

Exhibit A

This page intentionally left blank.

EXHIBIT A DISCUSSION

Monterey County Hazard Mitigation Plan

The County of Monterey developed and adopted a *Multi-Jurisdictional Hazard Mitigation Plan* in 2015 (excerpts in **Exhibit B**; web link to full document), to identify and profile natural hazards, assess vulnerability, and plan for future maintenance. Sea level rise (SLR) is addressed in the plan in section 4.3.9. The plan also discusses coastal erosion (section 4.3.2) and storm flooding (section 4.3.6) hazards due to SLR and climate change. The current plan estimates an approximate 5-foot rise in sea level by the year 2100. As summarized in the discussion for SLR, “sea level rise will be an amplifier of the magnitude for these other coastal hazards,” referring to coastal erosion and coastal flooding.

The current plan will be updated over the next year. Information about the update is found on the County website (<https://www.co.monterey.ca.us/government/departments-a-h/administrative-office/office-of-emergency-services/hazard-mitigation>). During the workshop, County staff will discuss the existing plan and the update process.

2018 State Guidance

The *State of California Sea-Level Rise Guidance* (**Exhibit C**—Executive Summary; web link to full document) was updated in 2018 and provides a science-based methodology for state and local governments to analyze and assess the risks associated with sea level rise, and to incorporate sea level rise into planning, permitting, and investment decisions. The State’s guidance outlines five steps to provide a decision framework to evaluate the consequences and risk tolerance of various planning decisions and should be used to guide selection of appropriate sea-level rise projections, and if necessary, develop adaptation pathways. These steps include: 1) Identify the nearest tide gauge; 2) Evaluate project lifespan; 3) For the nearest tide gauge and project lifespan, identify range of sea-level rise projections; 4) Evaluate potential impacts and adaptive capacity across a range of sea-level rise projections and emission scenarios; and 5) Select sea-level projections based on risk tolerance and, if necessary, develop adaptation pathways that increase resiliency to sea-level rise and include contingency plans if projections are exceeded. This type of analysis will be critical for providing acceptable risk information for public infrastructure investment and for private development projects.

The Coastal Commission is working on a document (*Coastal Adaptation Planning Guidance: Residential Development*) related to residential construction and sea level rise. The draft document (March 2018) can be found at <https://www.coastal.ca.gov/climate/slr/vulnerability-adaptation/residential/>. During the workshop, Coastal Commission staff will discuss how they are assisting local governments in developing policies and regulations related to climate change.

2017 Monterey Bay Study

Two areas along the coastline of Monterey County with unique values to Monterey County should be protected soon: Moss Landing area and Pebble Beach golf courses. However, other areas are also vulnerable, including agricultural lands, low areas of development around Carmel and Castroville, coastal development south of Moss Landing (e.g., Monterey Dunes Colony), and County infrastructure in many locations.

Under contract to the County, the Central Coast Wetlands Group (CCWG) prepared the *Moss Landing Coastal Climate Change Vulnerability Report* (Report) (**Exhibit D** for full report, **Exhibit E** for projected sea level rise scenarios), dated June 2017, in detail for the Moss

Landing Community area and more generally for other areas of the Monterey Bay coast. The Report allows staff and the community to utilize scientific information to develop policies and regulations for the Moss Landing Community Plan (MLCP) Update. This Report utilizes modeling scenarios for three emissions scenarios¹—low, medium, and high—and identifies the critical coastal infrastructure in the North County area that may be compromised due to sea level rise (SLR) and other climate change effects. The Report further estimates when those risks may occur, defines appropriate response strategies for these risks, and discusses policy options that can be adopted within the Moss Landing Community Plan update.

The Report follows a guidance document provided by the California Coastal Commission that recommends all communities evaluate the impacts from SLR on various land uses. The guidance recommends using a method called “scenario-based analysis.” Since SLR projections are not exact, but rather presented in ranges, scenario-based planning includes examining the consequences of multiple scenarios of SLR, plus extreme water levels from storms and El Nino events.

The Report contains a Summary of Findings on pages vii and viii. The modeling and outcomes described in the Report assumes a medium emissions scenario for year 2030 and a high emissions scenario for years 2060 and 2100 modeling. Section 4.3 provides a good summary of future vulnerabilities in Moss Landing for each of the three modeling years. This section provides a description of combined effects of coastal climate change by each modeled year, with a summary found in Table 6, Vulnerability of Assets due to Combined Effects of Coastal Climate Change (page 28). Projected SLR and an increase in storm frequency and intensity due to climate change would increase the frequency and severity of coastal flooding events. This combination would elevate the risk of damage to a greater number of Moss Landing properties and infrastructure.

The Report also describes each hazard type in Section 5, Vulnerability by Coastal Hazard. The hazards associated with each of the modeled coastal processes (coastal storm flooding, coastal erosion, rising tides and fluvial flooding) threaten various types of coastal infrastructure differently. Wave and fluvial flooding can damage buildings, and temporarily restrict use of public amenities, make storm drains and tide gates ineffective and limit the use of roads and walkways. Many of these impacts are temporary and repairs can be made while others require long-term programs to address necessary infrastructure improvements or changes in land use. Dune erosion and monthly high tide flooding, for example, are permanent impacts that will lead to extensive rebuilding, a change in use or abandonment of property. By analyzing the impacts due to separate coastal hazards, we can begin to plan adaptation strategies accordingly.

At this time, staff does not recommend using the low or high greenhouse gas emissions scenarios for the Moss Landing Community Plan update; however, policies are expected to be written to be flexible to changing conditions. In other words, the policies and regulations will be adaptable to updated scientific information. The low emissions scenario does not call for

¹ As the earth absorbs energy from the sun, it must eventually emit an equal amount of energy into space and the difference between incoming and outgoing radiation is known as a planet’s radiative forcing or “RF”. Climate change scenarios to predict how high earth’s RF could be in the future are derived from plausible pathways, Representative Concentration Pathways (RCPs), for emissions of greenhouse gases. The highest scenario, RCP 8.5, reflects a track with little mitigative measures to reduce greenhouse gas emissions resulting in a net increase in radiative forcing of 8.5 Watts/m² by year 2100 relative to pre-industrial (year 1750) conditions. A medium level emissions scenario, RCP 4.5, reflects a future wherein changes in technology and energy usage stabilize the increase in net radiative forcing to 4.5 Watts/m² by 2100. The low emissions scenario is modeled after existing conditions.

prudent planning decisions to protect existing infrastructure based on likely climate change impacts; experts are not anticipating that the low emissions scenario can be achieved based on current efforts. The high emissions scenario would likely require planning for managed retreat, which appears premature at this time.

Projected climate change effects are depicted graphically for Moss Landing in Figures 11, 13, 17 and 19 (**Exhibit E** of this staff report). Table 7 (**Exhibit D**, page 30) show hazards at projected SLR conditions (in feet) under medium and high scenarios, as well as tidal height projections (in feet) in a 10-year tide event combined with medium and high emissions scenarios for the years 2030, 2060, and 2100. The affected area is greatly increased with events such as a 10-year tide event, where for example the 5.2 feet of projected sea level rise (year 2100, High scenario) increases to 12.9 feet during a 10-year tide event. Future studies related to hazard risk assessments should continue to look at the full range of climate change projections.

On August 29, 2018, staff gave a presentation to the Moss Landing Community on the 2017 Vulnerability Report. Staff also presented the draft sea level rise policies to give the community a better understanding of recommended changes the County incorporated so they could comment on those recommended changes. This took two meetings, the second one being September 19, 2018. One of the primary authors of the *Moss Landing Coastal Climate Change Vulnerability Report*, Ross Clark, was present at both meetings and was very instrumental in providing additional input to the community and County staff. Considering the information presented at these meetings, the community expressed a desire to protect the Moss Landing community in its current location. The community encouraged adaptation strategies to maintain the long-term viability of the Moss Landing Community in its present location. Their main concern was funding and who would have to pay for any needed infrastructure upgrades or relocation when that becomes a reality. A copy of the draft Moss Landing Community Plan Policy Matrix related to climate change is attached to give an idea of the community's comments (**Exhibit F**). Ultimately, as sea level rise becomes significant, managed retreat for much or all the community may be necessary.

During the workshop, Ross Clark will discuss the local climate change studies his group is working on for Moss Landing, stormwater systems in Salinas Valley, and the Moss Landing Harbor. He will also discuss other local efforts related to cities on the Monterey Bay.

AMBAG Central Coast Highway 1 Climate Resiliency Study

The County is participating with many other agencies on an effort being coordinated by the Association of Monterey Bay Area Governments to study effects of climate change on Highway 1 infrastructure. Much of the focus is related to stretches of the Highway around Moss Landing (**Exhibit G**).

This study will evaluate and identify the transportation needs, including the ultimate corridor concept in the Central Coast Highway 1 and rail corridor near the Elkhorn Slough area while protecting and integrating the environmental needs of this unique corridor. There is a deficiency in this critical corridor where existing demand greatly exceeds the limited capacity and numerous intersections and conflict points, causing long delays. Highway and railroad infrastructure are prone to flooding and vulnerable to sea level rise, and are adjacent to valuable wetland habitats of an estuary of noted regional and national significance. Much of these valued habitats are also vulnerable to sea level rise. This study has an opportunity to increase the resilience of transportation infrastructure and habitat to sea level rise and climate change. Goals

of the AMBAG study are to identify sea level rise adaptation approaches for Highway 1 that can do the following:

- Improve transportation safety and efficiency
- Promote healthy coastal habitats
- Provide economic security and benefits to the local community

During the workshop, Heather Adamson with AMBAG will discuss the study.

Other Studies and Information

In addition to the plans, reports and studies described above, a lot of additional information is available. County staff have used the National Oceanic and Atmospheric Administration's Sea Level Rise Calculator: <https://coast.noaa.gov/digitalcoast/tools/slr.html>. Other calculators are available on line. The information from these calculators is useful for general purposes, but are subject to certain assumptions so are not sufficiently precise for individual areas or for development purposes. For example, accelerated coastal erosion or changes over time in protection infrastructure (natural or constructed) are not included in some of the calculator models.

In addition, a study has been submitted from the public (**Exhibit H**) that describes infrastructure needs for the United States and the costs of such needs. While this study has a good scientific basis, staff has two concerns with the assumptions. The first is that sea walls are the solution, and costs provided in this study are related only to seawalls. This may be a good way to analyze this on such a broad scale (over the entire US) but is not necessarily applicable in any given location. In addition, allocating the cost only to population is also not the best in every case, and certainly not for Moss Landing.

For Moss Landing in particular, the assumption in the report is for three miles of seawalls and that the costs are allocated only to residents of the community. Staff doesn't believe that either of these is applicable to Moss Landing. While armoring is anticipated for portions of the harbor area, natural dunes and planned open space in the area may allow reducing the need for seawalls to substantially less than three miles. In addition, costs of seawalls would likely be borne by property owners, including the Harbor District and commercial and industrial uses that need the protection. The residential area is higher in elevation and may not require any structural protection, at least during this century, so costs would not likely be allocated based on residents, except potentially through any broad taxpayer funding used to construct infrastructure.

Attached (**Exhibit I**) is the *Monterey Bay National Marine Sanctuary – Final Management Plan*, Section II, Coastal Development document excerpt. This document provides Action Plans for Coastal Armoring, Desalination, Harbor and Dredge Disposal, and Submerged Cables. Also attached (**Exhibit I**) is a document prepared by the California Legislative Analyst's Office (*Preparing for Rising Seas: How the State Can Help Support Local Coastal Adaptation Efforts*). This document focuses on the state's role in responding to climate change, the importance of local governments planning for climate change, and how the state can provide assistance.

In addition to the 2017 Monterey Bay Study discussed above, Ross Clark and the Central Coast Wetlands Group are also working on other studies related to climate change in the Central Coast. They have worked with the Salinas Valley Stormwater Plan development team to create

a watershed enhancement prioritization model. The Storm Water Resource Plan for the Greater Monterey County Integrated Regional Water Management Region (**Exhibit I**) guides the selection of lands for wetland, creek and riparian restoration that 1) improve aquatic habitat and water quality for native species, 2) support flood attenuation and storm water capture, 3) prioritize lands that pose problems to successful farming, and 4) develop projects that provide open space and recreational opportunities for disadvantaged communities (DAC) (i.e. Castroville). In addition, recent studies have recommended specific climate change adaptation management strategies (CCWG 2017, IRWMP 2018) which we intend to develop through this project.

Additional efforts include: working with the Moss Landing Harbor District Study in accordance with the requirements of the State Lands Commission to address climate change effects on harbor throughout the State of California; developing a dune restoration program, in partnership with State Parks, to maintain the Salinas River State Beach (SRSB) dune protective barrier between the ocean and the low lying Salinas Valley (see **Exhibit I**, SRSB Dune Restoration Brochure and full management plan is at <https://drive.google.com/file/d/0B4qUY-zc8V-WMXhFSi1SaGh5Wlk/view>); a "Planning for predicted Sea Level Rise in the Salinas Valley" contract, funded by the Wildlife Conservation Board, to collaborate with landowners of flood vulnerable lands to identify set back and other adaptation options for those areas of their lands (farms); and additional climate change work funded by the Department of Fish and Wildlife.

AEE Board of Supervisors Committee

On October 25, 2018, Staff presented the Moss Landing Community's desire to protect existing development in place to the Board of Supervisors' Alternative Energy and Environment (AEE) Committee. The AEE Committee wanted to know how the Moss Landing Community felt about the effects of sea level rise and how it pertains to their community. The basic question that staff determined needed to be answered was whether we currently have sufficient information that we should plan to relocate much or all of the community to reduce potential for climate change effects, or plan for the community to stay in its current location.

The Committee would like to see policies developed that would better allow the community to retreat inland when necessary. Managed retreat would naturally move at-risk land uses to higher elevations, either in place or inland. Higher elevation land areas in the vicinity of the community are currently designated for industrial, open space and agricultural uses, so those areas should be available for more intense development if the community requires relocation in the future. Any relocation of the Moss Landing Harbor would require an extensive study, based on updated climate change and important resource area information, at the time.

To determine the needed improvements, costs, and methods to allocate the costs with more accuracy for Monterey County, Staff will approach the Board of Supervisors with a request to direct Staff to seek funding to prepare a detailed climate hazards risk assessment. This more detailed look would identify County infrastructure at risk, potential costs to provide resilient infrastructure, and potentially identify private property areas also at risk from climate change effects. This effort would look at the entire Monterey County coast to identify areas at risk, as well as identify infrastructure at risk from the effects of climate change, potentially including development of engineering design plans for the protection and/or adaptation of any at-risk infrastructure.

This page intentionally left blank