradual sea-level rise over the life of the development as well as during storm surges at varying return frequencies. In addition, risk assessments should demonstrate that a project shall not exacerbate existing flood risk through net loss of flood storage capacity. Risk assessments should be accompanied and informed by the results of 2-D flood models specific to the proposed development. For

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
		complex sites or breach analysis studies, BCDC may request more advanced 3-D modeling pending input from qualified agencies or outside reviewers. Projects exempt from this requirement include habitat restoration and site remediation projects that will not alter the flood storage capacity of the site. **Alternative Language-Policy 1**
	Add underlined language as follows: 2. To protect public safety and ecosystem services, within areas vulnerable to future shoreline flooding, all projects—other than minor repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas that likely will be protected whether or not the infill takes place—should be designed to be resilient to a mid-century sea level rise projection based upon a risk assessment conducted for the project. 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.	**California Coastkeeper Alliance's suggestion:** 2. To protect public safety and ecosystem services, projects should be discouraged within areas vulnerable to future shoreline flooding… All projects—other than minor repairs of existing facilities, small projects that do not increase risks to public safety, and interim projects—should be designed to be resilient to a mid-century sea level rise projection based upon a risk assessment conducted for the project. 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.

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	Staff's Proposed Policies	**Alternative Language**
		Treasure Island Development Authority's suggestion: 2. To protect public safety and ecosystem services, within areas vulnerable to future shoreline flooding, all projects—other than minor repairs of existing facilities, small projects that do not increase risks to public safety, interim projects, infill projects within existing urbanized areas, and Priority Development Areas as designated by the Association of Bay Area Governments' FOCUS study that likely will be protected whether or not the infill takes place—should be designed to be resilient to a mid-century or a minimum of 50-year sea level rise projection based upon a risk assessment conducted for the project. 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. **Alternative Language-Policy 2**

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	Add underlined language as follows: 3. Undeveloped, vulnerable shoreline areas that currently sustain diverse habitats and species or possess conditions that make the areas especially suitable for ecosystem enhancement should be preserved, enhanced or permanently protected to allow for the inland migration of Bay habitat as sea level rises and to address the adverse environmental impacts of climate change.	**Save the Bay's suggestion**: 3. Undeveloped, vulnerable shoreline areas that currently sustain diverse habitats and species or possess conditions that make the areas especially suitable for ecosystem enhancement should be preserved, enhanced or permanently protected to allow for the inland migration of Bay habitat as sea level rises and to address the adverse environmental impacts of climate change. Development in these areas should be discouraged. **Alternative Language-Policy 3**
	Add underlined language as follows: 4. Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.	

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	Add underlined language as follows: 5. The Commission, in collaboration with the Joint Policy Committee, other regional, state and federal agencies, local governments, and the general public, should formulate a regional sea level rise adaptation strategy for protecting critical developed shoreline areas and natural ecosystems, enhancing the resilience of Bay and shoreline systems and increasing their adaptive capacity. The strategy should incorporate an adaptive management approach, be updated regularly to reflect changing conditions and information, and include maps of shoreline areas that are vulnerable to flooding based on projections of future sea level rise and shoreline flooding. The maps should be prepared and regularly updated in consultation with government agencies with authority over flood protection. The regional strategy should determine where existing development should be protected and infill development encouraged, where new development should be permitted, where existing development should eventually be removed to allow the Bay to migrate inland.	**Treasure Island Development Authority's suggestion:** 5. The Commission, in collaboration with the Joint Policy Committee, other regional, state and federal agencies, local governments, and the general public, should formulate a regional sea level rise adaptation strategy for protecting critical developed shoreline areas, Priority Development Areas as designated by the ABAG FOCUS study, and natural ecosystems, enhancing the resilience of Bay and shoreline systems and increasing their adaptive capacity. The strategy should incorporate an adaptive management approach, be updated regularly to reflect changing conditions and information, and include maps of shoreline areas that are vulnerable to flooding based on projections of future sea level rise and shoreline flooding. The maps should be prepared and regularly updated in consultation with government agencies with authority over flood protection. The regional strategy should determine where existing development should be protected and infill development encouraged, where new development should be permitted, where existing development should eventually be removed to allow the Bay to migrate inland.

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	The goals of the strategy should be to: a. advance regional public safety and prosperity by protecting most existing shoreline development, especially development that provides regionally significant benefits, and by protecting infrastructure that is critical to public health or the region's economy, such as airports, ports, regional transportation, wastewater treatment facilities, major parks, recreational areas and trails;	**California Coastkeeper Alliance's suggestion:** a. advance regional public safety and prosperity by protecting most existing shoreline environment, especially development that provides regionally significant benefits, and by protecting infrastructure that is critical to public health or the region's economy, such as airports, ports, regional transportation, wastewater treatment facilities, major parks, recreational areas and trails; **Treasure Island Development Authority's suggestion:** a. advance regional public safety and prosperity by protecting most existing shoreline development and Priority Development Areas as designated by the ABAG FOCUS study, especially development that provides regionally significant benefits, and by protecting infrastructure that is critical to public health or the region's economy, such as airports, ports, regional transportation, wastewater treatment facilities, major parks, recreational areas and trails;
	b. enhance the Bay ecosystem (e.g., Bay habitats, fish, wildlife and other aquatic organisms) by identifying both developed and undeveloped areas where tidal wetlands and tidal flats can migrate landward; assuring adequate volumes of sediment for marsh accretion; identifying priority conservation areas that should be considered for acquisition, preservation or enhancement; developing and planning for flood protection; and maintaining sufficient transitional habitat and upland buffer areas around tidal wetlands;	

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	c. integrate the protection of existing and future shoreline development with the enhancement of the Bay ecosystem, such as by using feasible shoreline protection measures that incorporate natural Bay habitat for flood control and erosion prevention; d. encourage innovative approaches to sea level rise adaptation; e. identify a framework for integrating the adaptation responses of multiple government agencies; f. integrate regional mitigation measures designed to reduce greenhouse gas emissions with regional adaptation measures designed to address the unavoidable impacts of climate change; g. advance regional sustainability, encourage infill development and job creation, and provide diverse housing served by transit; h. address any existing contamination and the implications of the contamination on water quality; i. support research that provides information useful for planning and policy development on the impacts of climate change on the Bay, particularly those related to shoreline flooding; j. identify actions to prepare and implement the strategy, including any needed changes in law; and k. identify mechanisms to provide information, tools, and financial resources so local governments can integrate regional climate change adaptation planning into local community design processes.	**California Coastkeeper Alliance's suggestion:** c. integrate the protection of existing and future shoreline environment with the enhancement of the Bay ecosystem, such as by using feasible shoreline protection measures that incorporate natural Bay habitat for flood control and erosion prevention; **California Coastkeeper Alliance's suggestion:** g. advance regional sustainability, encourage job creation, and provide diverse housing served by transit; **Alternative Language-Policy 5**

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	Add underlined language as follows: 6. Until a regional sea level rise adaptation strategy can be completed, when planning or regulating new development in areas vulnerable to future shoreline flooding, new projects should be limited to: a. minor repairs of existing facilities or small projects that do not increase risks to public safety; b. transportation facilities, public utilities or other critical infrastructure that is necessary for the continued viability of existing development; c. infill development within existing urbanized areas that contain development and infrastructure of such high value that the areas will likely be protected whether or not the infill takes place; d. redevelopment that will remediate existing environmental degradation or contamination, particularly on closed military bases, if the redevelopment will (1) provide significant regional benefits and meet regional goals by concentrating employment or housing near adequate transit service sufficient to serve the project, and (2) include the following elements: (i) an adaptation strategy for dealing with rising sea level and shoreline flooding with definitive goals and an adaptive management plan for addressing key uncertainties for the life of the project; (ii) measures that will achieve resilience and sustainability in all elements of the project; (iii) a permanent financial strategy that will guarantee the general public will not be burdened with the cost of protecting the project from any sea level rise or storm damage in the future;	**Baykeeper's suggestion:** 6. Until a regional sea level rise adaptation strategy can be completed, when planning or regulating new development in areas vulnerable to future shoreline flooding, new projects located below the 100 year flood level plus 2100 sea-level rise should be limited to: a) minor repairs of existing facilities or changes to land use designation small projects that do not increase risks to public safety; b) 'Less Vulnerable' and 'Water Compatible' developments, as defined below, and subject to appropriate pollution-prevention controls and adaptive management strategies. 'Less Vulnerable' developments include: • Retail buildings; • Non-residential offices; • Restaurants; • Storage and distribution facilities; • Sand and gravel processing areas; • Military installations; • Assembly and leisure; and • Land and buildings used for agriculture. 'Water Compatible' developments include: • Roads and transportation facilities necessary for existing development; • Electrical, water and sewage transmission infrastructure; • Maintenance of flood control structures;20 • Docks, marinas and wharves; • Navigation facilities; • Ship building, repairing and dismantling, dockside fish processing and compatible activities requiring a waterside location;

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
	e. projects or uses that are interim or temporary in nature where the use or structures: (1) can be easily removed or relocated to higher ground; (2) can be amortized within a period before removal or relocation of the proposed use is required; and (3) will not require shoreline protection during the life of the project; or f. public parks, natural resource restoration or environmental enhancement projects.	• Water-based recreation; • Public parks, habitat restoration projects, environmental remediation projects and essential infrastructure for these projects, such as restrooms and changing areas. c) redevelopment of 'More Vulnerable' developments, including residential units and health service facilities, that will remediate existing environmental degradation or contamination if the redevelopment (1) provides wider sustainability benefits to the community that outweigh flood risk and potential costs associated with shoreline defense and (2) includes the following elements: (i) an adaptation strategy for dealing with rising sea level and shoreline flooding with definitive goals and an adaptive management plan for addressing key uncertainties for the life of the project; (ii) a permanent financial strategy that will guarantee the general public will not be burdened with the cost of protecting the project from any sea level rise or storm damage in the future; (iii) evidence that project implementation shall not exacerbate flood risk through loss of flood storage capacity or; d) projects or uses that are interim or temporary in nature where the use or structures: (1) can be easily removed or relocated to higher ground; (2) can be amortized within a period before removal or relocation of the proposed use is required; and (3) will not require shoreline protection during the life of the project.

Climate Change		
	Staff's Proposed Policies	**Alternative Language**
		California Coastkeeper Alliance suggestion: *Note: Do not include finding 6(c).* **Treasure Island Development Authority's suggestion:** *Note: Keep the rest of Policy 6 as proposed, but revise Policy 6(d)(2)(iii) as follows:* d. (2) (iii) a permanent financial strategy that will guarantee the general public will not be burdened with the cost of protecting the project from sea level rise or storm damage caused by sea level rise in the future; **Alternative Language-Policy 6:**
	7. To effectively address sea level rise and flooding, if more than one government agency has authority or jurisdiction over a particular issue or area, project reviews should be coordinated to resolve conflicting guidelines, standards or conditions.	

Safety of Fills		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
f. Flood damage to fills and shoreline areas can result from a combination of heavy rainfall, high tides, and winds blowing onshore. To prevent such damage, structures on fill or near the shoreline should be above the highest expected water level during the expected life of the project or should be protected for the expected life of the project by levees of an adequate height.	**Add underlined language and delete struck-through language as follows**: f. Flood damage to fills and shoreline areas can result from a combination of sea level rise, storm surge, ~~heavy~~ rainfall, high tides, and winds blowing onshore. The most effective way ~~T~~to prevent such damage~~,~~ is to locate projects and facilities ~~structures~~ on fill or near the shoreline ~~should be~~ above ~~the~~ a ~~highest expected water level~~ 100-year flood level that takes future sea level rise into account, during the expected life of the project. ~~or should be protected for the expected life of the project by~~ Other approaches that can reduce flood damage include protecting structures or areas with levees, ~~of an adequate height~~ seawalls, tidal marshes, or other protective measures, employing innovative design concepts, such as building structures that can be easily relocated, tolerate periodic flooding or are adaptively designed and managed to address sea level rise over time.	**Baykeeper's suggestion:** f. Flood damage to fills and shoreline areas can result from a combination of sea level rise, storm surge, heavy rainfall, high tides, and winds blowing onshore. The most effective way ~~T~~to prevent such damage is to locate projects outside areas at risk of sea-level rise and storm surges of an appropriate return frequency. ~~, structures on fill or near the shoreline should be above the highest expected water level during the expected life of the project or should be protected for the expected life of the project by levees of an adequate height.~~ Other approaches that can reduce flood damage include protecting structures or areas with biological engineering approaches (i.e. Living Walls), levees, seawalls, tidal marshes, or other protective measures, employing innovative design concepts, such as building structures that can be easily relocated, tolerate periodic flooding or are adaptively designed and managed to address sea level rise over time. **Alternative Language-Finding f:**

Safety of Fills		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
g. Bay water levels are likely to increase in the future because of a relative rise in sea level. Relative rise in sea level is the sum of: (1) a rise in global sea level and (2) land elevation change (lifting or subsidence) around the Bay. If historic trends continue, global sea level should increase between four and five inches in the Bay in the next 50 years and could increase approximately one and one-half to five feet by the year 2100 depending on the rate of accelerated rise in sea level caused by the "greenhouse effect," the long-term warming of the earth's surface from heat radiated off the earth and trapped in the earth's atmosphere by gases released into the atmosphere. The warming would bring about an accelerated rise in sea level worldwide through thermal expansion of the upper layers of the oceans and melting of some of the earth's glaciers and polar ice packs. Land elevation change caused by tectonic (geologic including seismic) activity, consolidation or compaction of soft soils such as Bay muds, and extraction of subsurface groundwater or natural gas extraction, is variable around the Bay. Consequently, some parts of the Bay will experience a greater relative rise in sea level than other areas. For example, in Sausalito, the land area has been gradually lifting while in the South Bay excessive pumping from underground fresh water reservoirs has caused extensive subsidence of the ground surface in the San Jose area	**Add underlined language and delete struck-through language as follows**: g. ~~Bay water levels are likely to increase in the future because of a relative rise in sea level. Relative rise in sea level is the sum of: (1) a rise in global sea level and (2) land elevation change (lifting or subsidence) around the Bay. If historic trends continue, global sea level should increase between four and five inches in the Bay in the next 50 years and could increase approximately one and one-half to five feet by the year 2100 depending on the rate of accelerated rise in sea level caused by the "greenhouse effect," the long-term warming of the earth's surface from heat radiated off the earth and trapped in the earth's atmosphere by gases released into the atmosphere. The warming would bring about an accelerated rise in sea level worldwide through thermal expansion of the upper layers of the oceans and melting of some of the earth's glaciers and polar ice packs.~~ Sea level is rising at an accelerated rate due to global climate change. Land elevation change caused by tectonic (geologic, including seismic) activity, consolidation or compaction of soft soils such as Bay muds, and extraction of subsurface groundwater or natural gas extraction, is variable around the Bay. Consequently, some parts of the Bay will experience a greater relative rise in sea level than other areas. Relative rise in sea level is the sum of: (1) a rise in global sea level and (2) land elevation change (lifting or subsidence) around the Bay. ~~For example, in Sausalito, the land area has been gradually lifting while in the South Bay excessive pumping from underground fresh water reservoirs has caused extensive~~	

Safety of Fills		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
and as far north as Dumbarton Bridge (map of Generalized Subsidence and Fault Zones shows subsidence from 1934 to 1967). Indications are that if heavy groundwater pumping is continued indefinitely in the South Bay area, land in the Alviso area (which has already subsided about seven feet since 1912) could subside up to seven feet more; if this occurs, extensive levees may be needed to prevent inundation of low-lying areas by the extreme high water levels.	~~subsidence of the ground surface in the San Jose area and as far north as Dumbarton Bridge (map of Generalized Subsidence and Fault Zones shows subsidence from 1934 to 1967). Indications are that if heavy groundwater pumping is continued indefinitely in the South Bay area, land in the Alviso area (which has already subsided about seven feet since 1912) could subside up to seven feet more; if this~~ Where subsidence occurs, more extensive ~~levees~~ shoreline protection and wetland restoration projects may be needed to minimize ~~prevent inundation~~ flooding of low-lying areas by the extreme high water levels.	
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
3. To provide vitally-needed information on the effects of earthquakes on all kinds of soils, installation of strong-motion seismographs should be required on all future major land fills. In addition, the Commission encourages installation of strong-motion seismographs in other developments on problem soils, and in other areas recommended by the U.S. Coast and Geodetic Survey, for purposes of data comparison and evaluation.	**Add underlined language and delete struck-through language as follows**: 3. To provide vitally-needed information on the effects of earthquakes on all kinds of soils, installation of strong-motion seismographs should be required on all future major land fills. In addition, the Commission encourages installation of strong-motion seismographs in other developments on problem soils, and in other areas recommended by the U.S. ~~Coast and Geodetic~~ Geological Survey, for purposes of data comparison and evaluation.	

Safety of Fills		
Existing Bay Plan Findings	**Staff's Proposed Policies**	**Alternative Language**
4. To prevent damage from flooding, structures on fill or near the shoreline should have adequate flood protection including consideration of future relative sea level rise as determined by competent engineers. As a general rule, structures on fill or near the shoreline should be above the wave runup level or sufficiently set back from the edge of the shore so that the structure is not subject to dynamic wave energy. In all cases, the bottom floor level of structures should be above the highest estimated tide elevation. Exceptions to the general height rule may be made for developments specifically designed to tolerate periodic flooding.	**Add underlined language and delete struck-through language as follows**: 4. Adequate measures should be provided ~~T~~to prevent damage from sea level rise and storm activity ~~flooding,~~ that may occur ~~structures~~ on fill or near the shoreline over the expected life of a project. ~~should have adequate flood protection including consideration of future relative sea level rise as determined by competent engineers. As a general rule,~~ The Commission may approve fill that is needed to provide flood protection for existing projects. New projects ~~structures~~ on fill or near the shoreline should either be ~~above the wave runup level or sufficiently~~ set back from the edge of the shore so that the project ~~structure is~~ will not be subject to dynamic wave energy~~.~~,be built so ~~In all cases,~~ the bottom floor level of structures ~~should~~ will be above a ~~the highest estimated tide~~ 100-year flood elevation that takes future sea level rise into account for the expected life of the project~~.~~, be ~~Exceptions to the general height rule may be made for developments~~ 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.	**Baykeeper's suggestion:** 4. Adequate measures should be provided ~~T~~to prevent damage from sea level rise and storm activity ~~flooding,~~ that may occur ~~structures~~ on fill or near the shoreline over the expected life of a project. ~~should have adequate flood protection including consideration of future relative sea level rise as determined by competent engineers. As a general rule,~~ The Commission may approve fill that is needed to provide flood protection for existing projects. New projects ~~structures~~ on fill or near the shoreline should either be ~~above the wave runup level or sufficiently~~ set back from the edge of the shore so that the project ~~structure is~~ will not be subject to dynamic wave energy~~.~~,be built so ~~In all cases,~~ the bottom floor level ~~of structures~~, including an appropriate freeboard, is placed at a height appropriate for the use and location of the site, as informed by a flood risk assessment in consultation with Flood Control Districts and/or the Army Corps of Engineers; ~~of structures will be above the highest estimated tide elevation. Exceptions to the general height rule may be made for developments~~ 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.

Safety of Fills		
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
		Alternative Language-Policy 4
5. To minimize the potential hazard to Bay fill projects and bayside development from subsidence, all proposed developments should be sufficiently high above the highest estimated tide level for the expected life of the project or sufficiently protected by levees to allow for the effects of additional subsidence for the expected life of the project, utilizing the latest information available from the U.S. Geological Survey and the National Ocean Service. Rights-of-way for levees 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.	**Add underlined language and delete struck-through language as follows**: 5. ~~To minimize the potential hazard to Bay fill projects and bayside development from subsidence, all proposed developments should be sufficiently high above the highest estimated tide level for the expected life of the project or sufficiently protected by levees to allow for the effects of additional subsidence for the expected life of the project, utilizing the latest information available from the U.S. Geological Survey and the National Ocean Service. Rights-of-way for levees 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.~~	

Safety of Fills		
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
6. Local governments and special districts with responsibilities for flood protection should assure that their requirements and criteria reflect future relative sea level rise and should assure that new structures and uses attracting people are not approved in flood prone areas or in areas that will become flood prone in the future, and that structures and uses that are approvable will be built at stable elevations to assure long-term protection from flood hazards.	**Add underlined language and delete struck-through language as follows:** 6. Local governments and special districts with responsibilities for flood protection should assure that their requirements and criteria ~~reflect~~ address future relative sea level rise ~~and should assure~~ so that new structures and uses attracting people are not approved in current or future flood prone areas, ~~or in areas that will become flood prone in the future~~; and that structures and uses that are approved ~~approvable~~ will be built at stable elevations and are properly designed to assure long-term protection from ~~flood hazards~~ shoreline flooding.	

~~Protection of the~~ Shoreline Protection		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
	Add underlined language as follows: a. Well designed shoreline protection projects, such as levees, wetlands, or riprap, can prevent shoreline erosion and damage from flooding.	
a. Erosion control projects are often needed to protect shoreline property and improvements from erosion. Because so much shoreline consists of soft, easily eroded soils, protective structures are usually required to stabilize and establish a permanent shoreline. These structures often require periodic maintenance and reconstruction.	**Delete struck-through language as follows**: ~~a.~~ b. ~~Erosion control~~ Because vast shoreline areas are vulnerable to flooding and because much of the shoreline consists of soft, easily eroded soils, shoreline protection projects are often needed to ~~protect~~ reduce damage to shoreline property and improvements ~~from erosion~~. ~~Because so much shoreline consists of soft, easily eroded soils, protective structures are usually required to stabilize and establish a permanent shoreline. These structures~~ Structural shoreline protection, such as riprap, levees, and seawalls, often requires periodic maintenance and reconstruction.	
b. Most erosion control projects involve some fill which can adversely affect natural resources such as water surface area and volume, tidal circulation, wildlife use, marshes, and mudflats.	**Add underlined language and delete struck-through language as follows**: ~~b~~. c. Most ~~erosion control~~ structural shoreline protection projects involve some fill, which can adversely affect natural resources, such as water surface area and volume, tidal circulation, and wildlife use. ~~marshes, and mudflats.~~ Structural shoreline protection can further cause erosion of tidal wetlands and tidal flats, prevent wetland migration to accommodate sea level rise, create a barrier to physical and visual public access to the Bay, create a false sense of security and may have cumulative impacts. Physical and visual public access can be provided on levees and other protection structures. As the rate of sea level rise accelerates and the potential for shoreline flooding increases, the demand for new shoreline protection projects will likely increase. Some projects may involve extensive amounts of fill.	

~~Protection of the~~ Shoreline Protection		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
c. Shoreline protection structures, such as riprap and sea walls, are most effective and less damaging to natural resources if they are the appropriate kind of structure for the project site and erosion problem, and are properly designed, constructed, and maintained. Because factors affecting erosion vary considerably, no single protective method or structure is appropriate in all situations. When a structure is not appropriate or improperly designed and constructed to meet the unique conditions of and the erosion forces at a project site, the structure is more likely to fail, require additional fill to repair, have higher long-term maintenance costs because of higher frequency of repair, and cause greater disturbance and displacement of the site's natural resources.	**Add underlined language and delete struck-through language as follows**: ~~c~~. d. Structural ~~S~~shoreline protection ~~structures, such as riprap and sea walls, are~~ is most effective and less damaging to natural resources if ~~they are~~ it is the appropriate kind of structure for the project site and erosion and flood problem, and ~~are~~ is properly designed, constructed, and maintained. Because factors affecting erosion and flooding vary considerably, no single protective method or structure is appropriate in all situations. When a structure is not appropriate or is improperly designed and constructed to meet the unique site characteristics, flood conditions ~~of~~, and erosion forces at a project site, the structure is more likely to fail, require additional fill to repair, have higher long-term maintenance costs because of higher frequency of repair, and cause greater disturbance and displacement of the site's natural resources.	
	Add underlined language as follows: e. 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).	

~~Protection of the~~ Shoreline Protection		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
d. Nonstructural erosion control methods, such as marsh plantings, are typically effective only in areas experiencing mild erosion. However, in some instances, it may be possible to combine marsh restoration with structural approaches to control shoreline erosion, thereby minimizing the erosion control project's impact on natural resources.	**Add underlined language and delete struck-through language as follows**: ~~d~~ f. Nonstructural ~~erosion control~~ shoreline protection methods, such as tidal marshes ~~marsh plantings~~, can provide effective flood control but are typically effective for erosion control only in areas experiencing mild erosion. ~~However, i~~ In some instances, it may be possible to combine ~~marsh~~ habitat restoration, enhancement or protection with structural approaches to provide protection from flooding and control shoreline erosion, thereby minimizing the ~~erosion control~~ shoreline protection project's impact on natural resources.	
e. Loose dirt, concrete slabs, asphalt, bricks, scrap wood and other kinds of debris, are generally ineffective in halting shoreline erosion and may lead to increased fill. Although providing some short-term shoreline protection, protective structures constructed of such debris materials typically fail rapidly in storm conditions because the material slides bayward or is washed offshore. Repairing these ineffective structures requires additional material to be placed along the shoreline, leading to unnecessary fill and disturbance of natural resources.	**Add underlined language and delete struck-through language as follows**: ~~e~~.g. Loose dirt, concrete slabs, asphalt, bricks, scrap wood and other kinds of debris, are generally ineffective in halting shoreline erosion or preventing flooding and may lead to increased fill or release of pollutants. Although providing some short-term shoreline protection, protective structures constructed of such debris materials typically fail rapidly in storm conditions because the material slides bayward or is washed offshore. Repairing these ineffective structures requires additional material to be placed along the shoreline, leading to unnecessary fill and disturbance of natural resources.	

~~Protection of the~~ Shoreline Protection		
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
1. New shoreline erosion control projects and the maintenance or reconstruction of existing erosion control facilities should be authorized if: (a) the project is necessary to protect the shoreline from erosion; (b) the type of the protective structure is appropriate for the project site and the erosion conditions at the site; and (c) the project is properly designed and constructed. Professionals knowledgeable of the Commission's concerns, such as civil engineers experienced in coastal processes, should participate in the design of erosion control projects.	**Add underlined language and delete struck-through language as follows**: 1. New shoreline ~~erosion control~~ protection projects and the maintenance or reconstruction of existing ~~erosion control facilities~~ projects should be authorized if: (a) the project is necessary to protect existing shoreline development from flooding or erosion; (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; ~~and~~ (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.	**Treasure Island Development Authority's suggestion:** 1. New shoreline ~~erosion control~~ protection projects and the maintenance or reconstruction of existing ~~erosion control facilities~~ projects should be authorized if: (a) the project is necessary to protect existing shoreline development and Priority Development Areas as designated by the ABAG FOCUS study from flooding or erosion; (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; ~~and~~ (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.

~~Protection of the~~ Shoreline Protection		
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
		Alternative Language-Policy 1
2. Riprap revetments, the most common shoreline protective structure, should be constructed of properly sized and placed material that meet sound engineering criteria for durability, density, and porosity. Armor materials used in the revetment should be placed according to accepted engineering practice, and be free of extraneous material, such as debris and reinforcing steel. Generally, only engineered quarrystone or concrete pieces that have either been specially cast or carefully selected for size, density, durability, and freedom of extraneous materials from demolition debris will meet these requirements. Riprap revetments constructed out of other debris materials should not be authorized.	**Add underlined language and delete struck-through language as follows**: 2. Riprap revetments, the most common shoreline protective structure, should be constructed of properly sized and placed material that meet sound engineering criteria for durability, density, and porosity. Armor materials used in the revetment should be placed according to accepted engineering practice, and be free of extraneous material, such as debris and reinforcing steel. Generally, only engineered quarrystone or concrete pieces that have either been specially cast, <u>are free of extraneous materials from demolition debris,</u> ~~or~~ <u>and are</u> carefully selected for size, density, <u>and</u> durability~~, and freedom of extraneous materials from demolition debris~~ will meet these requirements. Riprap revetments constructed out of other debris materials should not be authorized.	

~~Protection of the~~ Shoreline Protection		
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
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 that the effects of the erosion control project on natural resources during the life of the project will be the minimum necessary.	**Add underlined language and delete struck-through language as follows**: 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 ~~erosion control~~ shoreline protection project on natural resources during the life of the project will be the minimum necessary.	
4. Shoreline protective projects should include provisions for nonstructural methods such as marsh vegetation where feasible. 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 protective projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever practicable.	4. Whenever feasible and appropriate, shoreline protecti~~ve~~on projects should include provisions for nonstructural methods such as marsh vegetation ~~where feasible~~ 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 protecti~~ve~~on projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever ~~practicable~~ feasible.	
	Add underlined language as follows: 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.	

Public Access. The staff preliminarily recommends the Commission revise the findings and policies in the *Public Access* policy section as shown below.

More context on how other findings and policies in this section of the Bay Plan relate to the proposed changes, especially those that the staff is not proposing to change, is available at http://www.bcdc.ca.gov/laws_plans/plans/sfbay_plan.shtml.

Public Access		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
	Add underlined language as follows: f. Accelerated flooding from sea level rise and storm activity will severely impact existing shoreline public access, resulting in temporary or permanent closures. Periodic and consistent flooding would increase damage to public access areas, which can then require additional fill to repair, raise maintenance costs, and cause greater disturbance and displacement of the site's natural resources. Risks to public health and safety from sea level rise and shoreline flooding may require new shoreline protection to be installed or existing shoreline protection to be modified, which may impede physical and visual access to the Bay.	
h. Public access areas obtained through the permit process are most utilized if they provide physical access, provide connections to public rights-of-way, are related to adjacent uses, are designed, improved and maintained clearly to indicate their public character, and provide visual access to the Bay.	**Add underlined language and delete struck-through language as follows**: ~~h~~ i. Public access areas obtained through the permit process are most utilized if they provide physical access, provide connections to public rights-of-way, are related to adjacent uses, are designed, improved and maintained clearly to indicate their public character, and provide visual access to the Bay. Flooding from sea level rise and storm activity increase the difficulty of designing public access areas (e.g., connecting new public access that is set at a higher elevation or located farther inland than existing public access areas).	

Public Access		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
k. Studies indicate that public access may have immediate effects on wildlife (including flushing, increased stress, interrupted foraging, or nest abandonment) and may result in adverse long-term population and species effects. Although some wildlife may adapt to human presence, not all species or individuals may adapt equally, and adaptation may leave some wildlife more vulnerable to harmful human interactions such as harassment or poaching. The type and severity of effects, if any, on wildlife depend on many factors, including physical site configuration, species present, and the nature of the human activity. Accurate characterization of site, habitat and wildlife conditions, and of likely human activities, would provide information critical to understanding potential effects on wildlife.	**Add underlined language and delete struck-through language as follows**: ~~k~~ l. Studies indicate that public access may have immediate effects on wildlife (including flushing, increased stress, interrupted foraging, or nest abandonment) and may result in adverse long- term population and species effects. Although some wildlife may adapt to human presence, not all species or individuals may adapt equally, and adaptation may leave some wildlife more vulnerable to harmful human interactions such as harassment or poaching. The type and severity of effects, if any, on wildlife depend on many factors, including physical site configuration, species present, and the nature of the human activity. Accurate characterization of current and future site, habitat and wildlife conditions, and of likely human activities, would provide information critical to understanding potential effects on wildlife.	
l. Potential adverse effects on wildlife from public access may be avoided or minimized by siting, designing and managing public access to reduce or prevent adverse human and wildlife interactions. Managing human use of the area may include adequately maintaining improvements, periodic closure of access areas, pet restrictions such as leash requirements, and prohibition of public access in areas where other strategies are insufficient to avoid adverse effects. Properly sited and/or designed public access can avoid habitat fragmentation and limit predator access routes to wildlife areas. In some cases,	**Add underlined language and delete struck-through language as follows**: ~~l~~ m. Potential adverse effects on wildlife from public access may be avoided or minimized by siting, designing and managing public access to reduce or prevent adverse human and wildlife interactions. Managing human use of the area may include adequately maintaining improvements, periodic closure of access areas, pet restrictions such as leash requirements, and prohibition of public access in areas where other strategies are insufficient to avoid adverse effects. Properly sited and/or designed public	

Public Access		
Existing Bay Plan Findings	**Staff's Proposed Findings**	**Alternative Language**
public access adjacent to sensitive wildlife areas may be set back from the shoreline a greater distance because buffers may be needed to avoid or minimize human disturbance of wildlife. Appropriate siting, design and management strategies depend on the environmental characteristics of the site and the likely human uses of the site.	access can avoid habitat fragmentation and limit predator access routes to wildlife areas. In some cases, public access adjacent to sensitive wildlife areas may be set back from the shoreline a greater distance because buffers may be needed to avoid or minimize human disturbance of wildlife. Appropriate siting, design and management strategies depend on the environmental characteristics of the site, ~~and~~ the likely human uses of the site, and the potential impacts of future ~~sea level rise~~ climate change.	
Existing Bay Plan Policies	**Staff's Proposed Policies**	**Alternative Language**
	Add underlined language as follows: 5. Public access should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding.	
5. 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. This should be done wherever appropriate by requiring dedication of fee title or easements at no cost to the public, in the same manner that streets, park sites, and school sites are dedicated to the public as part of the subdivision process in cities and counties.	**Add underlined language and delete struck-through language as follows**: ~~5~~ 6. 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. This should be done wherever appropriate by requiring dedication of fee title or easements at no cost to the public, in the same manner that streets, park sites, and school sites are dedicated to the public as part of the subdivision process in cities and counties. 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.	