FLOODING AHEAD: PLANNING FOR SEA LEVEL RISE

ISSUE

What actions can the County of San Mateo, and the 20 cities and two relevant local special agencies within the county, take now to plan for sea level rise?

SUMMARY

San Mateo County is at severe risk for sea level rise (SLR) over the period 2015-2100. The County, and the 20 cities and two relevant local special agencies within the county,[1] do not have a coordinated approach to address *existing* problems related to flooding and are not prepared for the added challenge of SLR. This investigation documents the countywide risk that SLR poses to people, property, and critical infrastructure. For example, wastewater treatment plants are highly vulnerable to SLR and this vulnerability presents significant problems for all cities, not just those along the coast and bay.

This Grand Jury report discusses ways to get organized to plan for SLR, as well as alternative sources of funding for SLR-related projects. Based on this investigation, the Grand Jury recommends that a single organization undertake SLR planning on a countywide basis. This report also examines ways to address SLR as part of local land use planning and recommends including SLR-related policies in local General Plans. It also recommends implementation of a coordinated program to raise public awareness of SLR, particularly as to how it may impact this county. Finally, the report highlights the need for effective and coordinated advocacy at the regional, State, and federal levels.

The Grand Jury strongly urges action *now* to undertake countywide planning for SLR. By acting now, SMC may be able to reduce future costs by integrating SLR-related projects with other programmed levee projects, such as those that may be triggered by new FEMA flood hazard maps. By acting now, San Mateo County jurisdictions may apply land use planning measures to mitigate future exposure to SLR. Finally, by acting now to address SLR, San Mateo County can also address the lack of coordination among jurisdictions that is evident in existing flood prevention efforts. Notably, this lack of coordination places the county at a severe disadvantage when applying for federal or State monies for flood protection.

GLOSSARY

County of San Mateo or **County**: County government under the Board of Supervisors

San Mateo County or **SMC**, or **county**: the geographic entity. Local governments and residents collectively.

[1] The two relevant special agencies with responsibilities for flood prevention are the County Flood Control District and the San Francisquito Creek Joint Powers Authority.

Levees: includes levees, horizontal levees, walls, dikes, and similar structures designed to prevent flooding along the coast, bay shoreline, and along creeks subject to tidal flows

Local officials: elected and appointed officials and staff of the County, cities, and special agencies within the county, interviewed by the jury

CEQA: California Environmental Quality Act. A law governing the environmental review process, including the preparation of environmental impact reports, to be used by local governments when considering proposed new developments.

JPA: Joint Powers Authority. A separate government agency created by its member agencies (such as cities and counties), typically with officials from the member agencies on its governing board. JPAs are formed for specific purposes and to exercise powers commonly held by the member agencies. For example, two or more cities may form a JPA to manage a common government function, such as fire protection for their jurisdictions, where it is more cost-effective to act together than separately.

Specific Agencies

BCDC: San Francisco Bay Conservation and Development Commission. A State agency with permit authority over new development along the San Francisco Bay shoreline. BCDC requires an SLR risk assessment for any new development within its jurisdiction. It published the report *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on Its Shoreline* (2011).

C/CAG: City/County Association of Governments of San Mateo County. A JPA formed by the County of San Mateo and all 20 cities within the county for various purposes including, for example, oversight of a regional transportation Congestion Management Program.

CCC: California Coastal Commission. A State agency with permit authority over new development along the coast. CCC requires an SLR risk assessment for new development within its jurisdiction.

CEC: California Energy Commission. A State agency responsible for energy policy and planning, including research. It published the reports *The Impacts of Sea Level Rise on the San Francisco Bay* (2012) and *Climate Change Scenarios and Sea Level Rise Estimates for California* (2009).

CO-CAT: Coastal and Ocean Working Group of the California Climate Action Team. A working group of senior staff from 17 State agencies with ocean and coastal resource management responsibilities. It issued the *State of California Sea-Level Rise Guidance Document* (2013) for use by State agencies as part of their assessments and decisions.

FEMA: Federal Emergency Management Administration. A federal agency whose responsibilities include preparing Flood Insurance Rate Maps that depict areas subject to

inundation by a "100-year storm."[2] At present, FEMA does not map flood hazards based on anticipated future sea levels.

NRC: National Research Council. An operating arm of the National Academy of Sciences and the National Academy of Engineering, a private nonprofit institution. It published the report *Sea Level Rise for the Coasts of California, Oregon and Washington: Past, Present and Future* (2012).

SCC: State Coastal Conservancy. A State agency that purchases, protects, restores, and enhances coastal resources. Currently supports preparation of local coastal plans and vulnerability assessments in San Mateo County that address SLR.

BACKGROUND

San Mateo County (SMC) residents are at severe risk for flooding due to projected sea level rise (SLR) over the period 2015-2100. In fact, SLR is already occurring. Measurements at the San Francisco Tide Station at the Golden Gate show eight inches of SLR between 1897 and 2006, consistent with figures from around the world.[3]

The precise amount and rate of SLR are unknown, but State agencies have consistently advised that seas are rising at "accelerating rates," and project SLR ranging up to 65 inches (167 centimeters) by the year 2100.[4] One scientist advised SMC officials of the possibility of even greater SLR, nearly 15 feet, during this century.[5]

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[2] A "100-year-storm" is used to define a rainfall event that statistically has a one percent chance of occurring in any given year. However, it is not the storm that will occur once every 100 years. Rather, it is the rainfall totals that have a one percent chance of being equaled or exceeded each year.

[3] Matthew Heberger et al. (Pacific Institute) 2012, *The Impacts of Sea Level Rise on the San Francisco Bay*, California Energy Commission (CEC) Publication No. CEC-500-2012-014, pp. 2-3; and San Francisco Bay Conservation and Development Commission (BCDC), *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on Its Shoreline*, Staff Report, October 6, 2011, p. 18.

[4] In 2008, Governor Schwarzenegger issued an executive order requiring State agencies to prepare SLR scenarios for the years 2050 and 2100 to "assess project vulnerability, reduce expected risks, and increase resilience to sea level rise." In response, the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), representing 17 State agencies, proposed interim SLR projections for the year 2100 ranging from 31 to 69 inches, grouped into "low," "medium," and "high" models (based on a 2009 CEC study). For some planning purposes, agencies such as BCDC focused on 55 inches of SLR, the average projection in the "high" model. However, CO-CAT urged agencies to "select SLR values based on agency and context-specific considerations of risk tolerance and adaptive capacity." (See BCDC, *Living with a Rising Bay*, pp. 9, 20-22.) In 2012, the National Research Council (NRC) issued a report *Sea Level Rise for the Coasts of California, Oregon and Washington: Past, Present and Future*. The report projects SLR ranging from about 16 inches to 65 inches (42 to 167 centimeters) by the year 2100. The NRC report was commissioned by California, Oregon, and Washington State agencies, by the National Oceanic and Atmospheric Administration (NOAA), the U.S. Army Corps of Engineers, and the U.S. Geological Survey. CO-CAT now considers the NRC report to be the "best available science" on SLR for this state, but allows State agencies to use the projections "in a flexible manner" in their assessments or decisions. (See CO-CAT, *Sea-Level Rise Guidance Document*, March 2013, p. 1, and California Coastal Commission (CCC), *Draft Sea Level Rise Policy Guidance,* October 14, 2013, p. 4.)

[5] John Englander, Conference Speech at Jackie Speier, Rich Gordon, and Dave Pine, "Meeting the Challenge of Sea Level Rise in San Mateo County," December 9, 2013, College of San Mateo Theatre, San Mateo, CA.

Scientists have identified the major sources of SLR: an increase in water temperature causing expansion of the oceans, plus the addition of water from melting glaciers.[6] Based on scientific studies, State agencies warn that additional SLR is now *inevitable*.[7]

Most discussions of SLR focus on the cause (climate change) and means of prevention (such as reducing carbon emissions). This Grand Jury report is not about preventing SLR, but rather about *adaptation* to SLR. Adaptation includes measures such as constructing or modifying levees, elevating structures, restoring wetlands, or abandoning low-lying areas.

This report addresses SLR that is projected to gradually increase through the year 2100. Although this may seem to stretch far into the future, it is within the lifespan of younger residents and the useful life of many existing buildings and infrastructure. Substantial areas of the county are *already* within existing FEMA flood insurance rate maps. Unless better protected, these areas could feel the first impact of SLR at any time.

Over the last 20 years, there have been incidents of severe flooding in SMC. In December 2014, low-lying basins and levee over-topping were contributing factors when a moderate "five-year"[8] storm left hundreds of residents homeless.[9] If the County, cities, and two relevant local special agencies are struggling to address *existing* flood conditions, how will they handle worse conditions in the future?[10]

METHODOLOGY

Documents

See Bibliography for a detailed list:

- Federal, State, and regional agency reports
- Consultant studies prepared for government agencies

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[6] The risk is not just SLR alone, that is, a slow rise in sea level until one day the levees are topped. For one thing, SLR can undermine the integrity of existing levees. Even more, the risk lies in the *combination* of SLR, plus the yearly high tides ("king" tides), plus a 100-year storm that causes a storm surge and wave action in the Bay, plus heavy rainwater runoff in creeks. Other factors that influence the risk of flooding due to SLR include changes in land elevation due to earthquakes, and the subsidence, or sinking, of land such as that caused by excess pumping of groundwater. See BCDC, *Living with a Rising Bay*, p. 4; and see Schaaf & Wheeler, Consulting Civil Engineers, *Climate Change Impacts for San Mateo, California*, February 2, 2009, pp. 4-10 (report commissioned by the City of San Mateo).

[7] "Perhaps the most notable finding from the IPCC is that the effect of GHG emissions will continue long after emissions are reduced. The IPCC projects that global temperature will continue rising for a few centuries before stabilizing. Sea level rise from thermal expansion will continue for centuries to millennia. Sea level rise from ice-sheet melting will continue for several millennia." BCDC, *Living with a Rising Bay*, p. 9.

[8] A five-year storm statistically is a storm whose magnitude has a 20% chance of occurrence each year.

[9] Angela Swartz, "Cleanup Begins: Some Still Can't Return to Homes Damaged from Storm, CSM Shelter Available," *San Mateo Daily Journal*, December 16, 2014; a 45-year flood in 1998 that damaged about 1,700 properties was a factor that led to the creation of the San Francisquito Creek JPA. See http://sfcjpa.org/web/about/agency-overview/.

[10] The two relevant local special agencies with responsibilities for flood prevention are the San Mateo County Flood Control District and the San Francisquito Creek Joint Powers Authority.

- Information from government websites
- City and county planning documents
- Newspaper articles
- Videos of two conferences on SLR held in San Mateo County

Site Tours

Silicon Valley Clean Water wastewater treatment plant (Redwood Shores)

Interviews

In conducting this investigation, the jury interviewed 14 individuals including two elected officials; four city managers or assistant city managers; four executive directors, general managers, or assistant general managers of three joint powers authorities; and four County of San Mateo appointed officials.

DISCUSSION

San Mateo County's Exposure to Sea Level Rise

As noted earlier, State agencies project SLR within a range of up to 65 inches by 2100. A 2012 report, prepared by the Pacific Institute for the California Energy Commission (CEC), documents the potential impacts on areas around San Francisco Bay of sea level rise of 16 inches by 2050 and 55 inches by 2100.[11]

The results of the CEC study are startling. Of all the counties in California, SMC is by far the most exposed to SLR, in terms of both the residents and economic value at risk. Assuming 55 inches of SLR, the replacement value of buildings and contents at risk of flooding along the bay is estimated to exceed $23 billion, while that along the coast is valued at $910 million (land value is not included in these figures).[12] This is about one-quarter of the statewide total and nearly 40% of the Bay Area total. The dollar figure only hints at the threat to the people and structures within SMC due to SLR:

- 120,000 residents at risk of losing their homes to flooding (also nearly one-quarter of the statewide and 40 percent of the Bay Area totals)[13]
- 110,000 employees at job locations at risk

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[11] Heberger et al., *The Impacts of Sea Level Rise,* pp. 6-21. As noted in the discussion in footnote 4 of this Grand Jury report, 55 inches is the average of "high" model projections. Thus, it represents a close-to-worst-case scenario (excluding catastrophic SLR discussed elsewhere in this report).

[12] SCC, "San Mateo County Shoreline Vulnerability Assessment," Staff Recommendation, January 29, 2015, p. 2. Valuation of coastal property at risk was not included in the Heberger et al. report but was provided by the Pacific Institute.

[13] Pacific Institute, "Thematic Maps." http://www.pacinst.org/publications/sea-level-rise-thematic-maps/. Based upon 2010 U.S. Census data, the website updates the 110,000 population figure for SMC that was included in Heberger et al.

- 6 wastewater treatment plants at risk
- 1 power plant at risk
- 72 miles of highways at risk
- 420 miles of roads at risk
- 10 miles of railroads at risk
- 78 EPA-regulated hazardous material sites at risk
- 75% of existing wetlands at risk of being "unviable"

The Grand Jury reviewed SLR flood maps prepared by the Pacific Institute, which show the impact of 55 inches of SLR.[14] These maps are included in the Appendix. All of Foster City and substantial areas of Redwood City and San Mateo could be inundated. Serious flooding could also occur in East Palo Alto, Menlo Park, San Carlos, Belmont, Burlingame, Millbrae, San Bruno, and South San Francisco.

The 55-inch SLR flood zone covers important commercial centers including part of South San Francisco's biotech industrial area, the hotels along Burlingame's shoreline, numerous shopping areas, business parks, and recreational spaces. Within this floodplain are the headquarters of Visa International in Foster City, Franklin Templeton Investments in San Mateo, Oracle in Redwood Shores, and Facebook in Menlo Park.

Fifty-five inches of SLR waters would flood San Francisco International Airport and the County's Half Moon Bay and San Carlos Airports. Other County facilities at risk include the new jail under construction and the Government Center, both in Redwood City. The Caltrain line in San Mateo, Burlingame, and Millbrae is threatened. The Port of Redwood City and marinas operated by the County Harbor District at Pillar Point on the coast and at Oyster Point in South San Francisco could be flooded.

The new Kaiser Foundation hospital in Redwood City, the Kaiser Foundation medical office building in San Mateo, the new Palo Alto Medical Foundation medical office building in San Carlos, and the Stanford Health Care medical office buildings in Redwood City are all within the 55-inch SLR flood zone.

On the coast, parts of Half Moon Bay and Pescadero could be flooded. In Pacifica, the potential for SLR has "very serious implications . . . areas of the Sharp Park Golf Course, the Rockaway Beach district, and the West Linda Mar and West Sharp Park neighborhoods could be inundated."[15] Further, "coastal erosion processes that have caused damage along the high bluffs of Pacifica's northern neighborhoods would very likely increase in magnitude . . . while there

[14] Pacific Institute, "Impacts of Sea Level Rise on the California Coast." http://www2.pacinst.org/reports/sea_level_rise/gmap.html.

[15] Dyett & Bhatia (consultants), *City of Pacifica Draft General Plan*, March 2014, pp. 7-8.

could be new risks of erosion along the length of Pacifica's coastline in areas that are not currently exposed to wave action erosion. . . ."[16]

Countywide Impact—Tax Revenue

Although no exact figure has been calculated, it is evident that the impacts identified above would also have a severe effect on tax revenues from a variety of sources. In particular, a reduction in property tax revenue from SLR flood zones would affect all taxing entities in the county. This might affect the provision of County and city services throughout the county.

Countywide Impact—Wastewater Treatment Plants

The impact of SLR is not limited to jurisdictions touching the ocean or bay. Inundation of wastewater treatment plants would pose severe countywide environmental and health threats. Since sewer systems rely on gravity, treatment plants are often located at sea level, with outflow of treated wastewater into the bay or ocean. The CEC report identified the following plants in SMC as vulnerable with 55 inches of SLR:[17]

- Mid-Coast Sewer Authority (includes the city of Half Moon Bay)
- City of Millbrae
- San Francisco International Airport
- City of San Mateo (includes the city of Foster City and part of the town of Hillsborough)
- South Bayside System Authority (now Silicon Valley Clean Water) (includes the cities and towns of Atherton, Belmont, East Palo Alto, Menlo Park, Portola Valley, Redwood City, San Carlos, and Woodside)
- South San Francisco/San Bruno (includes the town of Colma)

In addition to the threat of flooding, it is likely that these plants, and others that pump their treated water into the bay or ocean, will also need to install stronger pumps in order to deal with the increased water pressure at depths that will have increased due to SLR.[18]

The State CO-CAT advises that shoreline wastewater treatment plants with no space to relocate inland have "low adaptive capacity and high potential impacts from flooding." For such facilities, preparing for a higher projected SLR would be prudent.[19]

The Grand Jury toured the largest treatment plant, located in Redwood Shores, operated by Silicon Valley Clean Water. It serves 200,000 south county residents. At the plant, key

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[16] Ibid.

[17] Heberger et al., *The Impacts of Sea Level Rise,* p. 16. Note also that the City of Brisbane is served by the Southeast Water Quality Control treatment facility in San Francisco, which also appears to be vulnerable to SLR.

[18] Source: Interview.

[19] CO-CAT, *Sea-Level Rise Guidance*, pp. 3-4.

components have been elevated to protect against possible levee failure. However, this does not take into account SLR. Also, staff noted that the treatment plant receives wastewater from four pumping stations, all of which are in the SLR flood plain.[20]

Catastrophic Sea Level Rise

A 2013 *National Geographic Magazine* article described potential SLR of 212 feet, over many centuries.[21] In a presentation to SMC officials, oceanographer John Englander said that a 10-foot rise over just 10-15 years is possible this century if two west Antarctic glaciers break loose into the ocean.[22] This would be *in addition to* the SLR already projected by State agencies. This Grand Jury report looks at the local planning required for up to about 55 inches of SLR. At this level, SLR impacts SMC to a much greater extent than other Bay Area counties, and it makes sense to look at this county separately. However, SLR on the order of 15 feet or more would severely impact the entire Bay Area and planning may need to be addressed primarily at the regional level.

SLR Is a Countywide Issue

A key question is whether SLR should be viewed as a *countywide* threat or only as a risk to areas threatened with *actual inundation*. The answer to this question has important implications for how the problem is addressed—and who pays for it.

Currently, flood control, whether along creeks or shorelines, is the responsibility of each city, as cities have responsibility for public safety and for land use. In fact, exposure to SLR is partly the result of land use decisions by cities to develop tidal wetlands and other low-lying areas.

However, as detailed above, the impact of SLR will fall on *all* county residents. In particular, the exposure of wastewater treatment plants and the loss of countywide tax revenue are serious countywide threats.

Public Awareness of the Threat

Developing a plan to adapt to SLR will require broad support among elected officials and other government policymakers and, most importantly, the general public. This, in turn, requires greater public awareness of the issue.

Two forums on SLR sponsored by Congresswoman Jackie Speier, Assemblyman Rich Gordon, and Supervisor Dave Pine have served to educate many local elected officials and government

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[20] Source: Interview.

[21] Tim Folger and George Steinmetz, "Rising Seas: How They Are Changing Our Coastlines," *National Geographic*, September 2013.

[22] John Englander, Conference Speech at Speier, Gordon, and Pine, "Meeting the Challenge of Sea Level Rise"; see also Will Travis (former Executive Director of BCDC), Conference Speech at Speier, Gordon, and Pine, "Meeting the Challenge of Sea Level Rise." Travis noted that at some point higher levees may not be viable and suggested that we may need to look at the Dutch model of "living with water"; see also Larry Goldzband (Executive Director of BCDC), Conference Speech at Speier, Gordon, and Pine, "Meeting the Challenge of Sea Level Rise." He noted the possibility of addressing SLR at the Golden Gate, rather than along the entire length of the bay shoreline.

staff.[23] However, as one city manager noted, continuing education is necessary as elected officials rotate off their councils.

Moreover, despite some press coverage of the two forums, it appears that the public at large is not well informed on the issue. At present, the Grand Jury is not aware of any on-going educational efforts by local governments to inform county residents about SLR, particularly as it may impact SMC.

Preparing for SLR

Existing Flood Protection in San Mateo County

Cities and two special local agencies are responsible for construction and maintenance of levees within their jurisdictions.[24] Often, they pay the entire cost of levee projects. They work closely with various regional, State, and federal permitting agencies to meet design standards, both for the structures themselves and the adjacent shoreline environment.[25]

Presently, there is a chain of levees along the bay. Each link in the chain is the responsibility of a different city or special agency. However, flood risk is based on topography, not political boundaries. Thus, the safety of properties in any given city often depends on levee projects undertaken by its neighboring cities. The public is protected only so long as the "weakest link" in the chain of levees is able to meet the threat. Officials interviewed by the Grand Jury identified a number of existing "weak links."

Currently, no countywide agency has oversight of the levees as a whole. No agency provides countywide planning, coordinates cities' construction and maintenance efforts, or assists with grant applications related to *existing* flood problems, much less preparing for SLR. Cities do not contribute money to pay for projects outside their jurisdiction, even though their own residents may benefit.

The San Mateo County Flood Control District is "countywide" on paper but its tax base is limited by the California Water Code to certain "subzones," which were specified prior to the voters' adoption in 1978 of Proposition 13. The District's revenue stream is small and limited to funding flood control along the Colma, San Bruno, and San Francisquito Creeks. The District has no staff of its own, contracting with the County's Public Works Department on an as-needed basis for necessary staffing.

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[23] Jackie Speier, Rich Gordon, and Dave Pine, "Meeting the Challenge of Sea Level Rise in San Mateo County," College of San Mateo, December 9, 2013, and "Planning for Sea Level Rise in San Mateo County," Foster City City Hall, June 27, 2014.

[24] The cities of East Palo Alto and Menlo Park, the San Mateo County Flood Control District, the city of Palo Alto and the Santa Clara Valley Water District have formed the San Francisquito Creek Joint Powers Authority to address flooding, enhanced ecosystems and recreation along that creek in both San Mateo and Santa Clara Counties. The San Mateo County Flood Control District also has responsibility for flood control along Colma and San Bruno Creeks.

[25] Other agencies may be involved in particular situations. For instance, Caltrans is responsible for protecting State highways and airport owners may be responsible for protecting certain airports. (Source: Interviews.)

Current Efforts in San Mateo County to Plan for SLR[26]

The County has taken the lead in trying to jump-start the process of planning for SLR. Along with working groups of elected officials, city staff, and special district personnel, the County has commenced (a) conducting a vulnerability assessment, (b) exploring options for a countywide governance organization to address flood control and SLR, and (c) identifying sources of funding. In January 2015, the County's Office of Sustainability received a grant from the State Coastal Conservancy (SCC) to jointly manage an SLR vulnerability assessment for SMC. The study will cover the entire bayside and the coast from Half Moon Bay north.[27] While there is currently no guarantee, staff is confident that the Office of Sustainability will continue working on SLR beyond the period of the grant.

Characteristics of a Possible Organization to Address SLR Planning

Almost every local official interviewed by the Grand Jury acknowledged the need for greater coordination among jurisdictions to address SLR. Each person was asked about options for "getting organized" to address SLR. Some of the characteristics identified by many of those interviewed include:

- The organization should be countywide, including upland and coastal communities.
- The cities should participate in decision-making by the organization.
- The organization should have a *focus* on SLR and have a staff with expertise in the subject.
- The organization must be sustainably funded.

Interviewees also identified a number of existing needs related to planning for SLR that should be met:

- Identify consistent SLR-related projections and flood control project standards for all jurisdictions
- Help coordinate jurisdictions regarding SLR-related flood control projects and seek a commitment by jurisdictions to implement projects in a timely fashion

[26] Other important SLR-related efforts in SMC include the "SFO/San Bruno Creek/Colma Creek Resilience Study," a joint effort of the airport, affected cities, and the County to assess SLR impacts in the vicinity of San Francisco International Airport (Brendan P. Bartholomew, "Peninsula Sea-Level Study to Focus on Flood Threats Surrounding SFO," *San Francisco Examiner,* February 13, 2014). The San Francisquito Creek JPA is undertaking two SLR-related projects: the SAFER Bay project will protect property within the cities of East Palo Alto and Menlo Park from Bay 100-year tides with up to three feet of SLR and enhance and create Bay marshes; and the San Francisco Bay to Highway 101 project along San Francisquito Creek that will protect the tidally influenced areas of East Palo Alto and Palo Alto from a 100-year creek flow coincident with an extreme tide and 26 inches of SLR (http://sfcjpa.org/projects). In addition, the SCC is funding Local Coastal Plan updates for Half Moon Bay and Pacifica that will address adaptation to SLR (SCC, "San Mateo County Shoreline Vulnerability Assessment" RFP, February 18, 2015).

[27] SCC, "San Mateo County Shoreline Vulnerability Assessment," Staff Recommendation, January 29, 2015.

- Assist with grant applications (State and federal agencies prefer to provide grants to projects that demonstrate a multi-jurisdictional approach)

- Seek to broaden the revenue sources for SLR projects

However, several city managers and others questioned whether the cities are ready for a new organization to assume direct control of levees, since such an organization might impinge on city authority regarding public safety, land use, and use of eminent domain.

Organizational Options

The Grand Jury discussed the following organizational options for SLR planning with the interviewees:

- Expanding the role of the County Flood Control District (SMCFCD) and/or the County Office of Sustainability

- Creating a new independent special district with an elected board (such as the Santa Clara Valley Water District)

- Expanding the role of the City/County Association of Governments (C/CAG)

- Creating a new joint powers authority (JPA) with an appointed board of elected officials from the cities and County (and possibly relevant special agencies)

The County option (first bullet point) offers advantages. As an existing agency, the Flood Control District would not need to be created anew (although legislative action would be required to expand its role). Its existing jurisdiction extends countywide, at least on paper. County staff already has expertise in matters relating to flood control. Although separate, the SMC Office of Sustainability is also developing staff with knowledge about SLR. The relevant functions of the Office of Sustainability and County's Public Works Department (which staffs the County Flood Control District) could easily be coordinated or merged. Both the Flood Control District and the Office of Sustainability are responsible to the County Board of Supervisors. Therefore, a way would need to be found to ensure that cities may participate in decision-making. Given its other responsibilities, some interviewees were also concerned that the County Board of Supervisors might not be able to give SLR the focus it requires.

In the case of an independent special district with its own elected board (second bullet point), neither the cities nor the County Board of Supervisors would have decision-making authority. It is not a near-term option, since it would require voter approval, hiring of staff and acquisition of office space, among other things. The Grand Jury's investigation also suggests that the creation of a new district would be an expensive choice, particularly if the district's responsibilities are limited to SLR planning. An independent special district might be a more appropriate option if responsibilities included actual levee construction and maintenance.

The Grand Jury inquired as to whether C/CAG, which already has committees on several environmental subjects, could expand its role to include planning for SLR. However, local officials felt that C/CAG is strongly focused on congestion management and does not have

expertise in SLR/flood control. C/CAG staff has not proposed to the agency's Board of Directors that the agency take on SLR.[28]

Creating a new JPA (fourth bullet point) would allow the cities (and County) to have a voice. A JPA for SLR could hire staff with expertise in the field and, as a single-purpose agency, could stay focused on SLR. One negative factor is the need to create a brand new governmental structure and the added expense to do so. However, it is possible that the JPA could contract for administrative services and staffing with another agency, such as the County. A second concern expressed by local officials is the need to structure the JPA so that a membership that includes the County, 20 cities, and possibly other relevant local agencies does not become unwieldy.

Based on this analysis, the Grand Jury concludes that, under current circumstances, there is no perfect choice for an organization to undertake countywide SLR planning. However, it appears that either enlarging the role of the County Flood Control District or creating a new JPA would be viable options. What is critical is that a coordinated countywide approach be agreed upon soon.

Funding of an Organization to Plan for SLR

The costs of an organization that only focuses on *planning-type* functions such as coordinating local jurisdictions, conducting studies, developing standards and timelines, and preparing grant applications would be much less than the cost of actual construction of levees. It could be funded by member contributions, grants, and contributions from industry and wastewater treatment agencies. This would be similar to the general fund revenues that C/CAG currently collects from member contributions and grants.

Funding of Projects to Protect against SLR

At the Grand Jury's first interview, a local official posed the following question regarding SLR: "how are we going to pay for it?" Levee construction is extremely expensive. Projects recently completed or proposed in the county, just to address existing needs, have run into the tens of millions of dollars.[29]

Current Funding for Levee Protection in San Mateo County

Currently, funding for levee projects comes mainly from local general funds or capital improvement funds, plus, in some cases, an assessment on property owners who directly benefit from such projects. Where relatively few properties are involved, the assessment per parcel can be prohibitive.

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[28] Source: Interview.

[29] For example, in 2012 the City of San Mateo completed $22.7 million in levee improvements to protect 8,000 properties and faces raising another $22.35 million for levee improvements to protect 1,500 properties that remain in FEMA flood insurance rate maps (Larry Patterson, Conference Speech at Speier, Gordon, and Pine, "Meeting the Challenge of Sea Level Rise"). The San Francisquito Creek JPA has secured State and local funding for its $37.5 million project for the portion of that creek between the Bay and Highway 101 (Gennady Sheyner, "San Francisquito Creek Project Sees Breakthrough after Permit Stall," *Palo Alto Online*, November 3, 2014, and interview).

The cost of flood insurance to property owners is also expensive. As a result, cities focus on projects that remove residents from FEMA flood zones (which determine the need for insurance). Savings on insurance helps offset the cost of a property assessment.

Potential Countywide Sources of Funding for SLR Projects

City general funds and assessments on properties that directly benefit may also be used for SLR-related projects. However, since SLR has countywide impacts, spreading part of the cost countywide appears justified. Some potential sources of countywide revenue include:[30]

- Wastewater agencies may impose fees on customers within their service area to help pay for levee projects that protect wastewater treatment plants and pumping stations threatened by SLR.
- Officials interviewed doubt that, at present, SLR levee projects could secure the 66.7% voter approval required under Proposition 218 for a special tax (i.e., a tax imposed to raise revenue for a specific purpose). However, this could be a source of funds in the future, when the threat of SLR becomes more evident.
- The County and cities may raise funds through general taxes, such as County Measure A (2012), which require approval of a simple majority of voters, and distribute a *portion* of such revenues to protect against SLR, so long as the measure does not include a specific commitment to fund SLR projects.
- C/CAG used the simple majority voter threshold to win approval for County Measure M (2010), a vehicle registration fee used for a variety of transportation projects and for mitigation of transportation-related stormwater pollution.[31] Any organization, such as the County Flood Control District or a new JPA, that addresses SLR and other related issues such as groundwater management and water pollution, might be able to use a similar approach.
- State law (SB 628, 2014) allows for the formation of Enhanced Infrastructure Financing Districts within cities and counties with the authority to issue bonds, with 55% voter approval, for purposes such as "flood control levees and dams, retention basins, and drainage channels."[32] In certain circumstances, such districts may be formed within SMC jurisdictions to serve as a source of funding for SLR projects.
- Contributions may be solicited from business parks or agencies responsible for facilities such as airports or highways that are within SLR flood plains. For example, the Facebook headquarters campus in Menlo Park will benefit from the San Francisquito Creek JPA's SAFER project, and the company has contributed $275,000 toward its design and EIR.[33]
- Mitigation fees may be imposed on new developments in areas subject to SLR.

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[30] Source: Interview.

[31] C/CAG, Funding-Local/Measure M. http://ccag.ca.gov/funding/measure-m/.

[32] California Legislative Information, SB-678 Enhanced Infrastructure Financing Districts.

[33] Renee Batti, "Stemming the Tide," *Almanac: The Hometown Newspaper for Menlo Park, Atherton, Portola Valley and Woodside*, March 10, 2014, and interview source.

Potential Regional, State, and Federal Sources of Funding for SLR Projects

To date, local cities have received little federal or State funding for levee projects.[34] Several officials advised that granting agencies typically prefer projects that show multi-jurisdictional cooperation, placing the local government entities in San Mateo County at a significant competitive disadvantage in securing such funds. However, even for a multi-jurisdictional project, grants are highly competitive. SLR-related projects face a further difficulty if the granting agency does not yet recognize the risk of SLR. Finally, since SMC is by far the county most vulnerable to SLR, it may be difficult to find other counties with similar needs with which to collaborate on a regional basis. However, there is one new source of funding:

- The State of California's Climate Resilience Account, created in 2014, is a source of grant funding directed specifically at SLR. Although only $2.5 million has been allocated statewide in the first year, it may be enlarged in the future.

Reducing Costs by Integrating SLR-Related Projects with Other Levee Projects

Given that the amount and rate of SLR are uncertain, local officials may be reluctant to spend large amounts of money for projects that may never be needed. Possible cost-saving options that cities and relevant special agencies may examine on a case-by-case basis include:[35]

- Integrating SLR-related protection with existing planned or proposed levee projects[36]
- Developing SLR-related projects in stages, with specific "triggers" required before undertaking each stage of construction

In order to take advantage of these cost-saving options, however, SLR planning should begin now. For instance, a FEMA representative has advised county officials that new FEMA flood hazard maps will be forthcoming in the near future. These maps will reflect a new higher calculation of bay wave action during storms. This new calculation, which is independent of any SLR effect, may trigger the need for new levee projects to keep properties in SMC from being subject to flood insurance requirements. Incorporating consideration of future SLR in these new projects may result in cost-savings later.[37]

SLR Is a Land Use Issue

Levee projects are a common solution to SLR. However, they may not be feasible everywhere, due to financial, environmental, or technical reasons. If the risk of flooding due to SLR cannot be completely eliminated, the County and cities will need to examine land use measures to help mitigate the threat of SLR.[38] Possible land use measures include the following:

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[34] Notably, San Francisquito Creek JPA has received an $8 million State Water Resources Board grant for a multi-jurisdictional project. (Source: Interview.)

[35] Craig Conner, U.S. Army Corps of Engineers, Conference Speech at Speier, Gordon, and Pine, "Meeting the Challenge of Sea Level Rise." These suggestions were supported by local officials interviewed by the Grand Jury.

[36] The San Francisquito Creek JPA's San Francisco Bay to Highway 101 flood protection project will address, in combination, a 100-year creek flow coincident with an extreme tide and 26 inches of SLR. (Source: Interview.)

[37] Kathleen Schaefer, FEMA, Conference Speech at Speier, Gordon, and Pine, "Meeting the Challenge of Sea Level Rise."

[38] Flood control levees themselves are local land uses, sometimes offering public trails, and vista points, and other recreational options.

- Jurisdictions can include adaptation to SLR in the Safety Element of their General Plans. While not required by State Guidelines,[39] several cities in the county do mention SLR in their Safety Elements and/or Climate Action Plans.[40]
- Jurisdictions may restrict new development or types of land use in areas subject to SLR.
- Jurisdictions may use building codes to mitigate SLR flood risk. For instance, they could require habitable areas and key building equipment be placed above flood level.
- Jurisdictions may identify areas suitable for environmental resource protection and habitat enhancement, in light of the threat of SLR.
- Jurisdictions may need to identify certain areas to be abandoned to SLR.
- Jurisdictions may impose SLR mitigation fees as a condition of approval on major residential or commercial projects in undeveloped areas subject to future SLR.
- Jurisdictions may use the CEQA environmental review process to ensure that exposure to SLR is considered, and mitigation measures identified, when major residential or commercial projects are proposed within a SLR flood plain.

Actions Needed at the Regional, State, and Federal Levels

While focused on SMC, this investigation points to the need for action on SLR at other levels of government. The County, cities, and relevant local special districts, through their representation at regional agencies, memberships in state associations, lobbyists, and elected State and federal legislators, could advocate on our behalf. Some examples include:

- Federal agencies, such as the U.S. Army Corps of Engineers, do not currently recognize SLR in their flood control mapping and/or funding.[41]
- Federal and State funding is extremely limited for all stages of adaptation to SLR: studies, planning, and actual levee projects.

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[39] California Governor's Office of Planning and Research, *State of California General Plan Guidelines,* 2003.

[40] The City of Pacifica's draft Safety Element has a particularly comprehensive discussion related to SLR. However, the City will wait for "an adequate model with sufficient local detail" to project specific impacts of SLR (see Dyett & Bhatia, *City of Pacifica Draft General Plan,* March 2014, pp. 8-11 – 8-16*).* The City of San Carlos approved a *Climate Action Plan* (CAP) as a component of the City's General Plan update. The CAP includes a BCDC map of the city showing SLR of 16 and 55 inches. The City's approach to SLR is to cooperate with regional agencies, such as BCDC. (See City of San Carlos, *Climate Action Plan*, October 12, 2009, pp. 2, 87-91.) The City of San Mateo commissioned a report that includes a description of the potential effects of SLR on that city and has appended the report to the City's General Plan. However, the General Plan states that "considering that there is no definitive estimate and that sea level rise will occur slowly over time, the City will continue to address FEMA's current certification standards" (see *City of San Mateo 2030 General Plan*, 2010, pp. VII-6 and Appendix V, Schaaf & Wheeler, *Climate Change Impacts for San Mateo, California).*

[41] This may change. "In accord with the Biggert-Water Flood Insurance Reform Act of 2012, FEMA is to establish a Technical Mapping Advisory Council that will provide recommendations to FEMA on flood hazard mapping guidelines— including . . . the impacts of sea level rise. . . . FEMA will be required to incorporate future risk assessment in accordance with the recommendations of the Council." (See FEMA, http://www.fema.gov/coastal-frequently-asked-questions#CoastalFloodHazardMappingQuestions, pp. 10-11.)

- With just $2.5 million in this year's budget for statewide use, funding of the California Climate Resilience Account, dedicated to SLR, is inadequate.

- California General Plan Guidelines (2003), prepared by the Governor's Office of Planning and Research, do not require that SLR be addressed in the Safety Element or elsewhere in local general plans.

- Regional agencies, such as BCDC, could provide a forum for discussing SLR, including alternatives for addressing catastrophic SLR greater than 10 feet.

While these and other actions at the regional, State, and federal levels are important, it must be emphasized that San Mateo County cannot afford to wait for planning and resources to appear from outside the county. They may never come.

FINDINGS

F1. SMC is at severe risk for flooding due to the gradual rise in sea level, projected at up to 65 inches (167 centimeters) by the year 2100. Catastrophic SLR of nearly 15 feet is a possibility this century.

F2. SLR is a threat *countywide*, including the upland areas. All residents depend on public infrastructure, especially wastewater treatment plants. Also, a significant portion of the countywide property tax base is within the area threatened by SLR.

F3. Although many local officials are now familiar with and concerned about the threat of SLR, there is inadequate public awareness of SLR's potential impacts on this county.

F4. Levees, including their financing, are currently the responsibility of each individual city or special agency with jurisdiction along streams, bay, and coast (the County is responsible for unincorporated areas).

F5. Flood risk is based on topography, not political boundaries. The safety of properties in one jurisdiction often depends on levee projects undertaken by another jurisdiction.

F6. Currently, no countywide agency exists to provide planning, facilitate coordination among jurisdictions, or to assist with securing funding for *existing* flood control projects. The same is true for future SLR-related projects.

F7. To the Grand Jury's knowledge, no local jurisdiction has adopted SLR projections or maps for specific local land use planning purposes.[42] No consistent SLR projection has been adopted countywide by the County and cities.

F8. There is a recognized need for a countywide approach to SLR planning and coordination among jurisdictions.

F9. Several city managers and others interviewed did not support having a new countywide organization assume direct control of levee projects at this time.

F10. The County and cities can address SLR in their General Plans and Climate Action Plans, can map the threat, and can adopt relevant policies.

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[42] See discussion of SLR planning in several San Mateo County cities in footnote 39.

F11. Many actions to address SLR are within the authority of regional, State, and federal agencies.

F12. By acting *now*, SMC may be able to reduce future costs by integrating SLR-related projects with other programmed levee projects, and by using land use planning measures to mitigate future exposure to SLR.

RECOMMENDATIONS

The Grand Jury recommends increased public education about SLR:

R1. The County, each city in the county and relevant local special agencies[43] should conduct a public education effort to increase awareness of SLR and its potential effects on this county.

The Grand Jury recommends identifying a single organization to undertake SLR planning:

R2. The County, each city in the county and relevant local special agencies[44] should identify a single organization, such as a new joint powers authority or an expanded SMC Flood Control District, to undertake countywide SLR planning. It should be structured to ensure that:

- The organization is countywide in scope
- The organization is able to *focus* on SLR
- Both the County and cities (and possibly relevant local agencies) are able to participate in the organization's decision-making[45]
- The organization is sustainably funded

R3. The organization's responsibilities should include:

- Adopt consistent SLR projections for use in levee planning countywide
- Conduct and/or evaluate vulnerability assessments[46]
- Provide a forum for inter-jurisdictional coordination and exchange of information related to SLR
- Undertake grant applications for SLR-related planning and projects
- Facilitate raising funds on a countywide basis for SLR-related projects, to be passed through to agencies with direct responsibility for project construction

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[43] San Mateo County Flood Control District and San Francisquito Creek Joint Powers Authority.

[44] Ibid.

[45] The organization could also create a technical advisory committee with representatives of departments responsible for levee construction and management, as well as representatives of public facilities at risk, such as airports and wastewater treatment plants.

[46] A vulnerability assessment could (a) inventory areas at risk for SLR (commercial, residential, public facilities, and infrastructure), (b) determine the adequacy of existing levee protection, and (c) identify and prioritize the projects that will be needed to adapt to SLR.

- Monitor actual SLR over time and any changes in SLR projections, based upon the latest federal, State, or regional government reports and scientific studies
- Through the CEQA environmental review process, comment on major new developments proposed in the SLR floodplain
- Advocate on behalf of the member jurisdictions with federal, State, and regional agencies regarding SLR issues
- Assist the County and cities in public awareness efforts, as described in R1

R4. The County, cities and two relevant local special agencies[47] should consider expanding the role of the organization beyond SLR to include planning and coordination of efforts to address *existing* flooding problems along the Bay, coast, and creeks that are subject to tidal action. It may be cost-effective to integrate SLR protection with other levee-improvement programs.

The County and cities may also consider expanding the role of the new organization to include potentially compatible functions such as the National Pollution Discharge Elimination System (NPDES), currently managed by C/CAG, and the new (2014) State requirements for local sustainable groundwater planning.

R5. The organization—its administration, staffing, and program expenses—should be funded on a sustainable basis by:

- Member contributions
- Contributions solicited from parties threatened by SLR, including corporations and agencies that operate public facilities such as wastewater treatment plants
- Grants solicited from available potential sources such as the California Climate Resilience Account
- Reducing administrative costs by contracting for services with the County or another agency

The Grand Jury recommends that SLR be addressed in local land use planning:

R6. The County and each city should amend its General Plan, as needed, to address the risk for SLR. The Safety Element[48] should include a map of any areas vulnerable to SLR, as determined by measurements in the countywide Vulnerability Assessment [R3]. Further, it should identify policies that apply to areas threatened by SLR.

[47] San Mateo County Flood Control District and San Francisquito Creek Joint Powers Authority.

[48] As an alternative, the City of San Carlos has addressed SLR in its Climate Action Plan (CAP). The City states that the CAP was developed as a "component of the 2009 General Plan update . . . a legally defensible approach to ensuring that the Climate Action Plan is implemented" (see City of San Carlos, *Climate Action Plan*, 2009, p. 2).

The Grand Jury recommends that local governments champion SLR issues before regional, State, and federal governments and agencies:

R7. The County, cities, and relevant local special agencies, through their representatives on regional agencies, membership in state associations, lobbyists, and elected State and federal legislators, should pursue SLR-related issues with government bodies outside SMC.

REQUEST FOR RESPONSES

Pursuant to Penal code section 933.05, the Grand Jury requests responses as follows:

From the following governing bodies:

Responses to recommendations R1, R2, R3, R4, R5, R6, and R7 are requested from:

- The County of San Mateo Board of Supervisors
- The City and Town Councils of Atherton, Belmont, Brisbane, Burlingame, Colma, Daly City, East Palo Alto, Foster City, Half Moon Bay, Hillsborough, Menlo Park, Millbrae, Pacifica, Portola Valley, Redwood City, San Bruno, San Carlos, San Mateo, South San Francisco, and Woodside

Reponses to recommendations R1, R2, R3, R4, R5, and R7 are requested from:

- The Board of Directors of the San Francisquito Creek Joint Powers Authority

Response to recommendation R4 is requested from:

- The Board of Directors of the City/County Association of Governments of San Mateo County

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted subject to the notice, agenda, and open meeting requirements of the Brown Act.

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APPENDIX

Sea level rise inundation maps for selected areas of San Mateo County are presented below. The turquoise-colored zones represent the "current area at risk" to flooding during a 100-year storm, without consideration of existing flood protection levees. The magenta-colored zones represent the area at risk during a 100-year storm with 1.4 meters of SLR (140 centimeters or about 55 inches). The green-colored zones represent areas at risk of erosion from 1.4 meters of SLR, but are not clearly distinguishable at the scale used in this Appendix. These maps were prepared by the Pacific Institute, with specific infrastructure and major government and commercial facilities identified by the Grand Jury with an ✻ symbol.

SAN FRANCISCO INTERNATIONAL AIRPORT AND VICINITY

Maps from Pacific Institute at "http://www2.pacinst.org/reports/sea_level_rise/gmap.html"
Modified by the Grand Jury to show facilities at risk

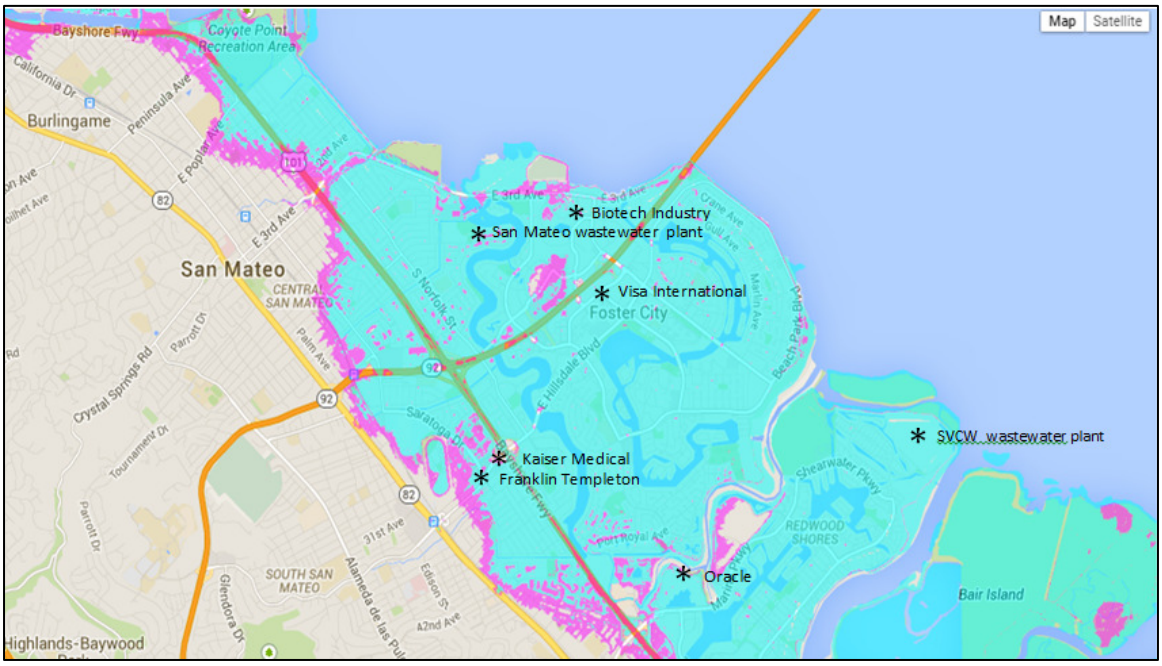
Area at risk from a 100-year coastal flood event

- Current area at risk
- Area at risk with a 1.4 meter sea-level rise

Erosion

- Area at risk from erosion in 2100 with a 1.4 meter sea-level rise

SAN MATEO AND VICINITY



Maps from Pacific Institute at "http://www2.pacinst.org/reports/sea_level_rise/gmap.html"
Modified by the Grand Jury to show facilities at risk

Area at risk from a 100-year coastal flood event

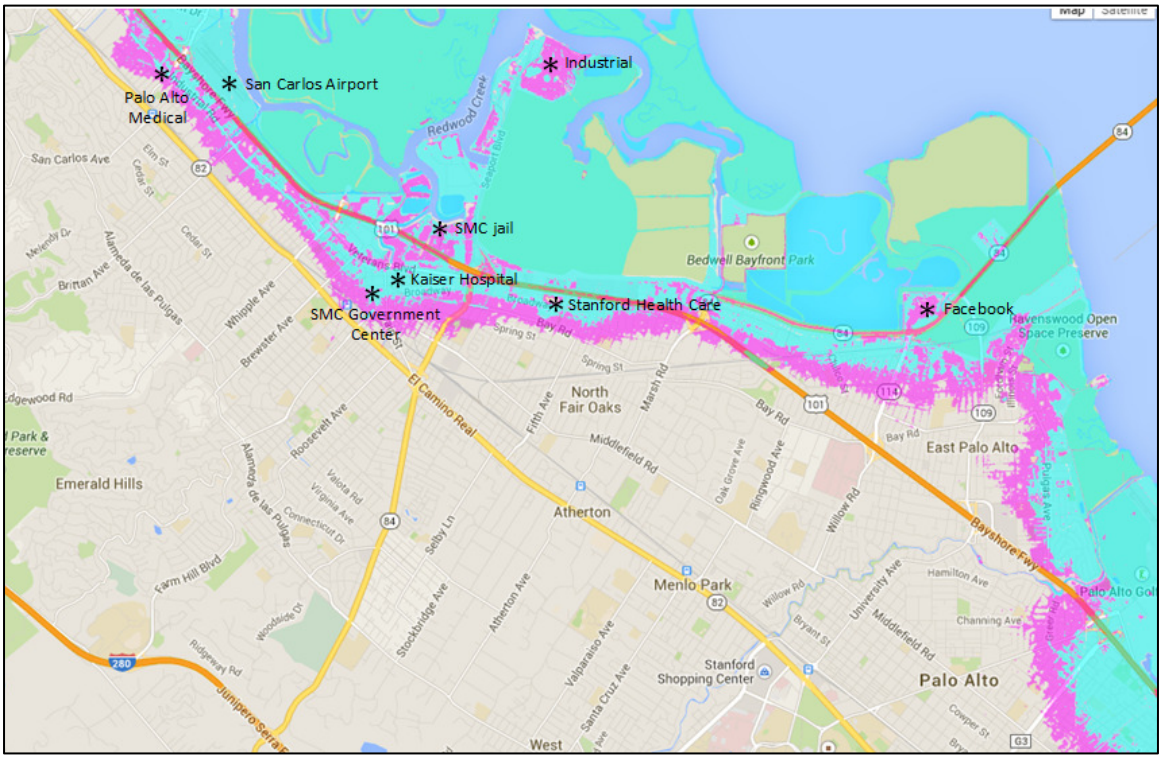
Current area at risk

Area at risk with a 1.4 meter sea-level rise

Erosion

Area at risk from erosion in 2100 with a 1.4 meter sea-level rise

REDWOOD CITY AND VICINITY



Maps from Pacific Institute at "http://www2.pacinst.org/reports/sea_level_rise/gmap.html"
Modified by the Grand Jury to show facilities at risk

Area at risk from a 100-year coastal flood event

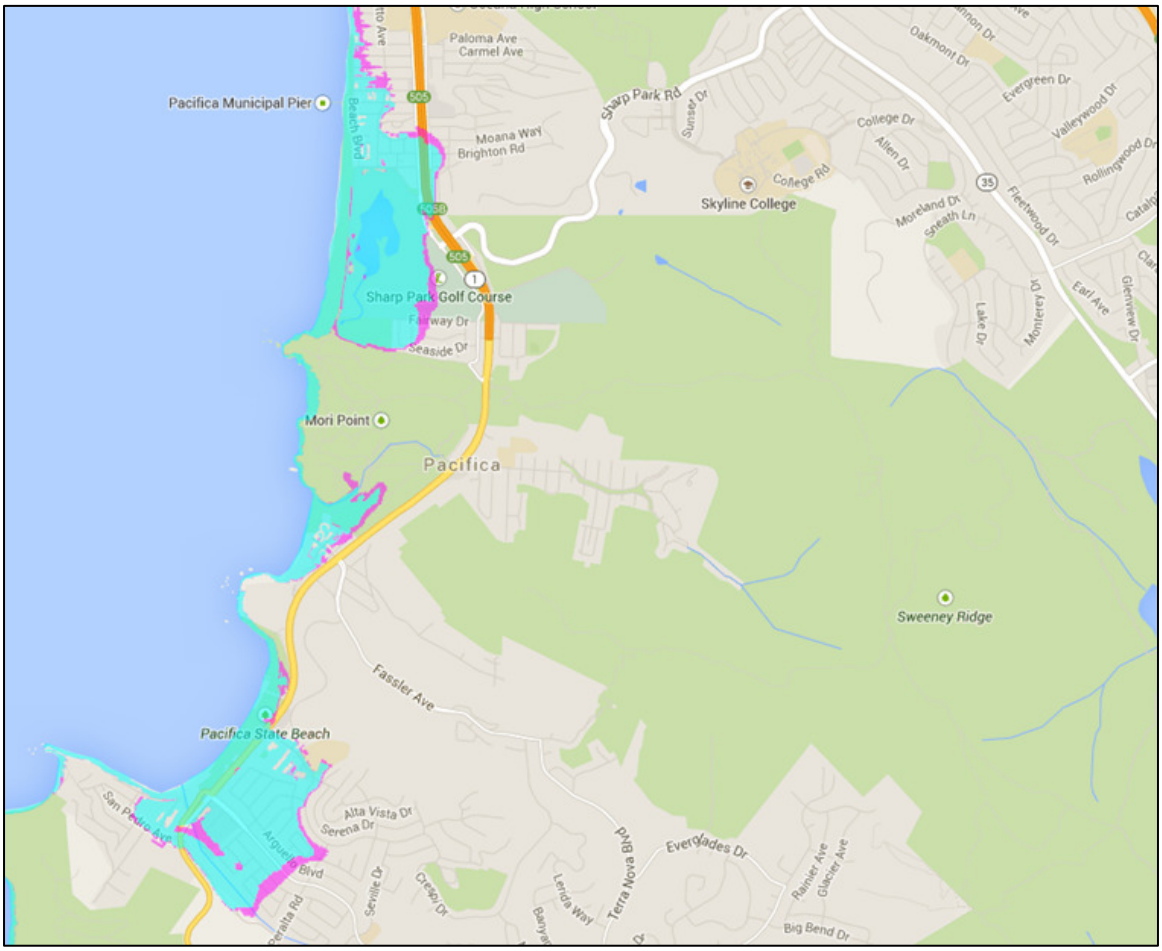
Current area at risk

Area at risk with a 1.4 meter sea-level rise

Erosion

Area at risk from erosion in 2100 with a 1.4 meter sea-level rise

PACIFICA



Maps from Pacific Institute at "http://www2.pacinst.org/reports/sea_level_rise/gmap.html"

Area at risk from a 100-year coastal flood event

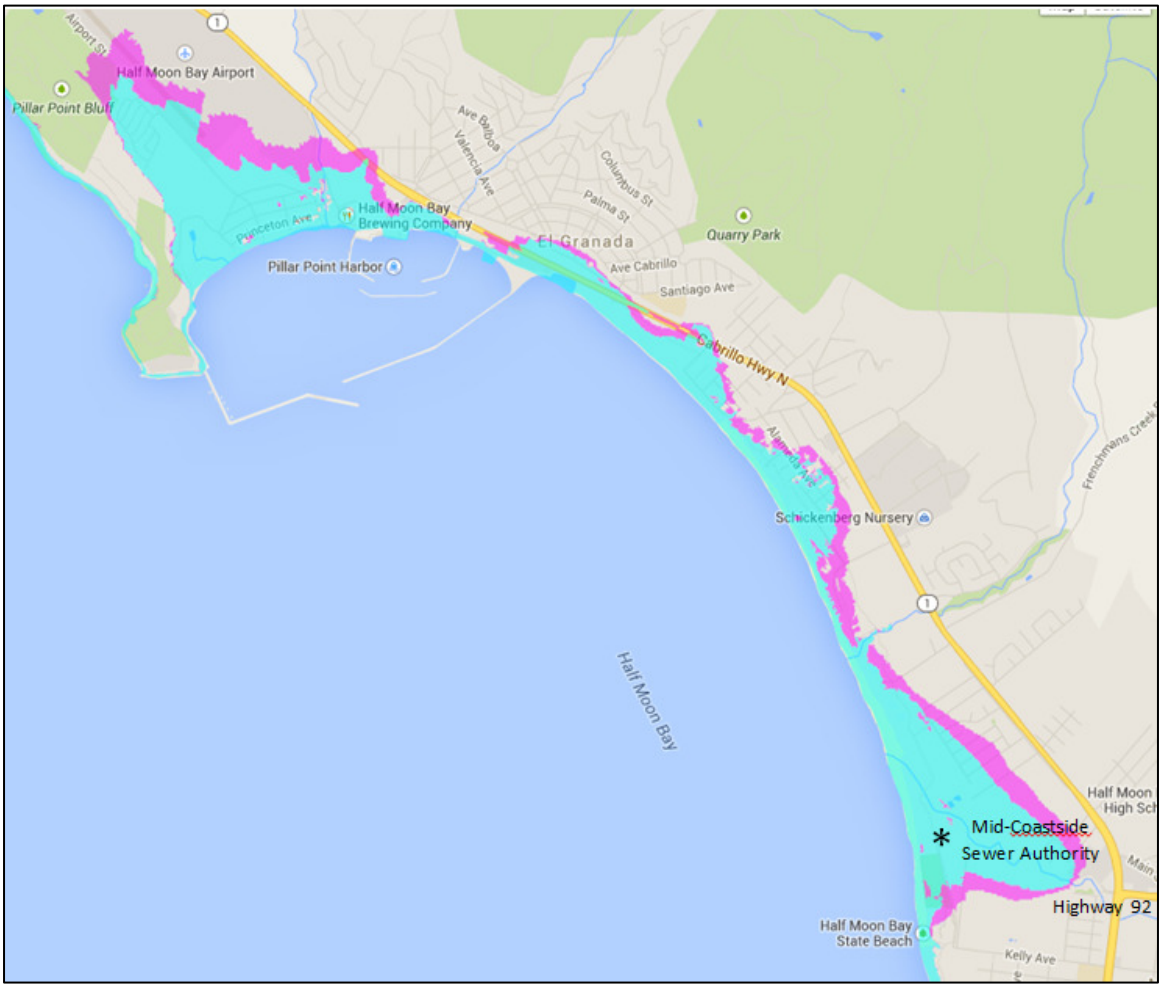
Current area at risk

Area at risk with a 1.4 meter sea-level rise

Erosion

Area at risk from erosion in 2100 with a 1.4 meter sea-level rise

HALF MOON BAY



Maps from Pacific Institute at "http://www2.pacinst.org/reports/sea_level_rise/gmap.html"
Modified by the Grand Jury to show facility at risk

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