

CITY of OXNARD

Sea Level Rise Atlas



A Sea Level Rise Atlas for the City of Oxnard

prepared by
City of Oxnard. Planning Division
214 South C Street. Oxnard. CA. 93030

with technical assistance from
Rincon Consultants, Inc.
180 North Ashwood Avenue. Ventura. CA. 93003

Revell Coastal, LLC
125 Pearl Street. Santa Cruz. CA. 95060

Everest International Consultants, Inc.
444 West Ocean Boulevard, Suite 1104, Long Beach, CA 90802

April 2016

Table Of Contents

1.0 Introduction.....	1
2.0 Background.....	2
2.1 Planning Area 1. McGrath/Mandalay Beach.....	5
2.2 Planning Area 2. Oxnard Shores.....	6
2.3 Planning Area 3. Channel Islands Harbor.....	7
2.4 Planning Area 4. Ormond Beach.....	8
2.5 City of Port Hueneme And County Beach Areas.....	9
3.0 Methodology.....	10
3.1 Coastal Hazards.....	11
3.2 Tsunami Inundation.....	14
4.0 Results.....	16
4.1 Coastal Hazards. Planning Area 1. McGrath/Mandalay Beach.....	19
Monthly Tidal Inundation Hazard Zone.....	19
Background Erosion Hazard Zone.....	21
100-yr Storm Erosion Hazard Zone.....	23
Coastal Storm Wave Hazard Zone.....	25
Coastal Storm Flood Hazard Zone.....	27
Combined Hazard Zone.....	29
4.2. Coastal Hazards. Planning Area 2. Oxnard Shores.....	31
Monthly Tidal Inundation Hazard Zone.....	31
Background Erosion Hazard Zone.....	33
100-yr Storm Erosion Hazard Zone.....	35
Coastal Storm Wave Hazard Zone.....	37
Coastal Storm Wave Flood Zone.....	39
Combined Hazard Zone.....	41
4.3 Coastal Hazards. Planning Area 3. Channel Islands.....	43

Monthly Tidal Inundation Hazard Zone.....	43
Background Erosion Hazard Zone	45
100-yr Storm Erosion Hazard Zone	47
Coastal Storm Wave Hazard Zone	49
Coastal Storm Flood Hazard Zone.....	51
Combined Hazard Zone	53
4.4 Coastal Hazards. Planning Area 4. Ormond Beach.....	55
Monthly Tidal Inundation Hazard Zone.....	55
Background Erosion Hazard Zone	57
100-yr Storm Erosion Hazard Zone	59
Coastal Storm Wave Hazard Zone	61
Coastal Storm Flood Hazard Zone.....	63
Combined Hazard Zone	65
4.5 Coastal Hazards. City of Port Hueneme And County Beach Areas.	67
Monthly Tidal Inundation Hazard Zone.....	67
Background Erosion Hazard Zone	69
100-yr Storm Erosion Hazard Zone	71
Coastal Storm Wave Hazard Zone	73
Coastal Storm Flood Hazard Zone.....	75
Combined Hazard	77
4.6 Tsunami Scenarios. Planning Area 1. McGrath/Mandalay Beach.	79
4.7 Tsunami Scenarios. Planning Area 2. Oxnard Shores.	81
4.8 Tsunami Scenarios. Planning Area 3. Channel Islands.	83
4.9 Tsunami Scenarios. Planning Area 4. Ormond Beach.....	85
4.10 Tsunami Scenarios. Port Hueneme and County Beach Areas.....	87
References	90

1.0 INTRODUCTION

Sea level rise is a global phenomenon, but its impacts vary at the local level. The State of California has provided grant funding to local coastal governments, like the City of Oxnard, to take proactive steps to address sea level rise in the City's Local Coastal Program (LCP). Updating an LCP to prepare for sea level rise allows the City to protect coastal resources and public safety while working with private property owners to identify strategies to avoid or minimize sea level rise impacts.

As required by the recently adopted California Coastal Commission Sea Level Rise Guidance Policy (2015), a risk and vulnerability assessment using the best-available information and science regarding coastal erosion, flooding, wave impacts, tidal inundation and tsunamis is needed to identify potential physical impacts in the City's coastal zone. In this way, the City can determine what areas are vulnerable to impacts from these five coastal hazards individually and combined, and with projected sea level rise.

Revell Coastal prepared many of the sea level rise maps in this atlas, using information on four coastal hazards and sea level rise found in *Coastal Resilience Ventura: Technical Report for Coastal Hazards Mapping* (ESA PWA 2013).

The *Coastal Resilience Ventura* report included 1) monthly tidal inundation, 2) erosion, 3) coastal storm waves, and 4) coastal storm floods. All four hazards were then combined into a combined hazard scenario. Hazard zones were mapped for 2015 (existing conditions) and three planning horizons (2030, 2060, and 2100) which is consistent with the *Coastal Resilience Ventura* report. The result is a series of five maps for each of the four Oxnard LCP Planning Areas and five maps for the City of Port Hueneme area, located between LCP Planning Areas 3 and 4. Each map depicts 2015, 2030, 2060, and 2100 conditions. Low, medium, and high sea level rise scenarios are shown for the years 2030, 2060, and 2100.

Oxnard's participation in the Coastal Resilience Ventura project

The Coastal Resilience Ventura initiative was started by The Nature Conservancy in 2011 so that regional partners could coordinate the planning for coastal hazards and climate change (Coastal Resilience 2015). The primary goals of Coastal Resilience Ventura are to assess the vulnerabilities of human and natural resources and to identify solutions that "help nature help people." A steering committee included representatives from the cities of Oxnard, Ventura and Ventura County, along with state and federal agency representatives, members of local non-profit and non-governmental organizations, and regional technical experts. The steering committee identified particular planning needs and data for technical analyses of coastal hazards, climate change, habitat evolution, planning, and adaptation strategies.

Sea Level Rise Assessments and Local Coastal Programs

The California Coastal Act requires that the 61 cities and 15 counties in coastal California prepare LCPs to govern land use and development in the coastal zone inland of the mean high tide line (MHTL). LCPs become effective after the California Coastal Commission (CCC) certifies that an LCP conforms to the policies found in Chapter 3 of the California Coastal Act. Approximately 87% of the California coast is now covered by certified LCPs (CCC 2016). The Oxnard LCP was adopted and certified between 1982 and 1986.

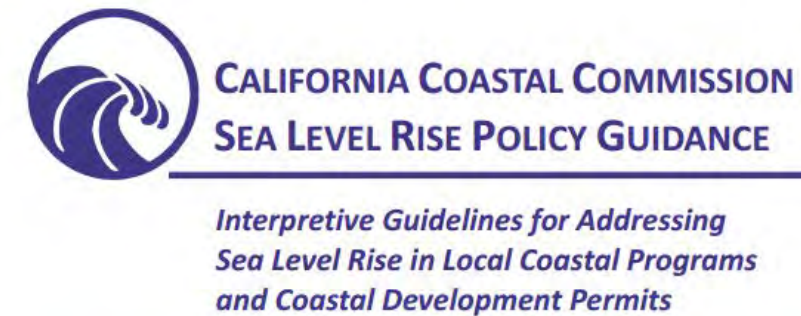
LCPs contain the ground rules for development and resource management in the coastal zone. Each LCP includes a Land Use Plan (LUP) and an Implementation Plan (IP). The LUP specifies the kinds, locations, and intensity of uses. It also contains a required Public Access Component so that maximum recreational opportunities and public access to the coast are provided. The IP includes measures to implement the LUP, usually in the form of a zoning ordinance.

The CCC Sea Level Rise Policy Guidance recommends six steps to address sea level rise as part of the development or update of an LCP. This Sea Level Rise Atlas aims to address the first three steps which are:

1. Choose range of sea level rise projections relevant to the LCP planning area/segment.
2. Identify potential sea level rise impacts in the LCP planning area/segment
3. Assess risks to coastal resources and development (i.e., identify problem areas).

LCP Planning Area Update process

As part of the Oxnard LCP Update process, the Oxnard LCP Planning Areas will be examined to determine what facilities, infrastructure, and natural resources could be affected by the sea level rise scenarios examined in this document. Mapping for the City of Port Hueneme and several Ventura County unincorporated areas is also provided in this atlas. Analysis of sea level rise impacts on the City of Port Hueneme will not be included as part of the City of Oxnard LCP Update.



UNANIMOUSLY ADOPTED – AUGUST 12, 2015

2.0 BACKGROUND

City of Oxnard

The City of Oxnard is home to 206,000 people and 54,000 homes (California Department of Finance 2015). Oxnard is the classic California story of a small farming town that grew rapidly after World War II. It covers about 27 square miles and has a grid-based development pattern established largely on 20- and 40-acre farm parcels that were subsequently urbanized. The city is about 60 miles northwest of Los Angeles along the Pacific Ocean coastline. The Pacific Ocean coastline was not a significant amenity for Oxnard until the 1960s, after which the city grew west and south. It now includes about 10 miles of the Pacific Ocean coastline between the Santa Clara River and the Ormond Beach wetlands.

Oxnard's coast lies along the Santa Barbara Channel and is part of the larger Santa Barbara littoral cell that extends from Point Conception to Point Mugu. The presence of the Channel Islands to the south and Point Conception to the west create a narrow swell window through which waves must pass.



Oxnard open space (Photo: City of Oxnard)



Oxnard's Coastal Zone Planning Areas

The Oxnard Coastal Zone has four LCP Planning Areas extending inland between 0.5 to 1.5-miles, and having a wide range of land uses and public infrastructure. Figure A illustrates the LCP Planning Areas discussed in this document. Planning Areas 1 and 4 have large power plants that are likely to be decommissioned in 2030. Planning Area 2 includes the Oxnard Beach Park, Oxnard Shores Neighborhood, the Colony (a mix of residential, recreational and hotel uses), two back-dune areas, and an inland waterway community. Planning Area 3 encompasses Channel Islands Harbor which is governed by the Channel Islands Harbor Public Works Plan. The objective of the public works plan is to provide policies that provide, protect, and maintain the public's access to and use of recreational water in and adjacent to the Harbor. It also protects and maintains commercial fishing facilities within the harbor. The Public Works Plan must be in conformity with Oxnard's LCP for it to be approved by the Coastal Commission. The Harbor consists of approximately 310 acres, 200 of which are water. (The following sections provide detailed descriptions of each of the LCP Planning Areas).

2.1 PLANNING AREA 1. MCGRATH/MANDALAY BEACH

Planning Area 1 primarily involves McGrath State Beach, the NRG/Southern California Edison Mandalay/McGrath power plant facilities, Mandalay State Beach Park (undeveloped), an entitled but unbuilt 292-unit residential development (North Shore), and resource protection areas including wetlands and Federal and State threatened and endangered species habitat. McGrath State Beach is located on the south bank of the mouth of Santa Clara River and is one of the best bird-watching areas in California, with the lush riverbanks of the Santa Clara River and sand dunes along the shore (California Department of Parks and Recreation 2015). That beach is a significant resource to the city of Ventura as well as Oxnard as it provides recreation areas for surfing, fishing, and camping and access to the Santa Clara Estuary Natural Preserve (California Department of Parks and Recreation 2015).

The McGrath State Beach area is highly susceptible, however, to riverine flooding causing the recreation areas to regularly close. Measures to alleviate flooding are complicated by the Ventura Water Reclamation Facility, estuary water levels, groundwater elevation, McGrath Lake, and the sensitive, endangered or threatened species in the estuary (City of Ventura 2014). The California Department of Parks and Recreation is planning to relocate camping and visitor facilities within the park boundaries to ground.

South of McGrath Beach is the NRG Mandalay Generating Station, Mandalay State Beach (also called Mandalay County Park), and the SCE McGrath Peaker Plant. The owner of Mandalay Generating Station, NRG Energy, has applied to the California Energy Commission to replace the existing power plant with a new 262 MW power plant.



McGrath State Beach (Photo: Parks.ca.gov)



Mandalay State Beach and Mandalay Generating Station (Photo: Californiabeaches.com)

2.2 PLANNING AREA 2. OXNARD SHORES



Oxnard Shores Mobile Home Park (Photo: Rincon Consultants Inc.)

Planning Area 2 is located between Fifth Street and Channel Islands Boulevard. The area includes the Oxnard Beach Park, the Oxnard Shores neighborhood, the Colony (a mix of residential housing, recreation areas and hotels), two undeveloped back-dune areas, an inland marina community (Seabridge and Harbour Island neighborhoods) and a mixed use Specific Plan (Seabridge and Westport). The Oxnard Shores area is accessible via South Harbor Boulevard that runs north-south.



Channel Islands Waterway Community (Photo: Rincon Consultants Inc.)

2.3 PLANNING AREA 3. CHANNEL ISLANDS HARBOR

Planning Area 3 includes the area south of Channel Islands Boulevard. A majority of this planning area, while located in Oxnard, is owned and operated by the County of Ventura as Channel Islands Harbor. The harbor was built as a recreational harbor in the 1960s and 1970s on 310 acres with approximately 2,150 boat slips, marina facilities, restaurants, sport fishing facilities, and shops. The majority of Channel Islands Harbor is operated by businesses that have long-term ground leases. Land use is governed by the Channel Islands Harbor Public Works Plan (PWP) that was first adopted in 1986 and most recently amended in 2008. The PWP is administered by the County of Ventura and essentially serves as the County's LCP for the harbor area, nested within the Oxnard LCP.

Channel Islands Harbor is divided into three areas (west, east, and peninsula) served by separate public roads, with each area offering different services. The west side consists of public, small craft marinas, a park that runs along the marina, restaurants, residential development, and retail businesses. Hotels, marinas, and apartments occupy the peninsula. The east side is primarily commercial in nature with boat yards, a marine supply store, boat sales, law enforcement, administration, and U.S. Coast Guard facilities.



Channel Islands Harbor (Photo: On Target Aerial Services)



Channel Islands Harbor Entrance (Photo: Rincon Consultants, Inc.)



Ormond Beach Wetlands (Photo: Rincon Consultants, Inc.)



Ormond Beach Generating Station (Photo: Rincon Consultants, Inc.)

Ormond Beach is the portion of the Oxnard coastal zone southeast of the City of Port Hueneme and northwest of Naval Base Ventura County Point Mugu. Historically, the Ormond Beach area was part of a rich wetlands ecosystem that included sandy beaches, coastal lagoons and estuaries, fore- and back-dune areas, brackish and seasonal freshwater marshes, freshwater drainages, grasslands and transitional uplands. Over time, a range of agricultural, industrial and energy-related uses developed, including the Ormond Beach Generating Station and a closed industrial metal smelter site known as Halaco. The former Halaco site is now an EPA Superfund site. The Coastal Conservancy and The Nature Conservancy own and manage large portions of the Ormond Beach wetlands and have developed a Wetlands Restoration Feasibility Study. The Coastal Conservancy is pursuing acquisitions at Ormond Beach, with a goal of acquiring at least 900 acres to accommodate wetland and other habitat needs. Acquisition and restoration of these properties would triple the habitat at Ormond Beach. To date, the Coastal Conservancy has acquired 540 acres at Ormond Beach.

The NRG Ormond Beach Generating Station is located within Planning Area 4. There are no announced plans regarding this generating station, other than it must comply with state-mandated once-through-cooling regulations by December 31, 2020.

2.5 CITY OF PORT HUENEME AND COUNTY BEACH AREAS

A portion of the City of Port Hueneme and the unincorporated County beach communities of Silver Strand and Hollywood Beach are located in the coastal zone between LCP Planning Areas 3 and 4. The deep water commercial Port of Hueneme is also located in this area. The Port of Hueneme is owned and operated by the Oxnard Harbor District, created in 1937 as an independent special district. The Port of Hueneme facility is the only deep-water port between Los Angeles and San Francisco. One of three Naval Base Ventura County (NBVC) facilities, the Naval Construction Battalion Center, is located within this area, adjacent to the Port of Hueneme. Situated east of the Port is a residential area that is part of the City of Port Hueneme as well as the Port Hueneme Beach Park.

Note: Although this area is not included within the City of Oxnard's LCP Update, sea level rise information for this area is presented in this atlas.



The Port of Hueneme (Photo: World Trade Center Association)



Silver Strand Beach Community (Photo: Rincon Consultants, Inc.)

This mapping of coastal hazards integrated with sea level rise scenarios is largely based on the *Coastal Resilience Ventura: Technical Report for Coastal Hazards Mapping* (ESA PWA 2013). Information on four coastal processes: 1) monthly tidal inundation, 2) erosion (long term and 100 year storm), 3) coastal storm wave velocity, and 4) coastal storm floods, were extracted from that report and mapped over the four Oxnard LCP Planning Areas. Hazard zones for each of these coastal processes were developed at four planning horizons, or future dates. They are current (2010 – 2015), 2030, 2060, and 2100.

For this sea level rise analysis, Revell Coastal used coastal hazards modeling analysis results (ESA PWA 2013), FEMA’s effective flood maps (FEMA 2010), and spatial infrastructure and locational data from ESRI and TNC (2015). The existing and future coastal hazard modeling methods and assumptions are summarized below. For more information readers are encouraged to review the technical documentation included in the *Coastal Resilience Ventura: Technical Report for Coastal Hazards Mapping* (ESA PWA 2013).

Hazard Coastal Modeling

To model coastal hazards, the analysis used detailed shoreline characterization of local geomorphology (i.e., elevations, beach slopes). The backshore characterization are analyzed approximately every 100 meters and then statistically represented for every 500 meters. Calculations of wave run-up and tide elevations were summed into a total water level elevation used to drive erosion and flooding to determine the coastal erosion and how the shoreline will potentially respond to increased tides and other hazards (Pacific Institute 2009; Revell et. al. 2011). Climate change impacts, assessed using a series of sea level rise, wave climate, and precipitation scenarios, projected the potential for coastal erosion and flooding hazards (ESA PWA 2013). All hazards are mapped with the 2010 California Coastal LIDAR Digital Elevation model (available from the National Oceanic and Atmospheric Administration [NOAA] Digital Coast website). Maps are provided in the NAD 1983 datum and UTM Zone 11N Projection.

Sea Level Rise Scenarios

Modeling considered sea level rise scenarios consistent with the intent of the CCC adopted guidance on sea level rise (CCC 2015), the National Research Council (NRC 2012), and the U.S. Army Corps of Engineers (USACE 2011). Some of the specific numbers used in the analysis, however, are not the same as those listed in the CCC guidance, as the draft guidance had yet to be released. Instead of using the rates for subsidence south of Cape Mendocino (NRC, 2012), the sea level rise curves were adjusted for the vertical land motion reported at the Santa Monica Bay tide gage so that the models presented in this document more accurately predict the possible outcomes of various sea level rise scenarios. The specific scenarios used in the modeling are shown in Table 1 and reflect projected low, moderate, and high levels of sea level rise for 2030, 2060, and 2100.

Table 1. Sea Level Rise Scenario Elevations for each Planning Horizon

Sea Level Rise Scenarios			
Year	Low (inches)	Moderate (inches)	High (inches)
2030	2.3	5.2	8.0
2060	7.4	16.1	25.3
2100	17.1	36.5	58.1

3.1 COASTAL HAZARDS



Erosion

when the land is worn away by water, wind, or ice

This analysis considers two types of coastal erosion:

1) background erosion and 2) 100-year storm erosion. Modeling of background erosion considers two components: erosion due to sea level rise and erosion due to historical trends in shoreline change (as a proxy for sediment supply). The 100-year storm erosion is event-based in that it is the amount of erosion that could be caused by a 1% annual chance storm wave event.

Three scenarios of changes to waves are modeled including no changes in historical wave conditions, a 500 year ArkStorm (for Atmospheric River) event (USGS 2010), and a doubling of the El Niño storm frequency. These models are intended to represent some of the uncertainty associated with increasing storm intensity. The potential for inland erosion caused by sea level rise and a large storm wave event are projected using a geometric model of dune erosion developed by Komar et al (1999). It is applied with different slopes to make the model more applicable to sea level rise (Revell et. al. 2011) and is consistent with the FEMA Pacific Coast Flood Guidelines for storm induced erosion (FEMA 2005).



Erosion of City of Port of Hueneme's shoreline (Photo: Blogspot.com)

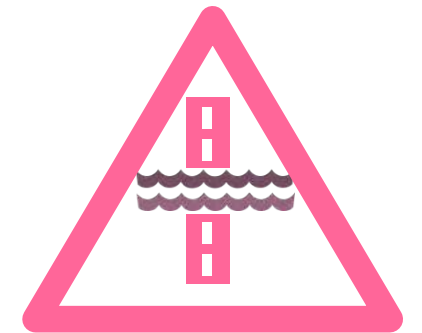


Silver Strand Beach near Channel Islands Harbor (Photo: Rincon Consultants, Inc.)

Coastal Storm Flood

when flooding occurs in eroded areas

The high tide coastal storm flood model is integrated with the coastal erosion hazard zones. Erosion projections are made for every 10 years. The coastal storm flood model considered areas that were eroded during this time period and exposed to wave flooding through enhanced hydraulic connectivity. For the coastal storm flooding, the El Nino winter of 1982/1983 is used for this mode. When, on January 27, 1983, wave heights reached 25 feet at 22 seconds (ESA PWA 2013; Seymour 1996). The coastal storm flood modeling is consistent with FEMA's Pacific Coastal Flood Guidelines (FEMA 2005).



Coastal Storm Wave

when water levels rise & waves reach further inland

Wave impact modeling assesses the inland extent of wave velocity and inland extents of flooding using the method of Hunt (1959) and supported in the Shore Protection Manual (USACE 1984). This method calculates the dynamic water surface profile, the nearshore depth limited wave, the wave run-up elevation and inland extent at the end of each representative profile.



Ventura Pier (Photo: Instagram)

3.1 COASTAL HAZARDS

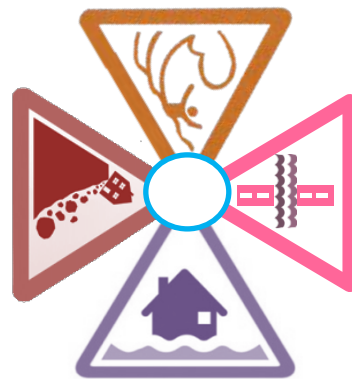


Tidal inundation when the tide rises & water covers land normally dry

Tidal inundation modeling represents the Extreme Monthly High Water level (EMHW similar to a King Tide). This monthly elevation is averaged from the maximum monthly water level from the Rincon Island tide gauge (EMHW = 6.56ft NAVD88 or 9.3ft MSL) and is applied to each sea level rise scenario.



Mandalay Beach Road and 5th Street (Photo: Rincon Consultants, Inc.)



Combined Hazards combination of all coastal hazards

For each planning horizon, projected coastal process hazards are combined into a single layer using a process called "spatial aggregation" (ESA PWA 2013). This layer represents the overlap of the four hazard zones and depicts the various sea level rise and wave condition scenarios impact specific areas. For example, an area mapped under three hazard scenarios indicates that the area was hazardous during that planning horizon for all coastal process hazard scenarios.

Critical Modeling Assumptions

As with all modeling, assumptions had to be made to complete the models. Some of the critical modeling assumptions made in the ESA PWA 2013 work are listed below.

- Coastal erosion and flood hazard projections do not consider existing coastal armoring
- Projections of potential erosion do not account for uncertainties in the duration of a future storm
- Modeling does not consider future changes to supply of sediment from the watersheds
- Modeling assumes that the existing dredge practices at all of the harbors continue
- Modeling assumes no change in watershed land uses

Tsunami

The mapping of potential tsunami hazards combined with sea level rise was performed by Everest International. Potential tsunami inundation elevations were determined from the selected tide condition and tsunami wave heights described below. These potential tsunami inundation elevations were then mapped for the four LCP Planning Areas using GIS and topographic/bathymetric data to evaluate areas with the potential to be inundated by a tsunami occurring in the same four planning horizons as discussed previously; 2015, 2030, 2060, and 2100.

Historical Tsunami

The 2010 Chilean and 2011 Japanese tsunamis were the most significant tsunamis to hit California since the 1964 Alaska tsunami. The 2010 Chilean tsunami was generated by a magnitude 8.8 earthquake on February 26, 2010 at the Maule region near central Chile, and the tsunami subsequently reached the Los Angeles region around noon on February 27, 2010. On March 11, 2011, a magnitude 9.0 earthquake struck the east coast of the Tohoku region in Japan, and it generated a large tsunami that reached the Los Angeles region at around 8:40 am on March 11, 2011. The NOAA ocean water level data collected at the Santa Barbara and Santa Monica gages for these two tsunamis were downloaded and analyzed for this analysis. Based on the data, the maximum measured tsunami amplitude (wave amplitude equals half the wave height) for the 2010 Chilean event was approximately 1.61 feet at Santa Monica and 1.91 feet at Santa Barbara. For the 2011 Japanese event, tsunami amplitude at Santa Monica was about 2.43 feet and 2.39 feet at Santa Barbara. The tsunami wave amplitude off the shoreline of Oxnard is likely between those measured at Santa Monica and Santa Barbara so an average value was calculated for these two locations (1.75 ft for the 2010 Chilean event and 2.41 ft for the 2011 Japanese event) to represent the tsunami amplitude. For this analysis, the 2011 Japanese tsunami amplitude was used since it represented the higher tsunami wave condition.

Tsunami

when a large wave caused by an earthquake or submarine landslide causes flooding on land

Local Tsunami

Given the lack of measured information for historical tsunamis and the potential for extreme tsunamis that have not been captured in the historical measurements, consideration was given to potential tsunamis that could be generated by distant sources and local sources. The State of California conducted an analysis of tsunamis that could be generated by numerous distant sources (*e.g.*, Cascadian Subduction Zone earthquake) and local sources (*e.g.*, Goleta 2 Landslide). A numerical model was used in the analysis conducted by the State of California to determine the maximum potential tsunami elevation for each individual source and then the maximum tsunami elevation was identified for each distant and local sources. The results were provided for different locations along the California coast, including the Oxnard and Ventura area. For the Oxnard area, the maximum tsunami elevation of +12 feet, mean sea level rise resulting from the Goleta 2 Landslide source was reported (California Geological Survey 2014). This tsunami was selected for inclusion in this analysis to allow consideration of a potentially large tsunami not captured in the historical measured record that could strike the Oxnard coast in the future. This tsunami is also being considered by the City of Oxnard for emergency evacuation planning.



3.2 TSUNAMI INUNDATION

Tides

Tide elevations are monitored by National Oceanic and Atmosphere Administration (NOAA) along the California coastline at designated tide stations. The Santa Barbara station (Station 9411340) and Santa Monica station (Station 9410840) are the two NOAA stations closest to the City of Oxnard. Tidal datums obtained from NOAA for these two stations are shown in Table 2 with elevations in feet relative to the North American Vertical Datum of 1988 (NAVD88). These tidal datums represent long term average water levels for the latest National Tidal Datum Epoch from Years 1983 to 2001. Since the City is approximately equal distance from the two NOAA stations, the average tide elevation at the two tide stations was used for this analysis. For the potential tsunami inundation analysis, Mean Higher High Water (MHHW) was selected as the tide condition for the historical tsunami while mean sea level (MSL) was selected as the tide condition for the locally generated tsunami.

Potential Tsunami Inundation Elevations

The potential tsunami inundation elevations for the 2011 Japanese tsunami and Goleta 2 Landslide tsunami are summarized in Tables 2 and 3, respectively. The values in Table 2 are based on the tsunami occurring during a high tide condition of mean higher high water in 2015 (existing conditions) as well as in the planning horizons 2030, 2060, and 2100. The values in Table 3 are based on the tsunami occurring during a tide condition of mean sea level in Year 2015 (existing conditions) as well as in the planning horizons 2030, 2060, and 2100.

Sea Level Rise

The sea level rise scenarios were consistent with the coastal hazards mapping prepared by ESA PWA (2013) for the County of Ventura. It also included an adjustment for local vertical land motion using the Santa Monica tide station for the medium and high sea level rise projections. The sea level rise projections relative to 2010 extracted from the ESA PWA 2013 are shown in Table 1 in Section 3.0 *Methodology*. The same sea level rise projections for Years 2030, 2060, and 2100 from the ESA PWA study (2013) High Scenario were used for this analysis to define future mean sea level conditions.

Table 2. 2011 Japanese Tsunami Potential Inundation Elevations

Year	MHHW (inches)	Tsunami Amplitude (inches)	Sea Level Rise (High Scenario, inches)	Inundation Elevation (inches)
2015	63.1	28.8	0	92.4
2030	63.1	28.8	8.0	99.6
2060	63.1	28.8	25.3	117.6
2100	63.1	28.8	58.1	150.0

Table 3. Goleta 2 Landslide Tsunami Potential Inundation Elevations

Year	MHHW (inches)	Tsunami Amplitude (feet)	Sea Level Rise (High Scenario, inches)	Inundation Elevation (inches)
2015	31.6	144.0	0	175.2
2030	31.6	144.0	8.0	183.6
2060	31.6	144.0	25.3	200.4
2100	31.6	144.0	58.1	234.0

Data used for GIS-Aided Tsunami Inundation Analysis

Imagery: World Imagery

The imagery "World Imagery" is available as a basemap in ESRI ArcGIS (ESRI, 2015). World Imagery provides one meter or better satellite and aerial imagery in many parts of the world and lower resolution satellite imagery worldwide. The map features 0.3 m resolution imagery in the continental United States.

Topographic/Bathymetric Data: 2013 NOAA Coastal California TopoBathy Merged Project

The raster data set was downloaded from the NOAA Digital Coast Data Access Viewer (NOAA, 2015). Data providers include the California State Coastal Conservancy, California Ocean Protection Council, and California Department of Water Resources. The data was extracted from a larger classified data set and only includes points classified as Ground, Model Key-point (mass point), Bathymetric Lidar Points, and Acoustic Bathymetry (bare earth) within the requested geographic bounds. This project merged recently collected topographic, bathymetric, and acoustic elevation data along the entire California coastline from approximately the 10 m elevation contour out to the three-mile State water's boundary.

The topographic Lidar data used in this merged project was the 2009-2011 California State Coastal Conservancy Lidar Project. The bathymetric Lidar data used in this merged project was 2009-2010 U.S. Army Corps of Engineers (USACE) Joint Airborne Lidar Bathymetry Center of Expertise (JALBTCX) Lidar, provided by JALBTCX. The data were collected for the California Coastal Mapping Project (CCMP). The multibeam acoustic data used in this merged project were provided by the California Seafloor Mapping Program (CSMP) Ocean Protection Council and NOAA's National Geophysical Data Center (NGDC). Vertical accuracy of the topographic data

is reported at 4.8 centimeters (cm) root mean square error (RMSE). JALBTCX bathymetric data is reported at 15 cm RMSE. As multiple multibeam acoustic datasets from multiple sources were used, the vertical accuracy varies. Horizontal accuracy is 100 cm.

Storm Drain Data

GIS storm drain data were obtained from the City of Oxnard. The types of data include locations of storm drains, open channels, manholes, inlets and outfalls. Among the information provided in the attribute tables are elevations of pipe inverts, manhole covers and inlets.

4.0 RESULTS

The following section contains the atlas of the coastal hazards and tsunami inundation maps along with a brief description of each modeled scenario.



Silver Strand Beach (Photo: Rincon Consultants Inc.)



Oxnard Shores (Photo: Rincon Consultants Inc.)

4.1 COASTAL HAZARDS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH

Monthly Tidal Inundation Hazard Zone

Existing Conditions

The modeled existing monthly high tidal inundation hazard zone for Planning Area 1 is approximately 100 meters (328 feet) of shoreline between the Santa Clara River and W. 5th Street. It also extends into the Mandalay Bay Generating Station (MBGS) beach discharge area and the Edison canal.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Is comparable to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Is comparable to existing conditions.

High Sea Level Rise Scenario (8.0" SLR)

Extends further than existing conditions near the north side of the MBGS beach discharge area.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 25 meters (75 feet) further inland than existing conditions near the north side of the MBGS beach discharge area.

Moderate Sea Level Rise Scenario (16.1" SLR)

The extent of the monthly tidal inundation hazard zone in the moderate sea level rise scenario extends further than existing conditions by approximately 50 meters (150 feet) near the north side of the MBGS beach discharge area.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 500 meters (1,500 feet) further inland than existing conditions to the north and to the south side of the MBGS beach discharge area.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 25 meters (75 feet) further inland than existing conditions near the north side of the MBGS beach discharge area.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 100 meters (300 feet) further inland than existing conditions to the north and approximately 500 meters (feet) to the south side of the MBGS beach discharge area.

High Sea Level Rise Scenario (58.1" SLR)

The extent of the monthly tidal inundation hazard zone in the high sea level rise scenario extends further than existing conditions by approximately 300 meters (600 feet) to the north and approximately 1,000 meters (3,000 feet) to the south side of the MBGS beach discharge area.

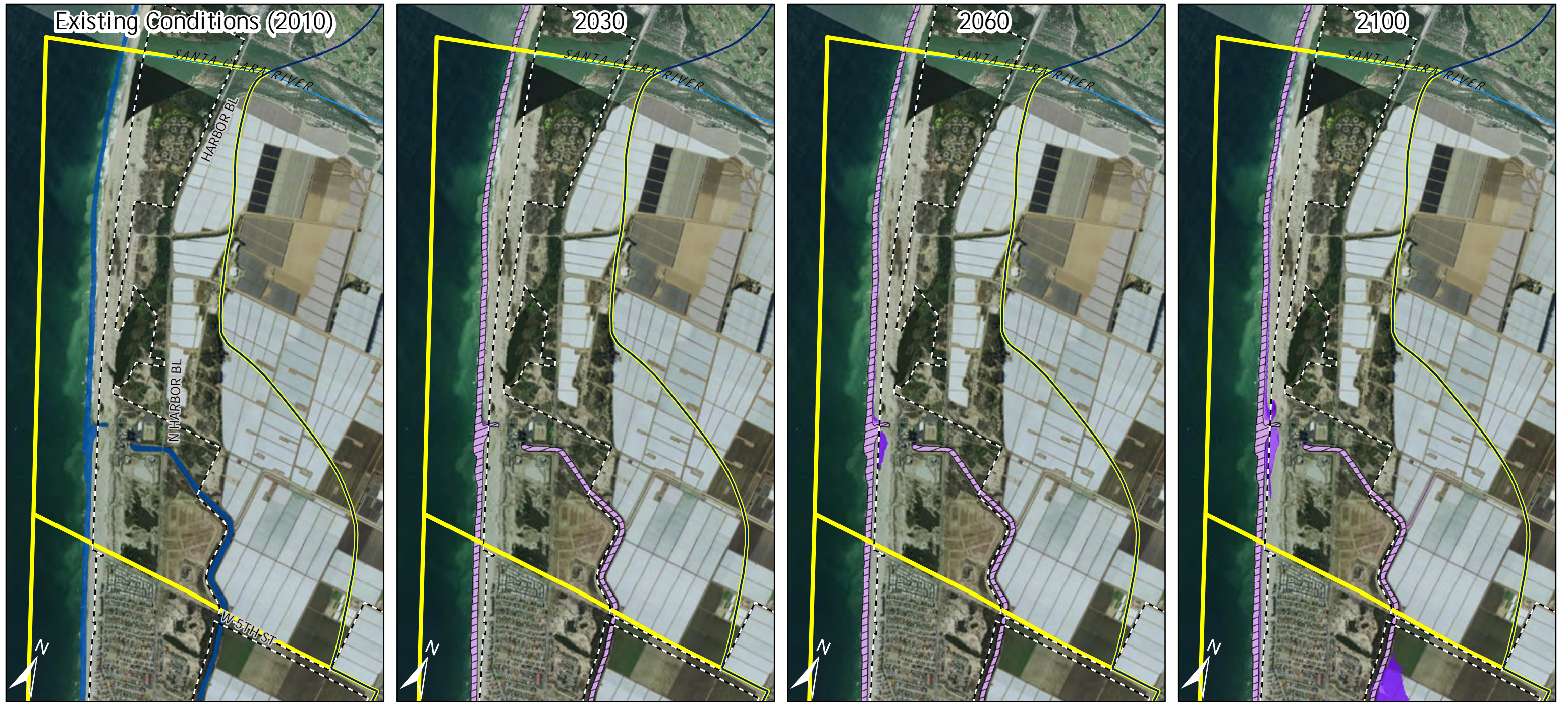


Figure 4.1.1 - Monthly Tidal Inundation Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Monthly Tidal Inundation

Modeling Scenario (2030)

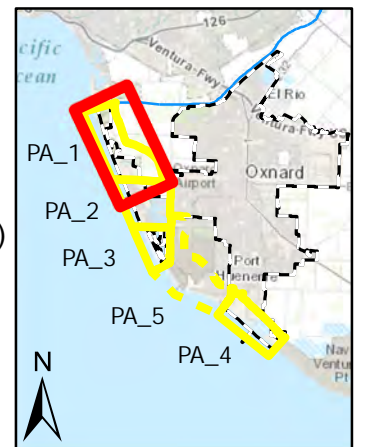
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.1 COASTAL HAZARDS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH

Background Erosion Hazard Zone

Existing Conditions

The modeled existing background erosion hazard zone for Planning Area 1 is approximately 150 meters (500 feet) of shoreline between the Santa Clara River and W. 5th Street.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Is comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Moderate Sea Level Rise Scenario (16.1" SLR)

High Sea Level Rise Scenario (25.3" SLR)

Is comparable to existing conditions.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Moderate Sea Level Rise Scenario (36.5" SLR)

High Sea Level Rise Scenario (58.1" SLR)

Is comparable to existing conditions.

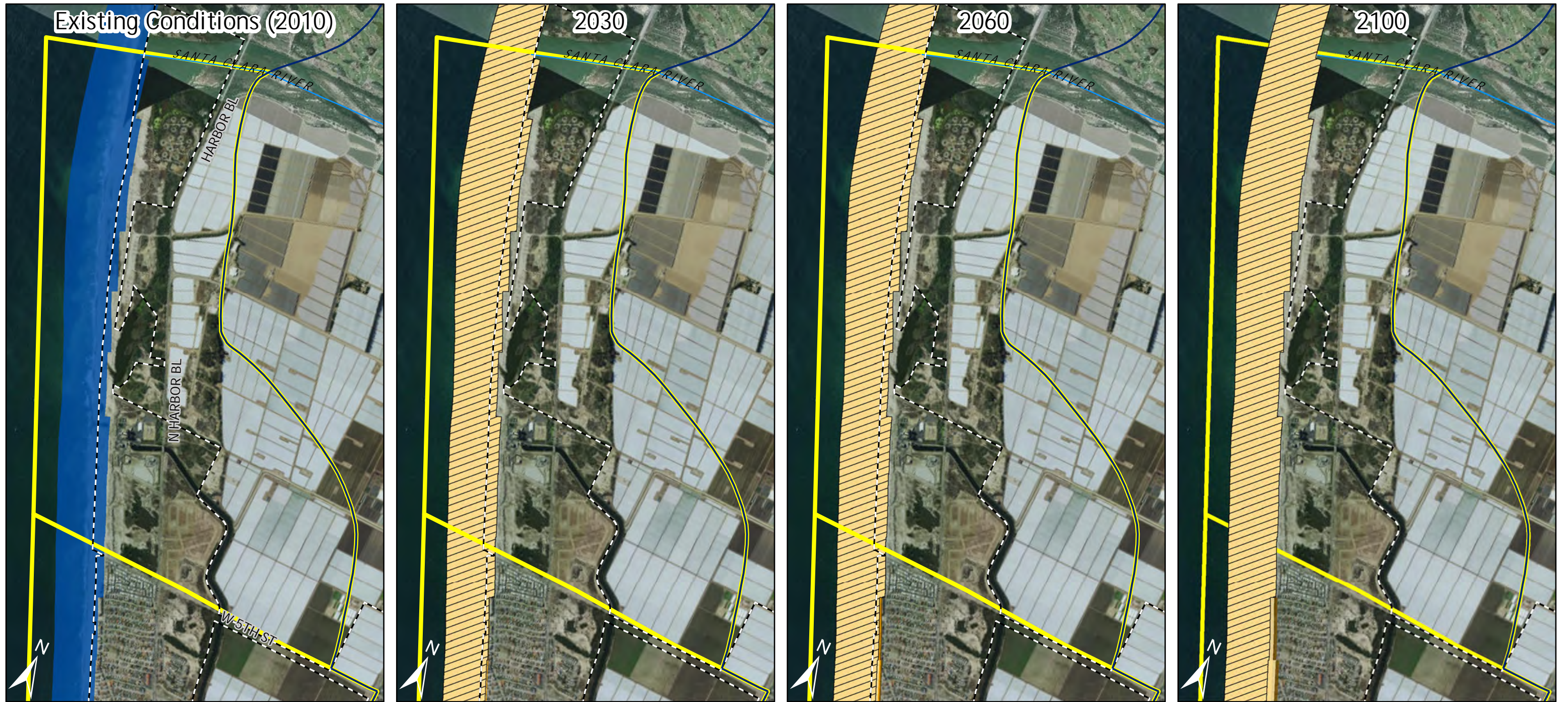


Figure 4.1.2A - Background Erosion Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Background Erosion

Modeling Scenario (2030)

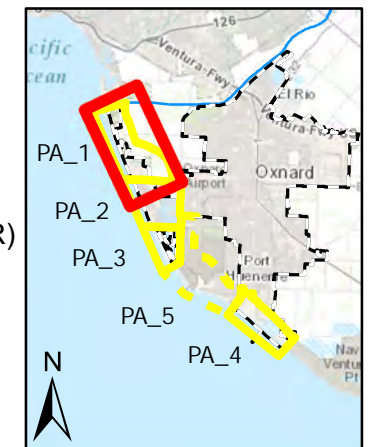
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.1 COASTAL HAZARDS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH

100-yr Storm Erosion Hazard Zone

Existing Conditions

The modeled existing 100-yr storm erosion hazard zone for Planning Area 1 is approximately 150 meters (500 feet) of shoreline between the Santa Clara River and W. 5th Street.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Is comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Moderate Sea Level Rise Scenario (16.1" SLR)

High Sea Level Rise Scenario (25.3" SLR)

Is comparable to existing conditions.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Moderate Sea Level Rise Scenario (36.5" SLR)

High Sea Level Rise Scenario (58.1" SLR)

Is comparable to existing conditions.

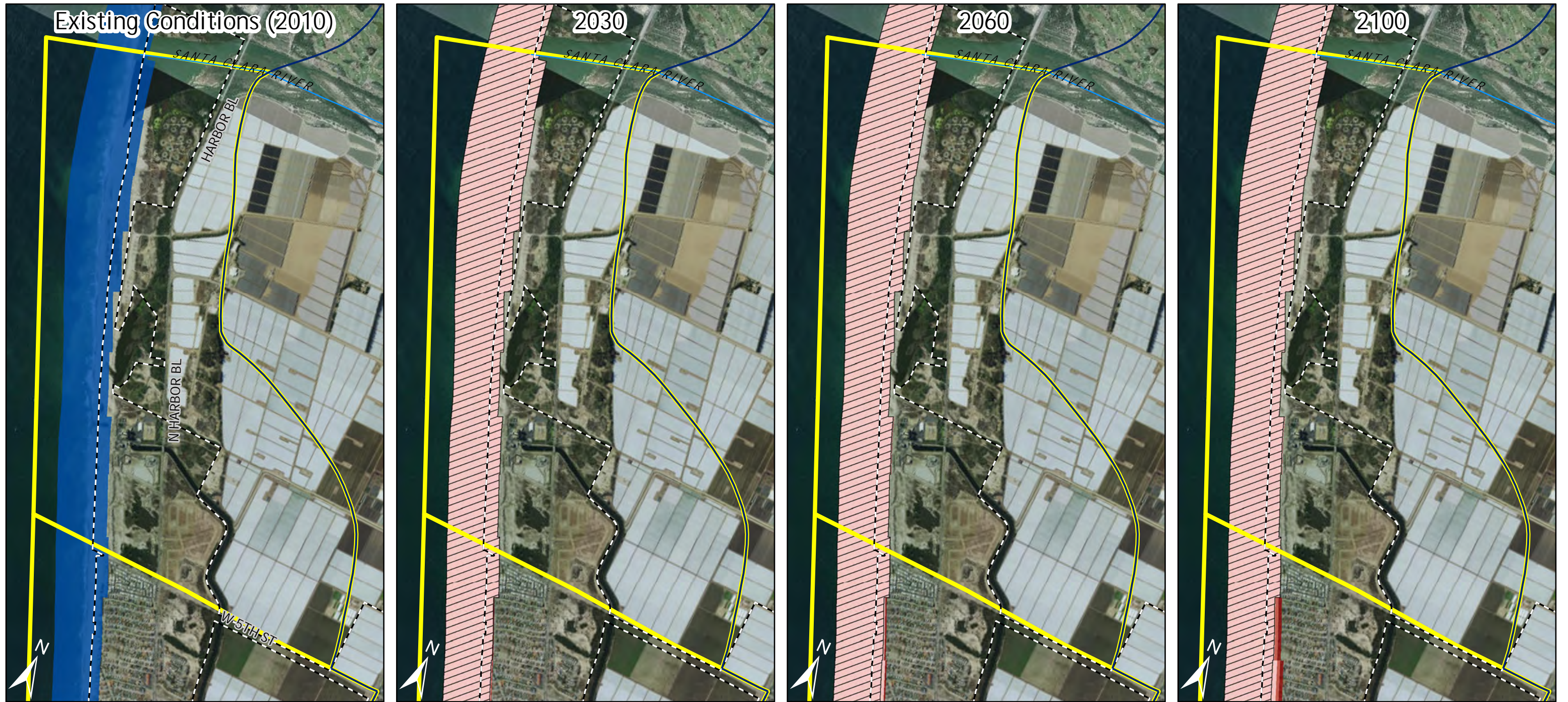


Figure 4.1.2B - 100-yr Storm Erosion Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-100-yr Storm Erosion

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

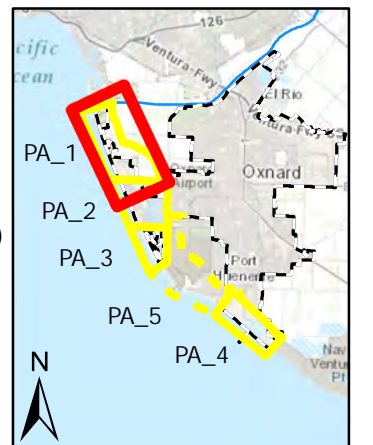
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.1 COASTAL HAZARDS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH

Coastal Storm Wave Hazard Zone

Existing Conditions

The modeled existing coastal storm wave hazard zone for Planning Area 1 extends approximately 500 meters (1500 feet) east of the mean high tide line between Santa Clara River and W. 5th Street. Storm waves do not reach N. Harbor Boulevard.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends further inland by approximately 10 meters (30 feet) on the western edge of the hazard zone.

Moderate Sea Level Rise Scenario (5.2" SLR)

Extends further inland by approximately 15 meters (45 feet) on the western edge of the hazard zone.

High Sea Level Rise Scenario (8.0" SLR)

Extends further inland by approximately 25 meters (75 feet) on the western edge of the hazard zone.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends further inland by approximately 50 meters (150 feet) on the western edge of the hazard zone.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends further inland by approximately 75 meters (225 feet) on the western edge of the hazard zone.

High Sea Level Rise Scenario (25.3" SLR)

Extends further inland by approximately 100 meters (300 meters) on the western edge of the hazard zone.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends further inland by approximately 150 meters (450 feet) on the western edge of the hazard zone.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland by approximately 300 meters (900 feet) only near McGrath State Beach, north of McGrath Lake.

High Sea Level Rise Scenario (58.1" SLR)

Extends further inland by approximately 500 meters (1,500 feet) on the eastern edge of the hazard zone, which encompasses Harbor Boulevard and nearby agricultural areas located in the County.

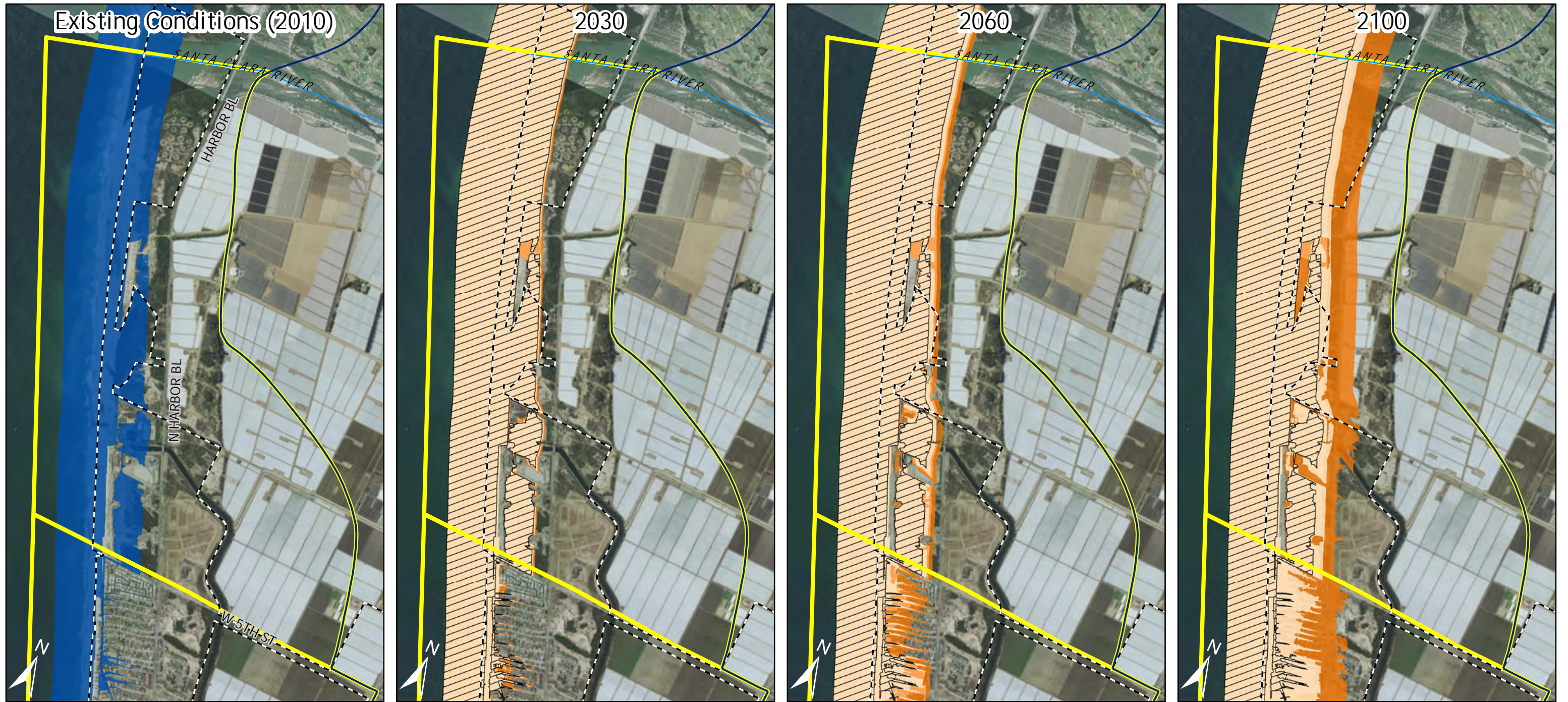


Figure 4.1.3 - Coastal Storm Wave Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Wave

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

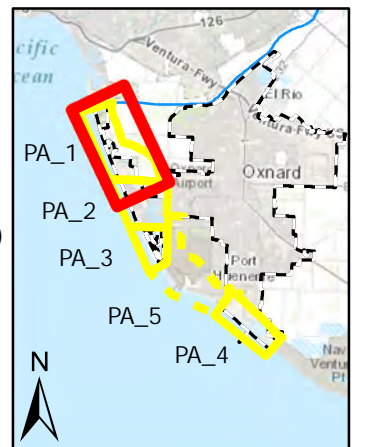
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from
 Coastal Resilience Ventura (ESA PWA, 2013)



4.1 COASTAL HAZARDS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH

Coastal Storm Flood Hazard Zone

Existing Conditions

The modeled coastal storm flood hazard zones for Planning Area 1 include most of the area west of N. Harbor Boulevard, between the Santa Clara River and W. 5th Street, including the Mandalay Power Generating Station, and along the Edison Canal.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends further inland by approximately 10 meters (30 feet) on the western edge of the hazard zone.

Moderate Sea Level Rise Scenario (5.2" SLR)

Extends further inland by approximately 20 meters (60 feet) on the western edge of the hazard zone.

High Sea Level Rise Scenario (8.0 SLR)

Extends further inland by approximately 30 meters (90 feet) on the western edge of the hazard zone.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends further inland by approximately 50 meters (150 feet) on the western edge of the hazard zone.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends further inland by approximately 75 meters (225 feet) on the western edge of the hazard zone and encompasses the complete delta of the Santa Clara River.

High Sea Level Rise Scenario (25.3" SLR)

Extends further inland by approximately 100 meters (300 feet) on the western edge of the hazard zone and encompasses the entire delta of the Santa Clara River.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends further inland by approximately 100 meters (300 feet) on the western edge of the hazard zone, surpassing the Santa Clara River Delta.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland by approximately 200 meters (600 feet) near the McGrath State Beach campground where it covers the Santa Clara River Delta and Harbor Boulevard.

High Scenario (58.1" SLR)

Extends further inland by approximately 300-500 meters (600-1,500 feet) on the eastern edge of the hazard zone, reaching past Harbor Boulevard throughout the planning area.

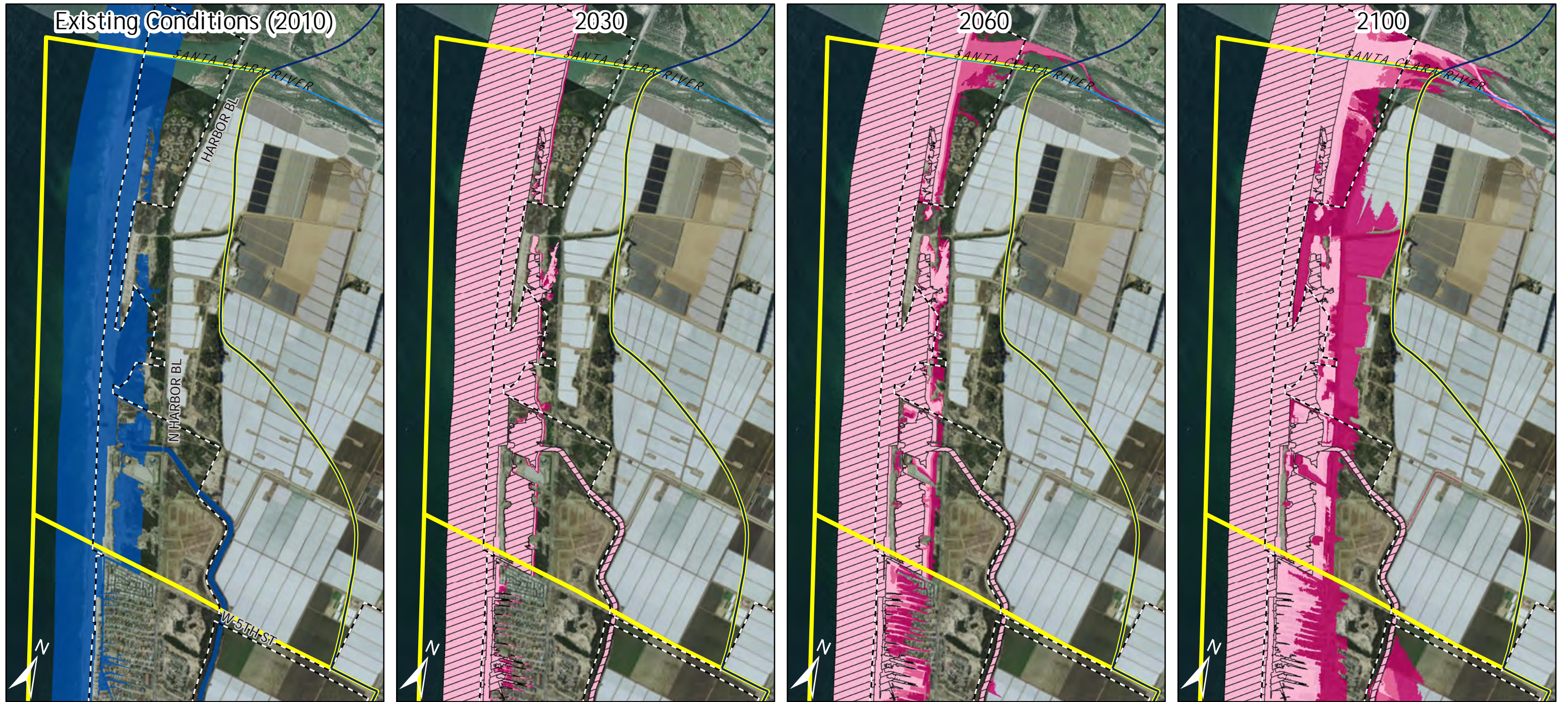


Figure 4.1.4 - Coastal Storm Flood Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Flood

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

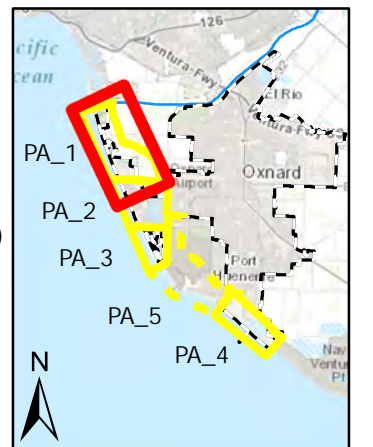
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.1 COASTAL HAZARDS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH

Combined Hazard Zone

Existing Conditions

The modeled combined hazard zone for Planning Area 1 begins at the Santa Clara River and extends south to West Gonzales Road, where it is bounded on the east by N. Harbor Boulevard. It also includes most of the area west of N. Harbor Boulevard, including the Mandalay Bay Generating Station (MBGS) and along the Edison Canal. The combined hazard zone extends inland by the Edison Canal to the west, which affects agricultural plots north of W. 5th Street. The McGrath State Beach coastline, beaches, and campgrounds are currently in the combined hazard zone.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Does not extend outside the range of the existing combined hazard zone.

Moderate Sea Level Rise (5.2" SLR)

Extends further inland to include more area on McGrath State Beach (north of McGrath Lake) and onto agricultural area located east of the Planning Area in the unincorporated county.

High Sea Level Rise Scenario (8.0" SLR)

Similar to the moderate SLR scenario but extends approximately 100 meters (300 feet) further inland on east of the planning area, reaching more agricultural areas in the unincorporated county.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends further inland by approximately 30 meters (90 feet) in the area near the MBGS.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends further inland by approximately 40 meters (120 feet) in the area near the MBGS and approximately 50 meters (150 feet) north of McGrath Lake.

High Sea Level Rise Scenario (25.3" SLR)

Extends further inland than the existing combined hazard zone by approximately 60 meters (180 feet) in the area near the MBGS and onto agricultural area east side of the Planning Area in the unincorporated county.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends further inland by approximately 50 meters (150 feet) in the area near the MBGS and Mandalay State Beach.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland by approximately 100 meters (300 feet) in the area near the MBGS, Mandalay State Beach, north of McGrath Lake, and onto agricultural area east of the Planning Area in the unincorporated county.

High Sea Level Rise Scenario (58.1" SLR)

Extends further inland by approximately 200 meters (600 feet) in the area near the MBGS, covering Harbor Boulevard and reaching agricultural areas north of West Gonzales Boulevard.

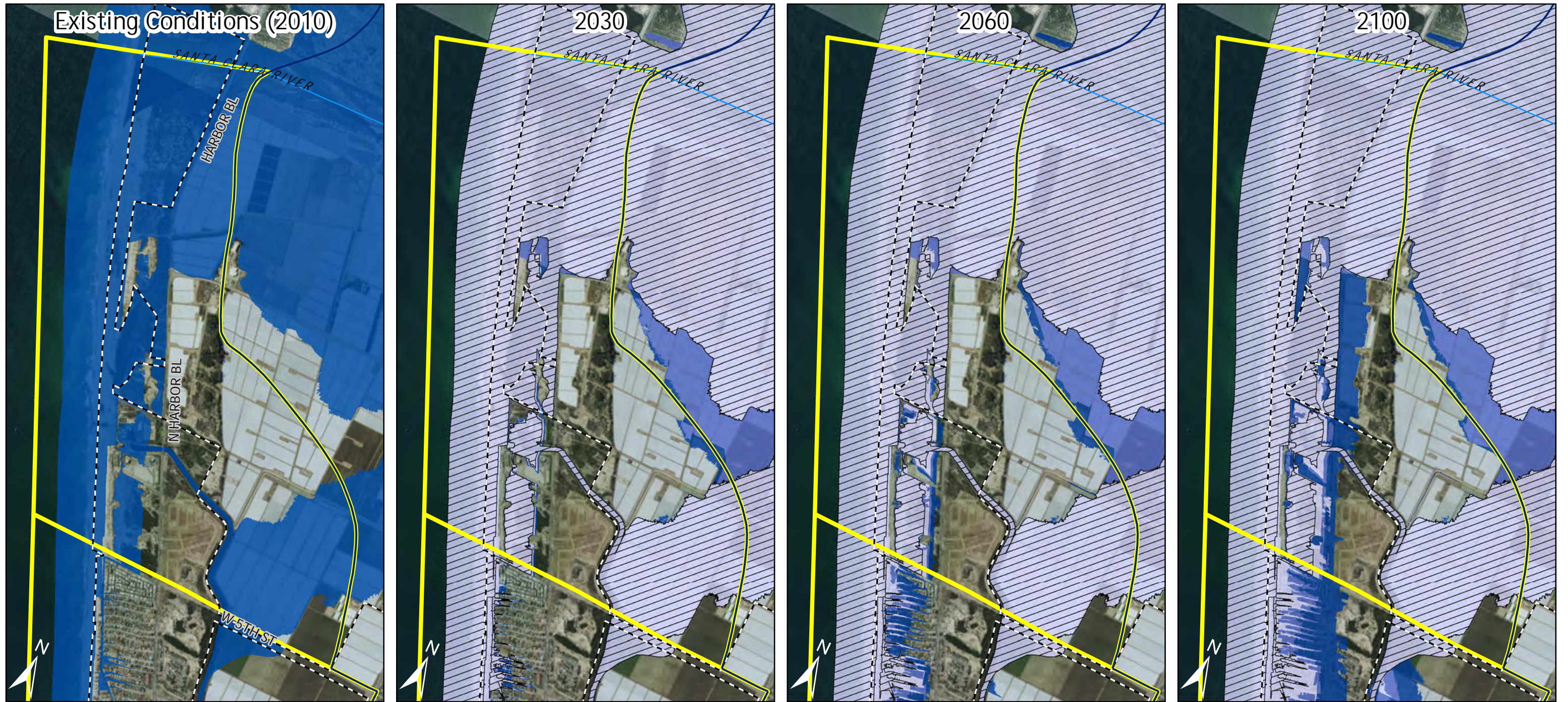


Figure 4.1.5 - Combined Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Combined

Modeling Scenario (2030)

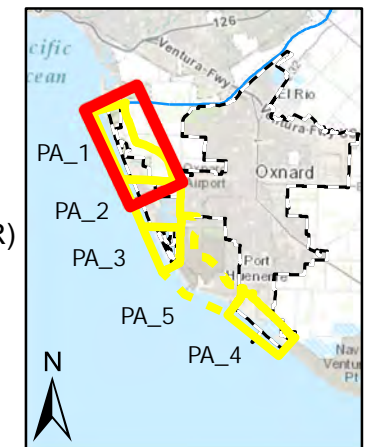
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.2. COASTAL HAZARDS. PLANNING AREA 2. OXNARD SHORES.

Monthly Tidal Inundation Hazard Zone

Existing Conditions

The modeled monthly tidal inundation hazard zone for Planning Area 2 extends approximately 100 meters (300 feet) off the shore between W. 5th Street and Channel Islands Boulevard. The zone also extends into the inland waterway community of Mandalay Bay.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to existing conditions and the low scenario.

High Sea Level Rise Scenario (8.0 SLR)

Comparable to existing conditions, the low scenario, and the moderate scenario.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to existing conditions and the low scenario.

High Sea Level Rise Scenario (25.3" SLR)

Comparable to existing conditions, and the low and moderate scenarios.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (36.5" SLR)

Encompasses residential units near the western side of the inland waterway community and onto Victoria Avenue, where it intersects with W. Channel Islands Boulevard.

High Sea Level Rise Scenario (58.1" SLR)

Encompasses most of the residential units in the western and southern portion of the inland waterway community. It also would affect the agricultural area adjacent to Harbor Boulevard.

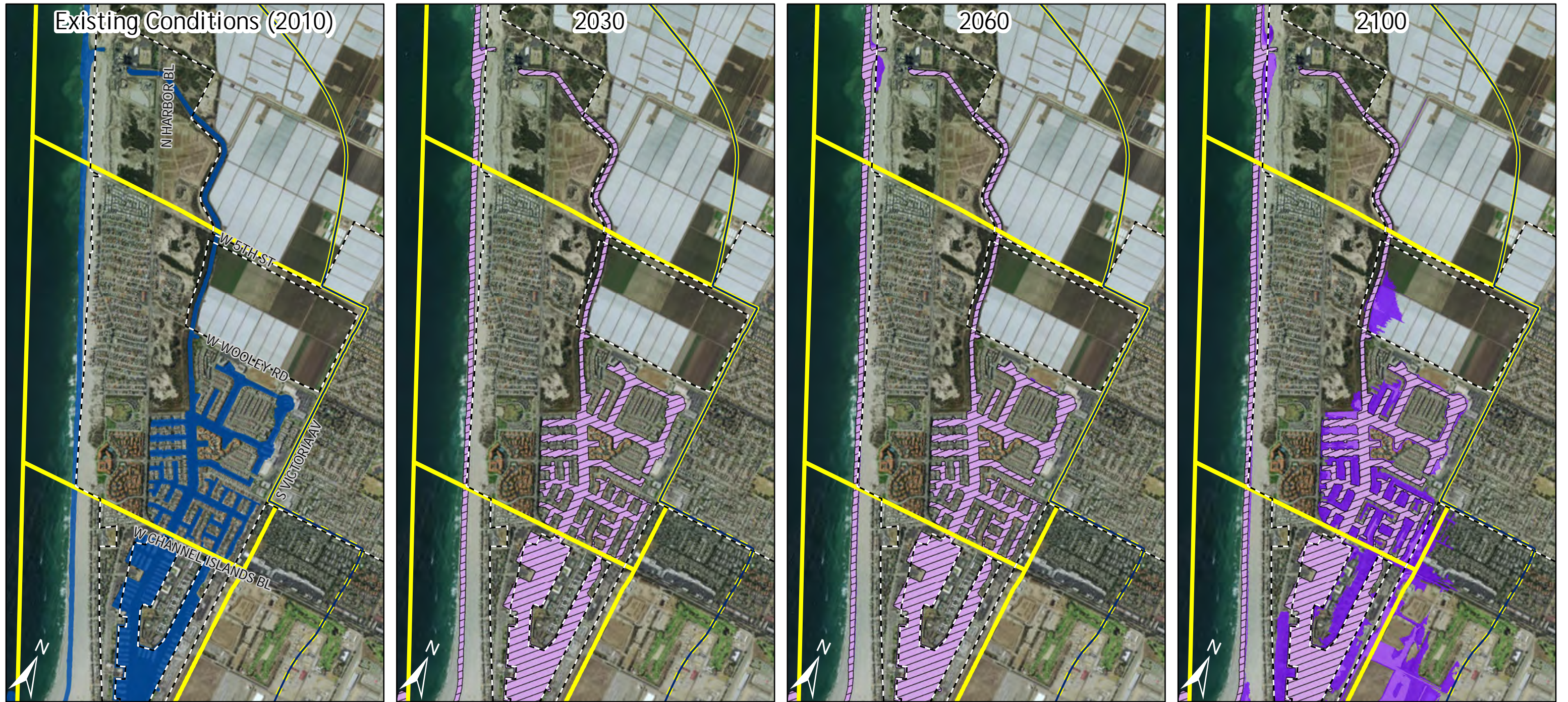


Figure 4.2.1 - Monthly Tidal Inundation Hazard Zones for Planning Area 2: Oxnard Shores

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Monthly Tidal Inundation

Modeling Scenario (2030)

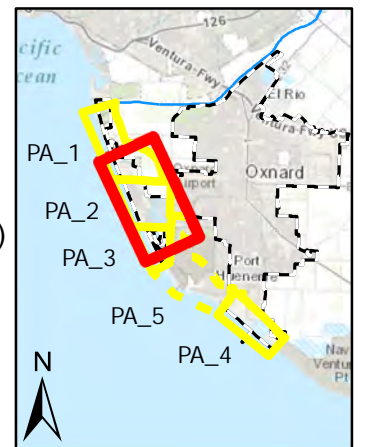
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.2. COASTAL HAZARDS. PLANNING AREA 2. OXNARD SHORES.

Background Erosion Hazard Zone

Existing Conditions

The modeled existing background erosion hazard zone for Planning Area 2 extends approximately 100 meters (300 feet) from the shoreline between W. 5th Street and Channel Islands Boulevard, reaching some beach front residential houses in the Oxnard Shores neighborhood.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 25 meters (80 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 35 meters (115 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 45 meters (150 feet) further inland compared to existing conditions.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 25 - 150 meters (80-500 feet) further inland compared to existing conditions, reaching the Mandalay Bay Beach Resort and Oxnard Beach Park.

Moderate Sea Level Rise Scenario (36.5" SLR)

Comparable to the low scenario.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 50-175 meters (150-575 feet) further inland compared to existing conditions, reaching past Mandalay Beach Road.

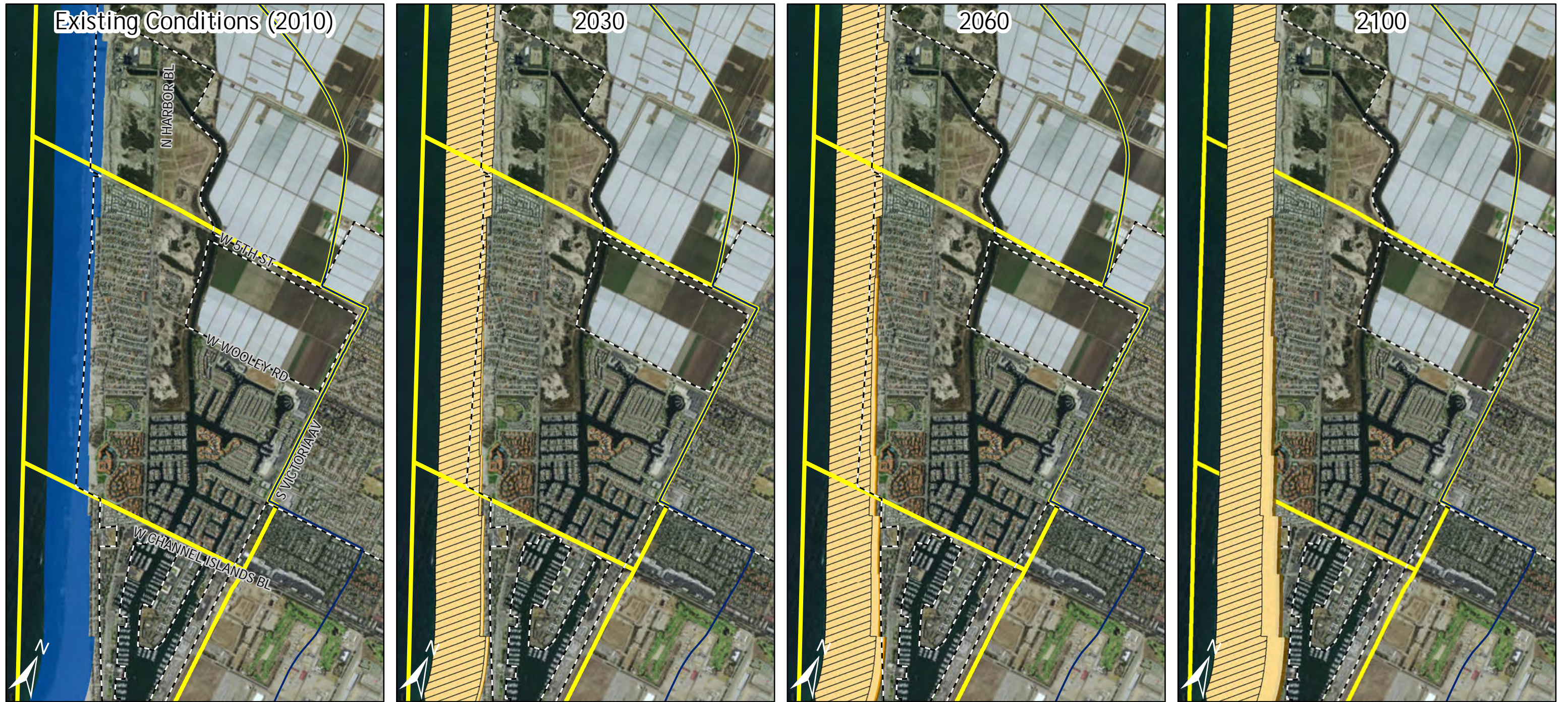


Figure 4.2.2A - Background Erosion Hazard Zones for Planning Area 2: Oxnard Shores

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Background Erosion

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

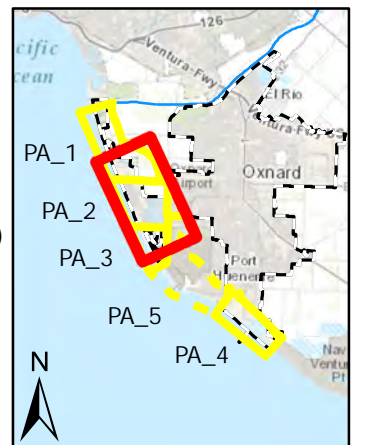
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.2. COASTAL HAZARDS. PLANNING AREA 2. OXNARD SHORES.

100-yr Storm Erosion Hazard Zone

Existing Conditions

The modeled existing 100-yr storm erosion hazard zone for Planning Area 2 extends approximately 200 meters (600 feet) from the shoreline between W. 5th Street and Channel Islands Boulevard, reaching Mandalay Beach Road in the northern portion of Planning Area 2.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 25 meters (80 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 35 meters (115 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 45 meters (150 feet) further inland compared to existing conditions.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 25 - 100 meters (80-300 feet) further inland compared to existing conditions, reaching the Mandalay Bay Beach Resort and Oxnard Beach Park.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 50- 150 meters (150- 500 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 100 - 200 meters (300- 1600 feet) further inland compared to existing conditions, further inland compared to the low scenario, reaching past Mandalay Beach Road.

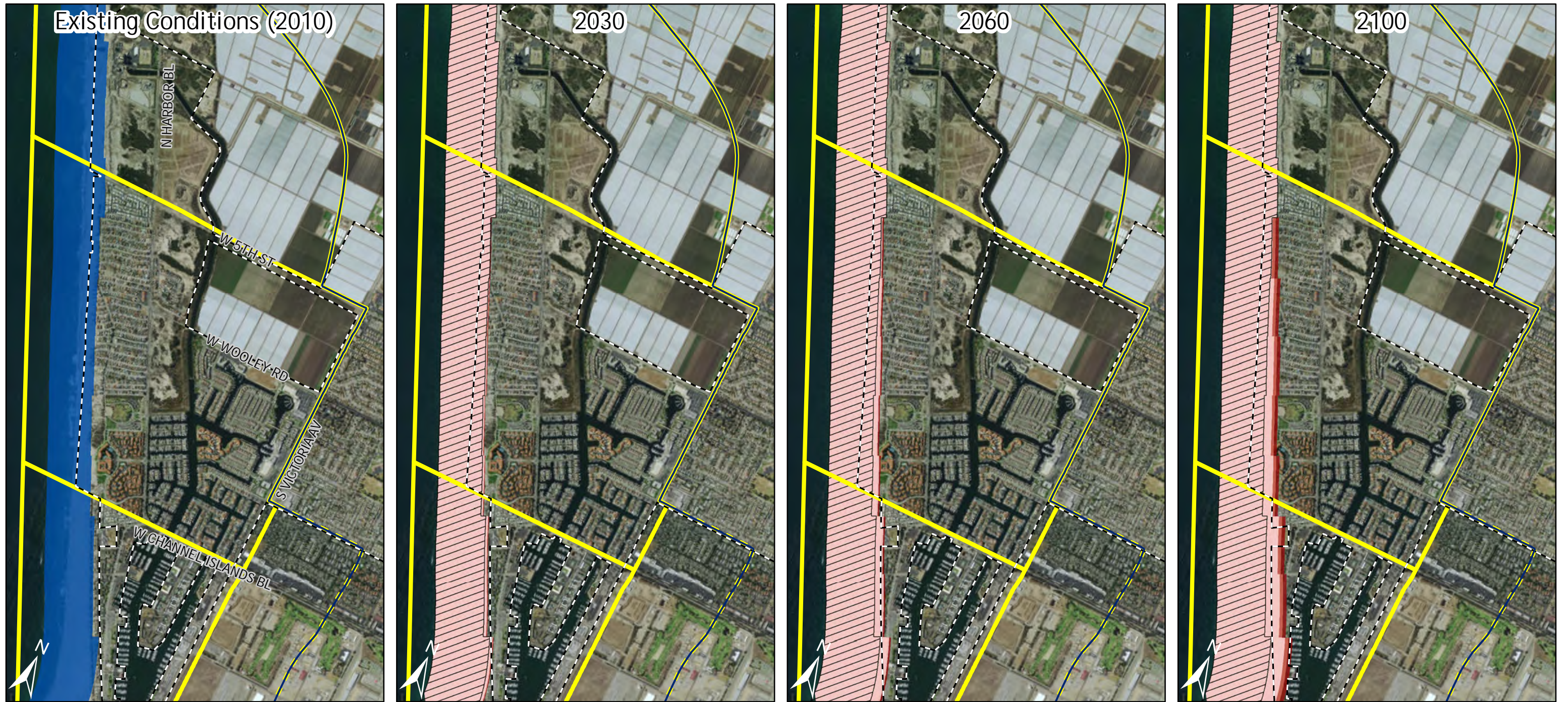


Figure 4.2.2B - 100-yr Storm Erosion Hazard Zones for Planning Area 2: Oxnard Shores

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-100-yr Storm Erosion

Modeling Scenario (2030)

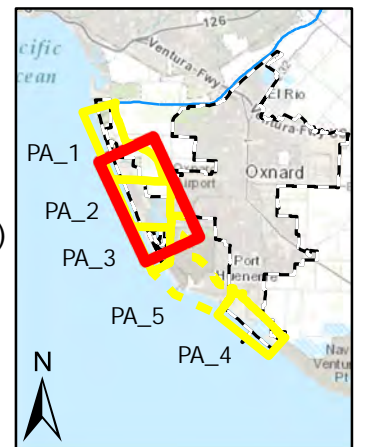
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.2. COASTAL HAZARDS. PLANNING AREA 2. OXNARD SHORES.

Coastal Storm Wave Hazard Zone

Existing Conditions

The modeled coastal storm wave hazard zone for Planning Area 2 begins on the shore between W. 5th Street and Hollywood Beach on W. Channel Islands Drive, and extends 250 meters (750 feet) east in the Oxnard Shores neighborhood between Wavecrest Way and W. Wooley Road.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends further inland by approximately 250 meters (750 feet) in the Oxnard Shores Area, between Dolphin Way and Island View Street on the western edge of the hazard zone.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0 SLR)

Extends further inland by approximately 325 meters (975 feet) in the Oxnard Shores neighborhood between Seabreeze Way and W. Wooley Road.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends further inland by approximately 325 meters (975 feet) mostly in the Oxnard Shores neighborhood between Dolphin Way and Island View Street and between Seabreeze Way and W. Wooley Road.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends further inland by approximately 500 meters (1,500 feet) mostly in the Oxnard Shores neighborhood between Dolphin Way and Island View Street and between Seabreeze Way and W. Wooley Road. The moderate scenario also encompasses most of the Oxnard Shores Mobile Home Park and the residential units west of Mandalay Bay Beach Road.

High Sea Level Rise Scenario (25.3" SLR)

Encompasses most of the Oxnard Shores neighborhood and Oxnard Shores Mobile Home Park.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Encompass most of the Oxnard Shores neighborhood and Oxnard Shores Mobile Home Park.

Moderate Sea Level Rise Scenario (36.5" SLR)

Is similar to the Low Scenario but extends approximately 50 meters (150 feet) further inland near Hollywood Beach and Embassy Suites Mandalay Beach Hotel and Resort.

High Sea Level Rise Scenario (58.1" SLR)

Encompasses all of the area west of Harbor Boulevard including the Oxnard Shores neighborhood, Oxnard Shores Mobile Home Park, and half of the Oxnard Beach Park. Most of the Colony is not included in the High Sea Level Rise Scenario, but the area east of S. Harbor Boulevard is included; residential units in the waterway community, units near Oxnard Dunes, and the open space area in between.

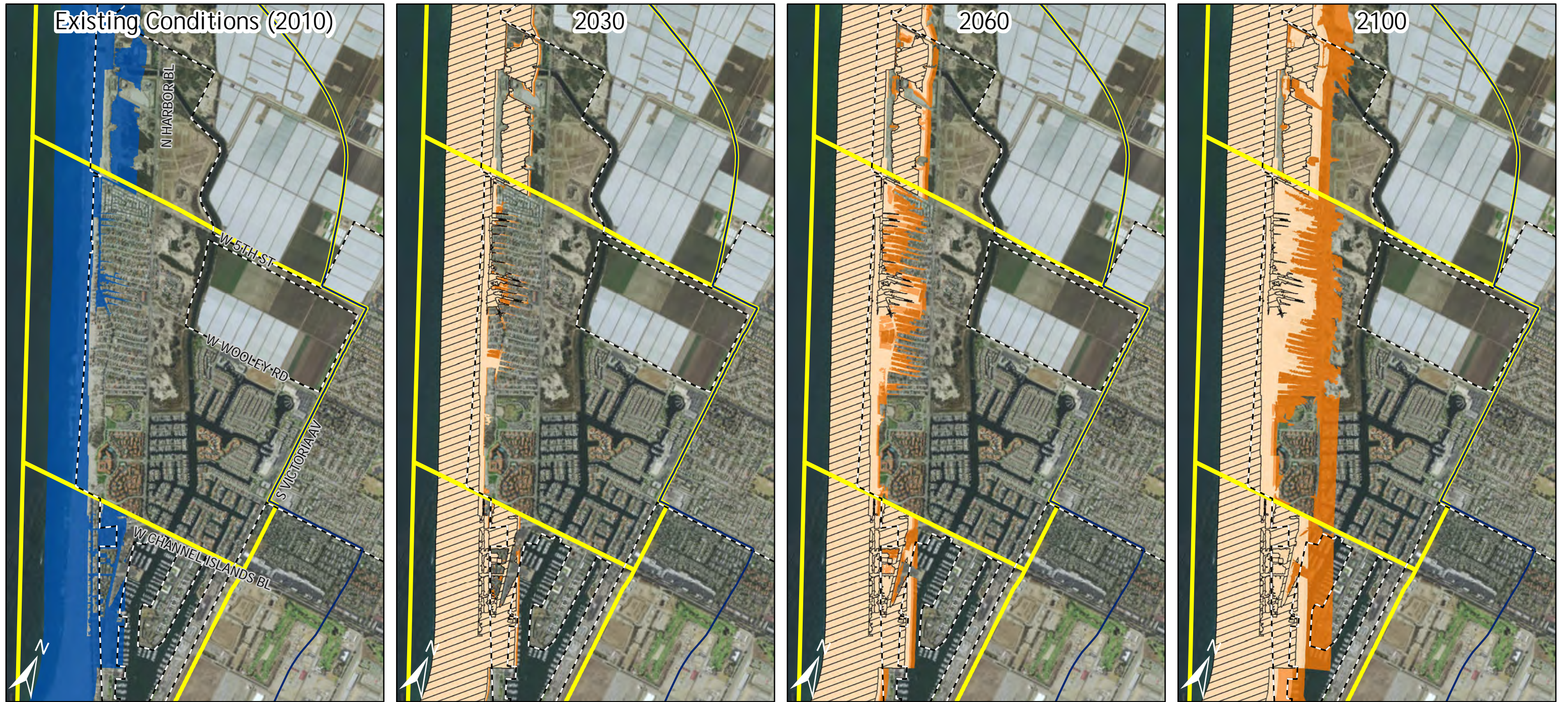


Figure 4.2.3 - Coastal Storm Wave Hazard Zones for Planning Area 2: Oxnard Shores

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Wave

Modeling Scenario (2030)

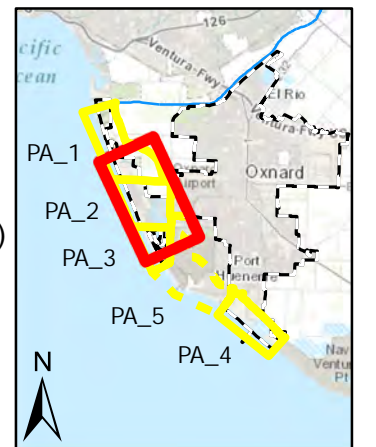
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.2. COASTAL HAZARDS. PLANNING AREA 2. OXNARD SHORES.

Coastal Storm Wave Flood Zone

Existing Conditions

The modeled coastal storm wave flood zone for Planning Area 2 mostly includes the shore, between 5th Street and Channel Islands Boulevard, and the Mandalay Bay waterway community. In the northern section of Planning Area 2, the coastal storm wave flood zone extends into the streets of the Oxnard Shores neighborhood. Mandalay Beach Road is inside the coastal storm wave flood zone as are the streets between Wooley Road and Seabreeze Way. Other streets within the existing coastal storm wave flood zone include Channel Way, Driftwood Street, and Breakers Way.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Encompasses the western-edge of the Oxnard Shores Mobile Home Park and the southern portion of the Oxnard Shores neighborhood, specifically Amalfi Way, Island View Street, Corbina Way, and Marlin Way.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0 SLR)

Extends further inland in the Oxnard Shores neighborhood, in the same areas as the Low and Moderate Sea Level Rise Scenarios.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Encompasses almost all streets within the Oxnard Shores neighborhood, with the widest hazard zone occurring in the middle of the neighborhood, between W. Wooley Road and Seabreeze Way. Residential units west of Mandalay Beach Road between Amalfi Way and Dolphin Way are also in the hazard zone. In the southern portion of the planning area, the hazard zone impinges on the Embassy Suites Mandalay Beach Hotel and Resort.

Moderate Sea Level Rise Scenario (16.1" SLR)

Encompasses the same streets and areas as the Low Sea Level Rise Scenario but extends several meters further inland.

High Sea Level Rise Scenario (25.3" SLR)

Would affect a majority of the Oxnard Shores Mobile Home Park and the Oxnard Shores neighborhood, reaching as far inland as the commercial center west of Harbor Boulevard. Several residential units in the waterway community would also be affected.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Encompasses about half of the Oxnard Shores neighborhood, with the most affected area in the middle of the neighborhood where the coastal storm wave flood zone nears Harbor Boulevard and also encompasses several western residential units in the waterway community.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland in the Oxnard Shores neighborhood and encompasses more of the Embassy Suites Mandalay Beach Hotel and Resort and the waterway community and agricultural area east of Jeep Trail.

High Sea Level Rise Scenario (58.1" SLR)

Covers all area west of S. Harbor Boulevard and north of Beach Way, including the Oxnard Shores neighborhood. Other areas within the hazard zone include half of the Oxnard Beach Park, some agricultural area, and the southern and western portion of the waterway community.



Figure 4.2.4 - Coastal Storm Flood Hazard Zones for Planning Area 2: Oxnard Shores

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Flood

Modeling Scenario (2030)

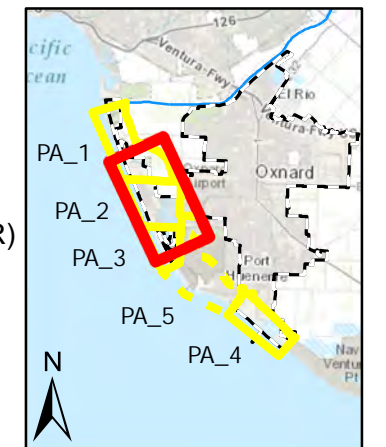
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.2. COASTAL HAZARDS. PLANNING AREA 2. OXNARD SHORES.

Combined Hazard Zone

Existing Conditions

The modeled combined hazard zone for Planning Area 2 is on the shore between W. 5th Street and W. Channel Islands Boulevard. In the northern section of Planning Area 2, the combined hazard zone extends into the streets of Oxnard Shores. Mandalay Beach is within the combined hazard zone in addition to most of Terramar Way, W. Wooley Road, Whitecap Street, and Seabreeze Way. Other streets within the combined hazard zone include Channel Way, Driftwood Street, and Breakers Way. The entire Mandalay Bay waterway community is also within the combined hazard zone. The hazard zone extends from the community past W. Wooley Road, reaching agriculture land adjacent to W. 5th Street.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends into the western-edge of the Oxnard Shores Mobile Home Park and into the southern portion of the Oxnard Shores neighborhood into Amalfi Way, Island View Street, Corbina Way, and Marlin Way.

Moderate Sea Level Rise Scenario (5.2" SLR)

Is comparable to the low scenario.

High Sea Level Rise Scenario (8.0 SLR)

Extends further inland into the Oxnard Shores neighborhood in the same areas as the low and moderate scenario.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Encompasses all streets within the Oxnard Shores neighborhood with the largest hazard zone in the middle of the neighborhood between W. Wooley Road and Seabreeze Way. The residential units west of Mandalay Beach Road between Amalfi Way and Dolphin Way are also included. On the southern part of the planning area, the combined hazard zone begins to encompass the Embassy Suites Mandalay Beach Hotel and Resort.

Moderate Sea Level Rise Scenario (16.1" SLR)

Encompasses the same streets and areas as the low scenario but extends several meters more inland.

High Sea Level Rise Scenario (25.3" SLR)

Encompasses a majority of the Oxnard Shores Mobile Park and Oxnard Shores neighborhood reaching as far inland as the commercial center west of Harbor Boulevard. Several residential units in the waterway community would also be affected.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Encompasses several western residential units in the waterway community and approximately half of the Oxnard Shores neighborhood, with the most affected area being in the middle, where the combined hazard zone reaches almost to Harbor Boulevard.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland in the Oxnard Shores neighborhood and encompasses more of the Embassy Suites Mandalay Beach Hotel and Resort, the waterway community, and agricultural area.

High Sea Level Rise Scenario (58.1" SLR)

Covers the entire area west of S. Harbor Boulevard and north of Beach Way, including the Oxnard Shores neighborhood and the northwestern half of Oxnard Beach Park, the southern and western part of the waterway community, and one-third of the adjacent agricultural area.

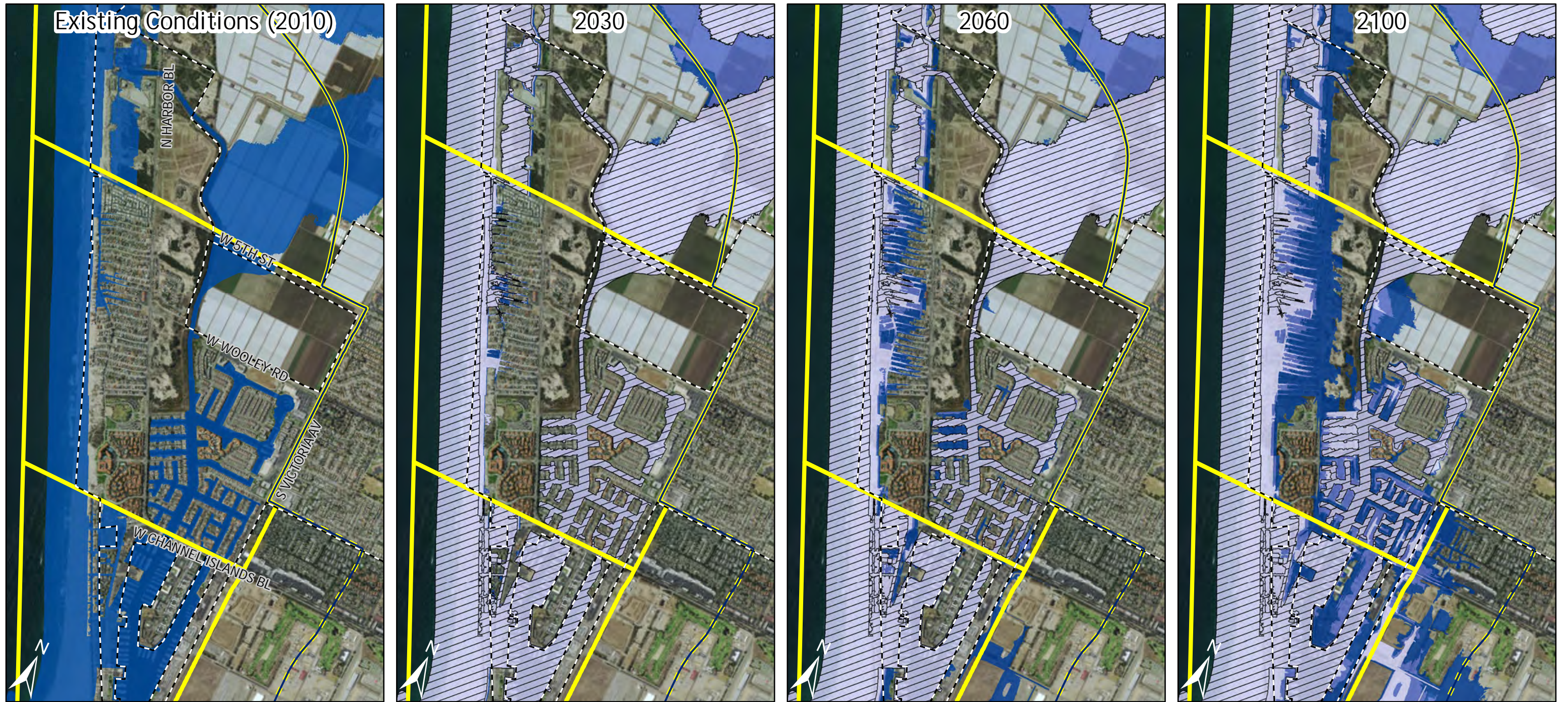


Figure 4.2.5 - Combined Hazard Zones for Planning Area 2: Oxnard Shores

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Combined

Modeling Scenario (2030)

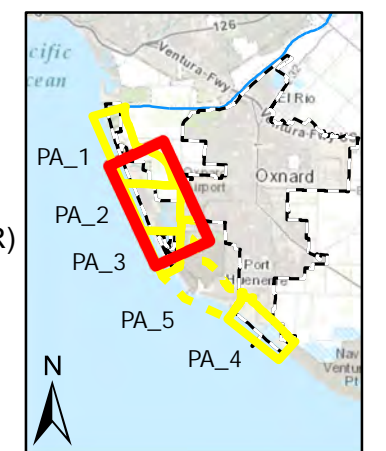
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.3 COASTAL HAZARDS. PLANNING AREA 3. CHANNEL ISLANDS.

Monthly Tidal Inundation Hazard Zone

Existing Conditions

The modeled monthly tidal inundation hazard zone for Planning Area 3 extends between W. 5th Street, W. Channel Islands Boulevard and San Nicholas Avenue, in the tidal zone. This area is approximately 100 meters (300 feet) west of the beach-front residential neighborhood. The inundation zone also extends into Channel Islands Harbor.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to existing conditions.

High Sea Level Rise Scenario (8.0 SLR)

Comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Similar to existing conditions. Includes an area just north of the Channel Islands Harbor inlet and in the residential area near Lakeshore Court, and Lakeshore Drive.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland than existing conditions north of the Channel Islands Harbor inlet, and reaches the residential zone between S. Victoria Avenue and Panama Drive.

High Sea Level Rise Scenario (58.1" SLR)

Includes the commercial and residential areas surrounding S. Harbor Boulevard in the southern half of the planning area, the Paz Mar Apartments on the east side of Peninsula Road, and the parking lot on the east side of the harbor.



Figure 4.3.1 - Monthly Tidal Inundation Hazard Zones for Planning Area 3: Channel Islands

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Monthly Tidal Inundation

Modeling Scenario (2030)

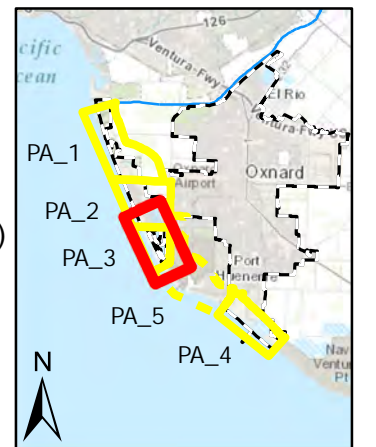
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.3 COASTAL HAZARDS. PLANNING AREA 3. CHANNEL ISLANDS.

Background Erosion Hazard Zone

Existing Conditions

The modeled existing background erosion hazard zone for Planning Area 3 extends approximately 150 meters (450 feet) off the shore between W. 5th Street, W. Channel Islands Boulevard and San Nicholas Avenue, reaching beach front houses within the planning area.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 25 meters (75 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 50 meters (150 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 60 meters (180 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 75 meters (225 feet) further inland compared to existing conditions, encompassing all residential units west of Sunset Lane.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 200 meters (600 feet) further inland compared to existing conditions, reaching east of Harbor Boulevard.

Moderate Sea Level Rise Scenario (36.5" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 250 meters (750 feet) further inland compared to existing conditions, reaching east of Harbor Boulevard.

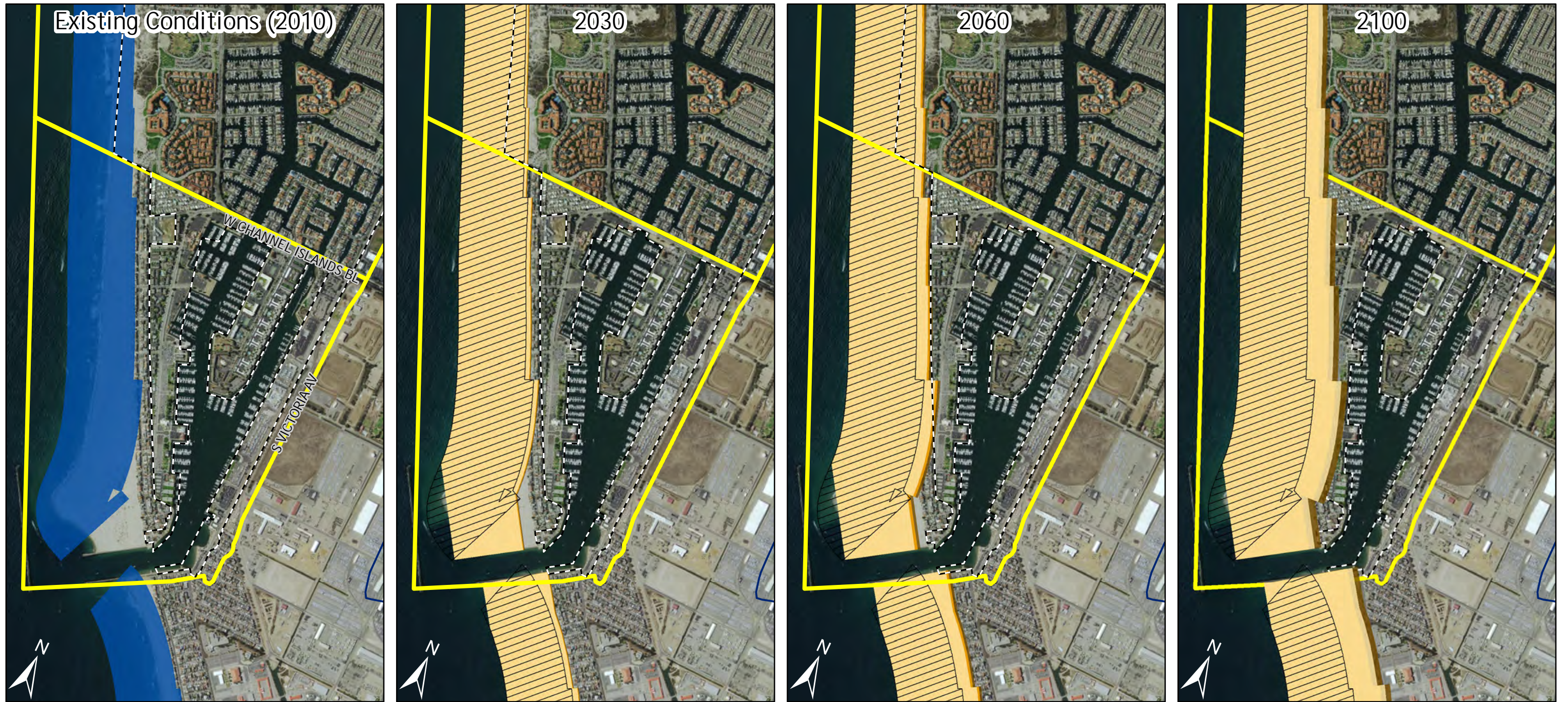


Figure 4.3.2A - Background Erosion Hazard Zones for Planning Area 3: Channel Islands

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Background Erosion

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

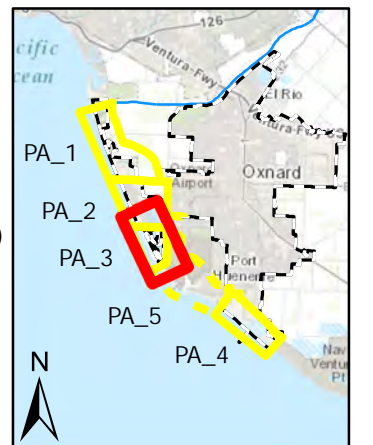
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.3 COASTAL HAZARDS. PLANNING AREA 3. CHANNEL ISLANDS.

100-yr Storm Erosion Hazard Zone

Existing Conditions

The modeled existing monthly background erosion hazard zone for Planning Area 3 extends approximately 200 meters (600 feet) from the shoreline between W. 5th Street and Channel Islands Boulevard, reaching Mandalay Beach Road in the northern portion of the planning area.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 25 meters (75 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0" SLR)

Comparable to the Low and Moderate Sea Level Rise scenarios.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 50 meters (150 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 60 meters (180 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 75 meters (225 feet) further inland compared to existing conditions, encompassing all residential units west of Sunset Lane.

2100 Projection

Low Scenario (17.1" SLR)

Extends approximately 200 meters (600 feet) further inland compared to existing conditions, reaching east of Harbor Boulevard.

Moderate Scenario (36.5" SLR)

Extends approximately 250 meters (750 feet) further inland compared to existing conditions, reaching east of Harbor Boulevard.

High Scenario (58.1" SLR)

Extends approximately 300 meters (900 feet) further inland compared to existing conditions, reaching east of Harbor Boulevard and into Channel Islands Harbor.

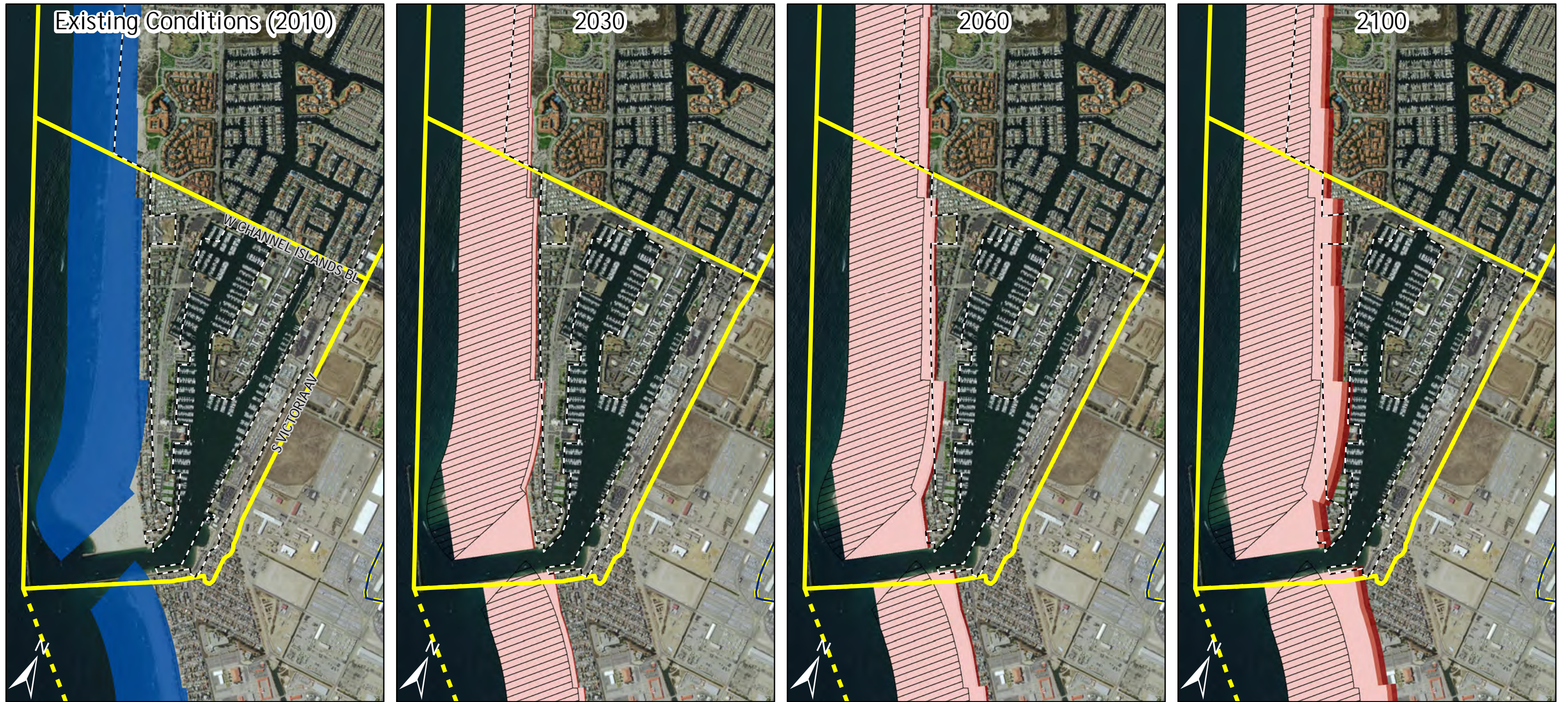


Figure 4.3.2B - 100-yr Storm Erosion Hazard Zones for Planning Area 3: Channel Islands

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-100-yr Storm Erosion

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

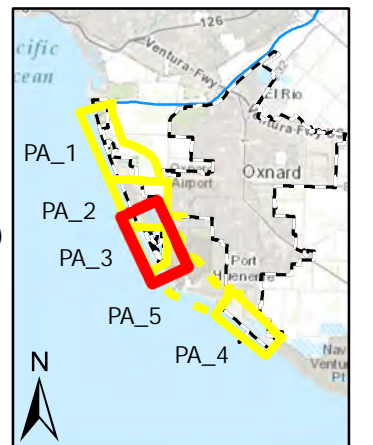
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.3 COASTAL HAZARDS. PLANNING AREA 3. CHANNEL ISLANDS.

Coastal Storm Wave Hazard Zone

Existing Conditions

The modeled existing coastal storm wave hazard zone for Planning Area 3 contains the residential area west of S. Harbor Boulevard and some of the docks located on the western side of Channel Islands Harbor. The Hollywood Beach Elementary School and the majority of the Hollywood Beach Mobile Home Park are also included in this zone.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 10 meters (30 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Extends 30 meters (90 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (8.0 SLR)

Comparable to the Moderate Sea Level Rise Scenario.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 15 meters (45 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 25 meters (75 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 45 meters (135 feet) further inland compared to existing conditions and includes the entire Hollywood Beach Park and more additional docks located on the western side of Channel Islands Harbor.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 45 meters (135 feet) further inland compared to existing conditions.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 100 meters (300 feet) further inland, south of West Channel Park.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 200 meters (600 feet) further inland, north of West Channel Park, encompassing the entire west side of Channel Islands Harbor and some of the peninsula in the harbor.



Figure 4.3.3 - Coastal Storm Wave Hazard Zones for Planning Area 3: Channel Islands

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Wave

Modeling Scenario (2030)

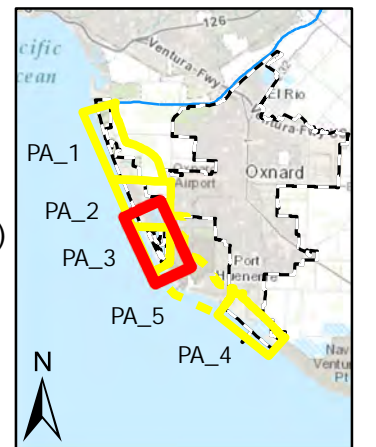
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from
 Coastal Resilience Ventura (ESA PWA, 2013)

4.3 COASTAL HAZARDS. PLANNING AREA 3. CHANNEL ISLANDS.

Coastal Storm Flood Hazard Zone

Existing Conditions

A majority of the area within Planning Area 3 is in the modeled coastal storm flood hazard zone. These areas include the Hollywood Beach Mobile Home Park, Hollywood Beach Elementary School, the Channel Islands Harbor Marina, and houses along the shore.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends 10 meters (30 feet) further northeast compared to existing conditions in the residential areas on S. Victoria Avenue and Sunset Drive.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0 SLR)

Extends approximately 20 meters (60 feet) further inland compared to existing conditions reaching the residential area near Sunset Drive and includes Panama Drive.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 30 meters (90 feet) further inland compared to existing conditions in the southwestern portion of the harbor, reaching the residential area near Sunset Drive and Panama Drive.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 100 meters (300 feet) further inland compared to existing conditions in the southwestern portion of Channel Islands Harbor and in the residential neighborhood near Sunset Drive and approximately 50 meters (150 feet) further inland near Harbor Boulevard in the northern portion of the planning area.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 100 meters (300 feet) further inland compared to existing conditions in the southwestern portion of the harbor.

Moderate Sea Level Rise Scenario (36.5" SLR)

Includes the entire southern portion of Channel Islands Harbor and adjacent residential areas and extends to the residential area on the eastern side of the peninsula within the harbor.

High Sea Level Rise Scenario (58.1" SLR)

Includes almost all of Planning Area 3, with the exception of the commercial areas near W. Channel Islands Boulevard, and the western side of the peninsula.



Figure 4.3.4 - Coastal Storm Flood Hazard Zones for Planning Area 3: Channel Islands

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Flood

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

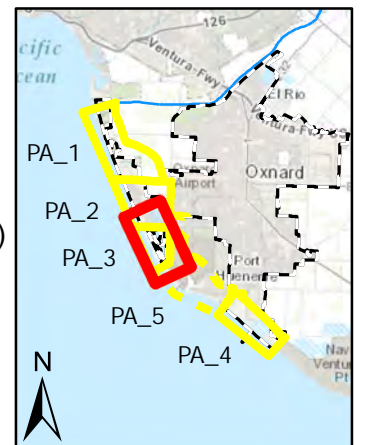
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.3 COASTAL HAZARDS. PLANNING AREA 3. CHANNEL ISLANDS.

Combined Hazard Zone

Existing Conditions

A majority of this Planning Area is within the modeled combined hazard zone. These areas include the Hollywood Beach Mobile Home Park, Hollywood Beach Elementary School, the Channel Islands Harbor Marina, and houses along the shore.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 50 meters (150 feet) inland in the residential area along Sunset Lane.

Moderate Sea Level Rise Scenario (5.2" SLR)

Similar to the Low Sea Level Rise Scenario with an addition of approximately 3,000 m² (32,292 ft²) of residential area near the entrance to the harbor.

High Sea Level Rise Scenario (8.0 SLR)

Similar to the Low and Moderate Sea Level Rise Scenarios, extending approximately 15 meters (45 feet) into the residential areas at the harbor entrance and near Hollywood Beach Mobile Home Park.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 50 meters (150 feet) further inland compared to existing conditions, encompassing additional residential areas.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 75 meters (225 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 150 meters (450 feet) further inland compared to existing conditions, encompassing almost the entire west side of the marina and developed land west of S. Victoria Avenue.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 150 meters (450 feet) further inland compared to existing conditions, encompassing almost the entire west side of the marina and developed land west of S. Victoria Avenue.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 250 meters (750 feet) further inland compared to existing conditions and includes residential units east of Peninsula Road.

High Sea Level Rise Scenario (58.1" SLR)

Encompasses almost all of the Planning Area with the exception of parts of commercial areas along W. Channel Islands Boulevard.

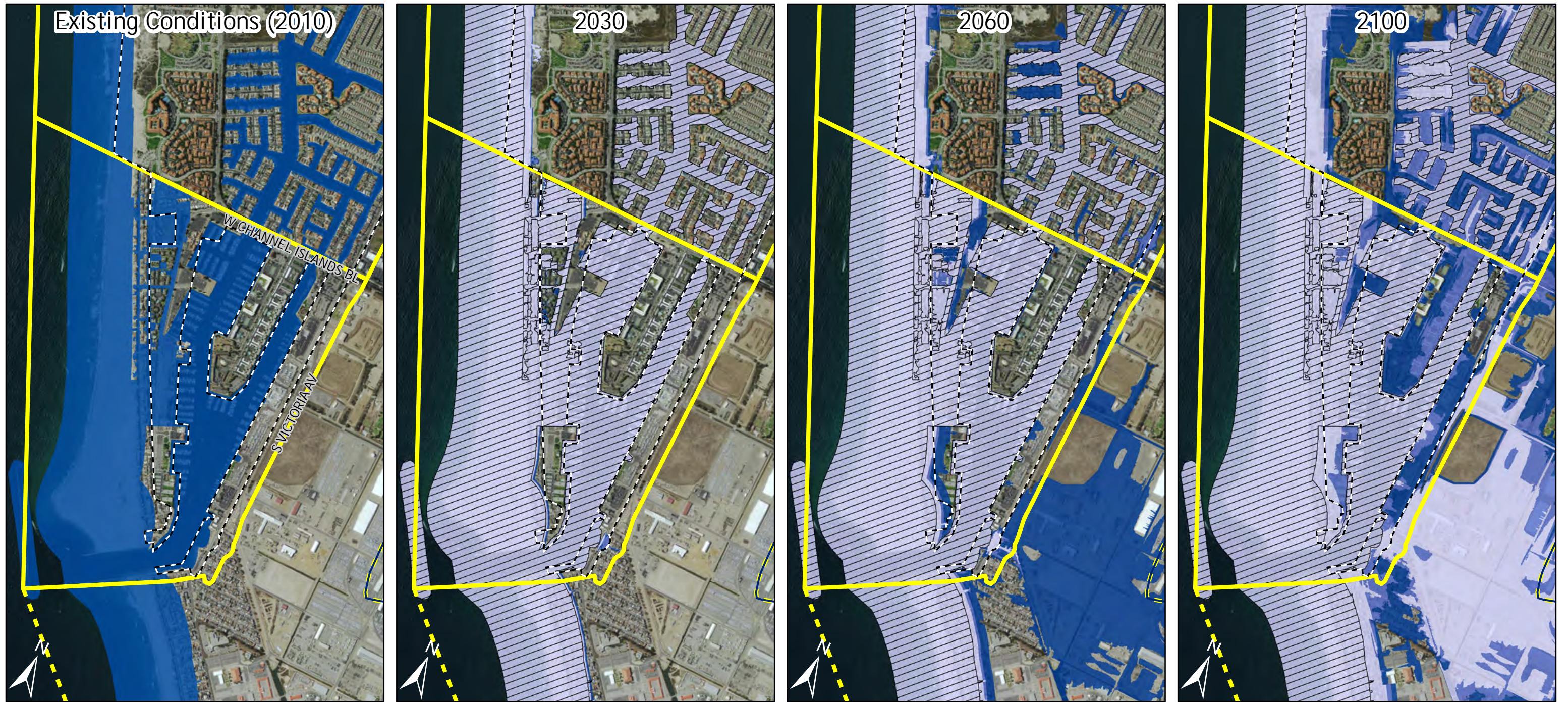


Figure 4.3.5 - Combined Hazard Zones for Planning Area 3: Channel Islands

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Combined

Modeling Scenario (2030)

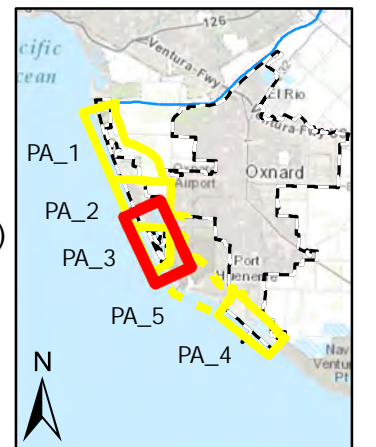
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.4 COASTAL HAZARDS. PLANNING AREA 4. ORMOND BEACH.

Monthly Tidal Inundation Hazard Zone

Existing Conditions

The modeled existing monthly tidal inundation hazard zone includes the wetland area near the eastern boundary of Planning Area 4, east of the Ormond Beach Generating Station.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Comparable to existing conditions, but also includes agricultural land west of the area occupied by a commercial composting facility.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0 SLR)

Encompasses the same area under existing conditions, as well as a portion of the commercial composting site and nearby agricultural land.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Encompasses agricultural land in the northeastern edge of the planning area, in addition to wetland habitat and the commercial composting facility.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends farther northwest compared to the Low Sea Level Rise Scenario and encompasses the area southeast of the Ormond Beach Generating Station.

High Sea Level Rise Scenario (25.3" SLR)

Encompasses the area in the Low and Moderate Sea Level Rise Scenarios, with the addition of agricultural land and open space northwest of the Ormond Beach Generating Station.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Overlaps area in the southeastern portion of the planning area, including open space, agricultural land, and a commercial composting facility.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends farther northwest compared to the Low Sea Level Rise Scenario and encompasses a manufacturing site.

High Sea Level Rise Scenario (58.1" SLR)

Encompasses almost all of the area in the planning area, surrounding the Ormond Beach Generating Station.

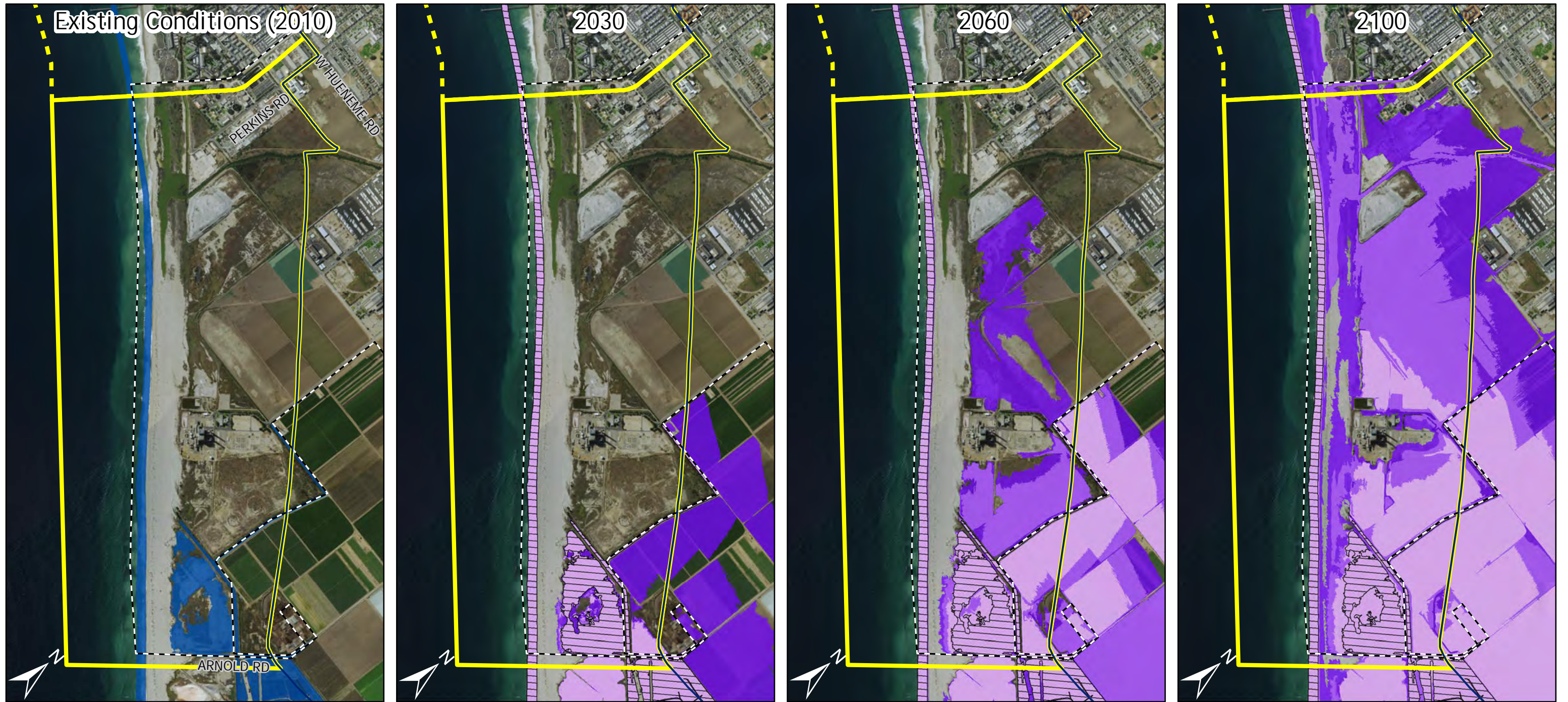















Figure 4.4.1 - Monthly Tidal Inundation Hazard Zones for Planning Area 4: Ormond Beach

-  Coastal Zone Boundary
-  City Boundary
-  City of Oxnard LCP Planning Area
-  Adjacent Jurisdictions
-  Existing Conditions-Monthly Tidal Inundation





Modeling Scenario (2030)

-  Existing Conditions
-  Low (2.3" SLR)
-  Moderate (5.2" SLR)
-  High (8.0" SLR)

Modeling Scenario (2060)

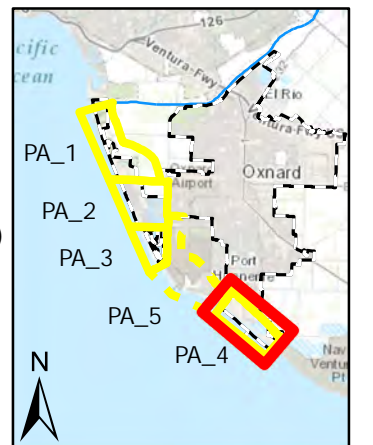
-  Existing Conditions
-  Low (7.4" SLR)
-  Moderate (16.1" SLR)
-  High (25.3" SLR)

Modeling Scenario (2100)

-  Existing Conditions
-  Low (17.1" SLR)
-  Moderate (36.5" SLR)
-  High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.4 COASTAL HAZARDS. PLANNING AREA 4. ORMOND BEACH.

Background Erosion Hazard Zone

Existing Conditions

The modeled existing background erosion hazard zone for Planning Area 4 encompasses approximately 250 meters (750 feet) of shoreline north of Arnold Road and up to the northwestern Planning Area boundary.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR).

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 25 meters (75 feet) further inland compared to existing conditions in the southern portion of the planning area.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (25.3" SLR)

Comparable to the Low and Moderate Sea Level Rise scenarios.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 50 meters (150 feet) further inland compared to existing conditions, reaching the Ormond Beach Generating Station.

Moderate Sea Level Rise Scenario (36.5" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 100 meters (300 feet) further inland compared to existing conditions, further into the Ormond Beach Generating Station property and agricultural lands in the Planning Area

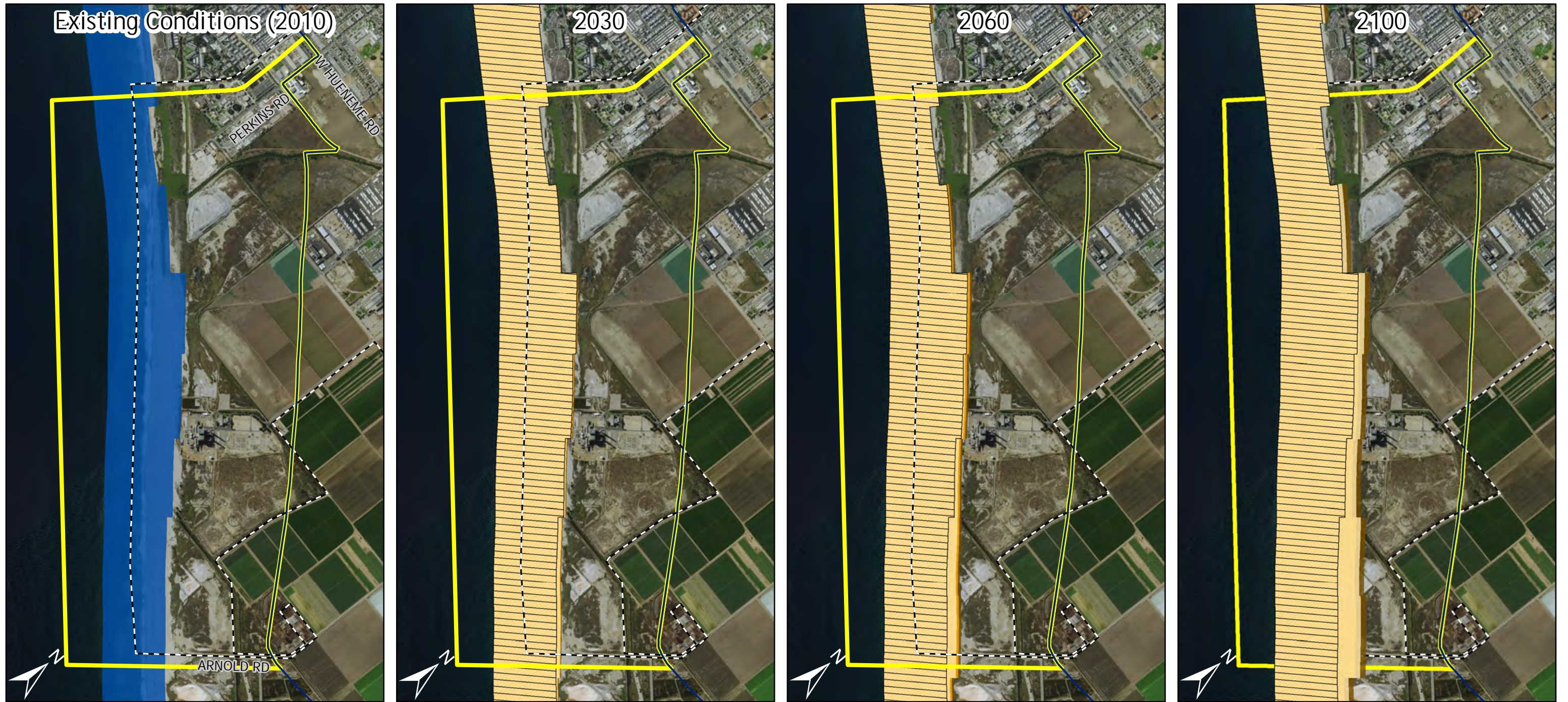

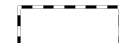













Figure 4.4.2A - Background Erosion Hazard Zones for Planning Area 4: Ormond Beach

-  Coastal Zone Boundary
-  City Boundary
-  City of Oxnard LCP Planning Area
-  Adjacent Jurisdictions
-  Existing Conditions-Background Erosion





Modeling Scenario (2030)

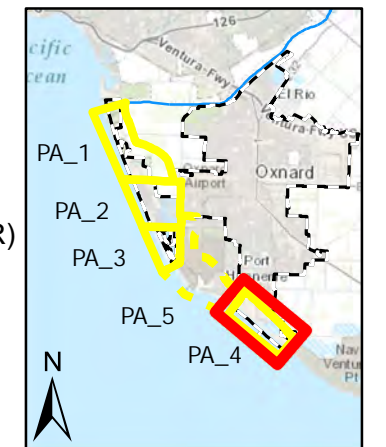
-  Existing Conditions
-  Low (2.3" SLR)
-  Moderate (5.2" SLR)
-  High (8.0" SLR)

Modeling Scenario (2060)

-  Existing Conditions
-  Low (7.4" SLR)
-  Moderate (16.1" SLR)
-  High (25.3" SLR)

Modeling Scenario (2100)

-  Existing Conditions
-  Low (17.1" SLR)
-  Moderate (36.5" SLR)
-  High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.4 COASTAL HAZARDS. PLANNING AREA 4. ORMOND BEACH.

100-yr Storm Erosion Hazard Zone

Existing Conditions

The modeled existing 100-year storm erosion hazard zone for Planning Area 4 extends approximately 200 meters (600 feet) from the shoreline between W. 5th Street and Channel Islands Boulevard, reaching Mandalay Beach Road in the northern portion of the planning area.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 75 meters (225 feet) further inland compared to existing conditions in the southern portion of the planning area.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (25.3" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 100 meters (300 feet) further inland compared to existing conditions, reaching the Ormond Beach Generating Station.

Moderate Sea Level Rise Scenario (36.5" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 150 meters (450 feet) further inland compared to existing conditions, further into the Ormond Beach Generating Station property and agricultural lands in the Planning Area.



Figure 4.4.2B - 100-yr Storm Erosion Hazard Zones for Planning Area 4: Ormond Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-100-yr Storm Erosion

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

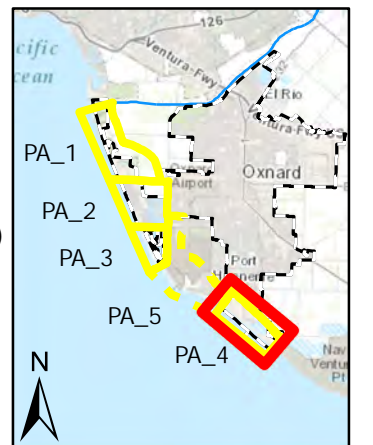
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.4 COASTAL HAZARDS. PLANNING AREA 4. ORMOND BEACH.

Coastal Storm Wave Hazard Zone

Existing Conditions

The modeled existing coastal storm wave hazard zone for Planning Area 4 extends approximately 200 meters (600 feet) from the shoreline between W. 5th Street and Channel Islands Boulevard, reaching Mandalay Beach Road in the northern portion of the planning area.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 75 meters (225 feet) further inland compared to existing conditions in the southern portion of the planning area.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 100 meters (300 feet) further inland compared to existing conditions, reaching the Ormond Beach Generating Station.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 150 meters (450 feet) further inland compared to existing conditions, further into the Ormond Beach Generating Station property and agricultural lands in the Planning Area.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 150 meters (450 feet) further inland compared to existing conditions, further into the Ormond Beach Generating Station property and agricultural lands in the Planning Area.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 300 meters (900 feet) further inland compared to existing conditions, further into the Ormond Beach Generating Station property and agricultural lands in the Planning Area.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 900 meters (2,700 feet) further inland in the northwestern half of the Planning Area compared to existing conditions and therefore encompassing a portions of Oxnard's Waste Water Treatment plant.



Figure 4.4.3 - Coastal Storm Wave Hazard Zones for Planning Area 4: Ormond Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Wave

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

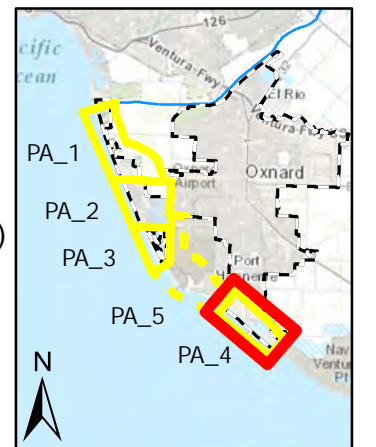
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from
 Coastal Resilience Ventura (ESA PWA, 2013)



4.4 COASTAL HAZARDS. PLANNING AREA 4. ORMOND BEACH.

Coastal Storm Flood Hazard Zone

Existing Conditions

The modeled existing coastal storm flood hazard zone for Planning Area 4 includes the Ormond Beach shoreline and the open space surrounding the Ormond Beach Generating Station.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 20 meters (60 feet) inland compared to existing conditions, reaching nearby agricultural areas.

Moderate Sea Level Rise Scenario (5.2" SLR)

Extends approximately 30 meters (90 feet) further inland than existing conditions.

High Sea Level Rise Scenario (8.0 SLR)

Extends approximately 50 meters (150 feet) further inland than existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Ranges from approximately 100 to 400 meters (300 to 1,200 feet) further inland compared to existing conditions and mostly encompasses open space and agricultural area.

Moderate Sea Level Rise Scenario (16.1" SLR)

Ranges from approximately 200 to 500 meters (600 to 1,500 feet) further inland compared to existing conditions and overlaps the Ormond Beach Generating Station.

High Sea Level Rise Scenario (25.3" SLR)

Ranges from approximately 300 to 800 meters (900 to 2,400 feet) further inland compared to existing conditions and includes the Ormond Beach Generating Station and Perkins Road, in addition to open space and agricultural areas.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Ranges from approximately 300 to 800 meters (900 to 2,400 feet) further inland than existing conditions and encompasses the Ormond Beach Generating Station and Perkins Road, in addition to open space and agricultural areas.

Moderate Sea Level Rise Scenario (36.5" SLR)

Ranges from approximately 500 to 1,000 meters (1,500 to 3,000 feet) further inland than existing conditions, encompassing the Ormond Beach Generating Station, the City of Oxnard's Wastewater Treatment Facility, a manufacturing site, and open space and agricultural areas.

High Sea Level Rise Scenario (58.1" SLR)

Almost all of Planning Area 4 is within the coastal storm flood hazard zone under this scenario.

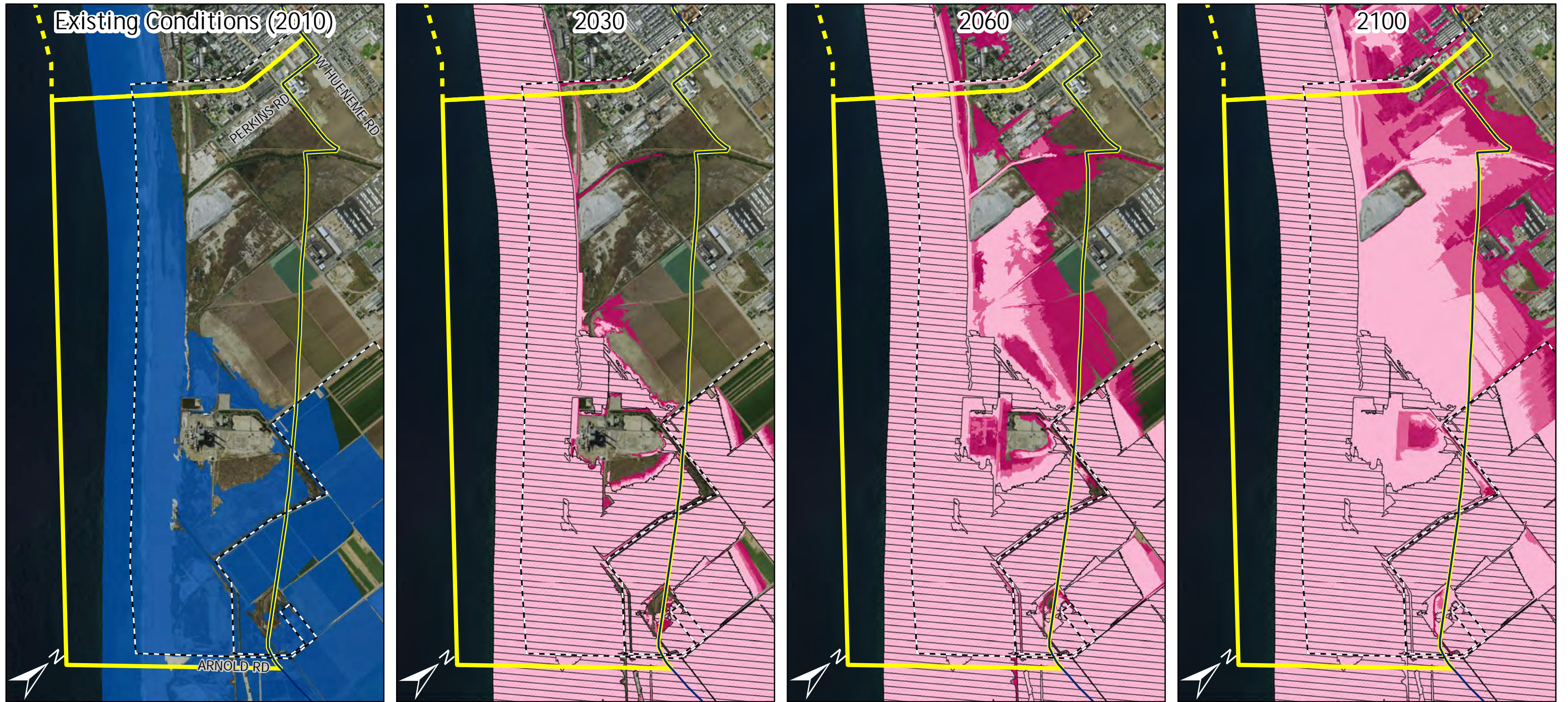


Figure 4.4.4 - Coastal Storm Flood Hazard Zones for Planning Area 4: Ormond Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Flood

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

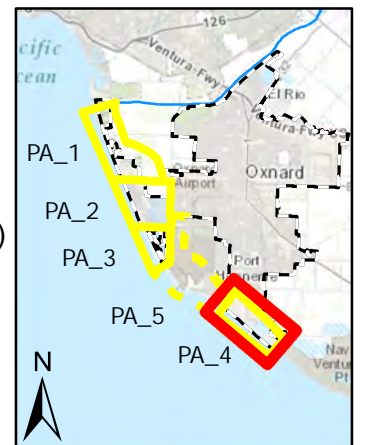
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.4 COASTAL HAZARDS. PLANNING AREA 4. ORMOND BEACH.

Combined Hazard Zone

Existing Conditions

The modeled existing combined hazard zone for Planning Area 4 encompasses the Ormond Beach Wetlands, the area surrounding the Ormond Beach Generating Station, and the area south of the Ormond Beach Generating Station.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 35 meters (105 feet) further inland compared to existing conditions, concentrated near the Ormond Beach Generating Station.

Moderate Sea Level Rise Scenario (5.2" SLR)

Extends approximately 55 meters (165 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (8.0 SLR)

Extends approximately 85 meters (255 feet) further inland compared to existing conditions and encompasses an agricultural area near Jeep Trail.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 100 meters (300 feet) further inland compared to existing conditions, in the open space area east of the Ormond Beach Generating Station, the agricultural area near Jeep Trail and onto open space area to the west.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 200 meters (600 feet) further inland compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Overlaps the entire Ormond Beach Generating Station, most of the agricultural land in the planning area, and the open space area also affected in the Low and Moderate Sea Level Rise Scenarios.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Encompasses most of the planning area, including the Ormond Beach Generating Station, and the surrounding agricultural land and open space.

Moderate Sea Level Rise Scenario (36.5" SLR)

Includes all the areas in the Low Sea Level Rise Scenario and reaches further to Perkins Road, near the City of Oxnard's Wastewater Treatment Facility.

High Sea Level Rise Scenario (58.1" SLR)

Encompasses almost all of the planning area, including the City of Oxnard's Wastewater Treatment Facility, the Ormond Beach Generating Station, and the surrounding agricultural land and open space.

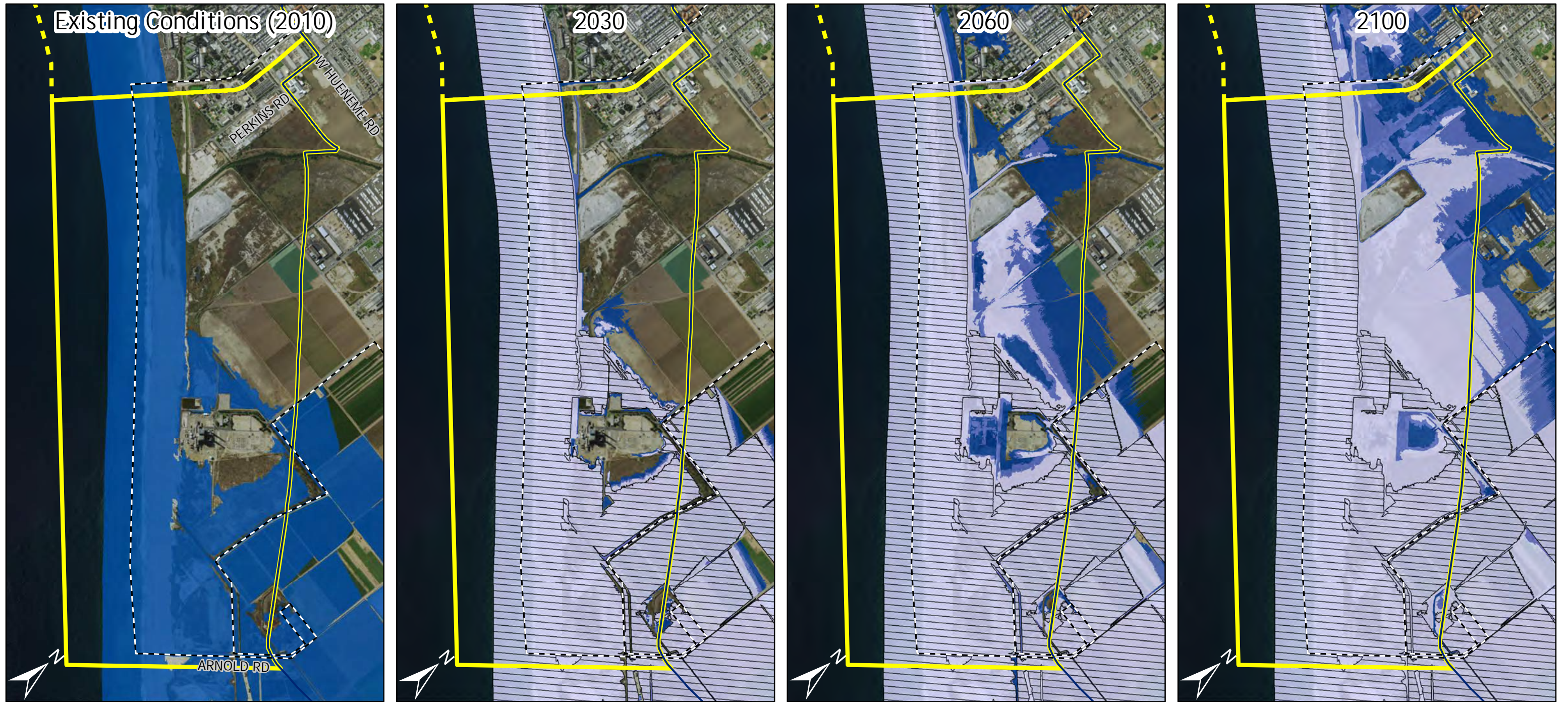


Figure 4.4.5 - Combined Hazard Zones for Planning Area 4: Ormond Beach

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Combined

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

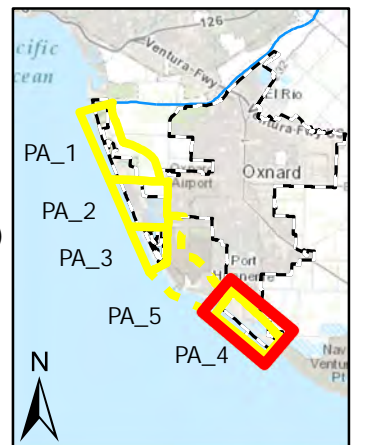
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.5 COASTAL HAZARDS. CITY OF PORT HUENEME AND COUNTY BEACH AREAS.

Monthly Tidal Inundation Hazard Zone

Existing Conditions

The modeled existing monthly tidal inundation hazard zone for the Port Hueneme and County Beach Areas includes the shoreline that begins just east of the Channel Islands Harbor entrance and extends west to the area adjacent to the Oxnard Wastewater Treatment Facility. It also extends into the Port of Hueneme harbor.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Moderate Sea Level Rise Scenario (5.2" SLR)

High Sea Level Rise Scenario (8.0" SLR)

Comparable to existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Moderate Sea Level Rise Scenario (16.1" SLR)

High Sea Level Rise Scenario (25.3" SLR)

Comparable to existing conditions.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Comparable to existing conditions.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends further inland than existing conditions into the Naval Construction Battalion Center around Pennsylvania Road.

High Sea Level Rise Scenario (58.1" SLR)

Extends further inland than existing conditions into the Silver Strand Beach Residential Area and into the Naval Construction Battalion Center around Pennsylvania Road.

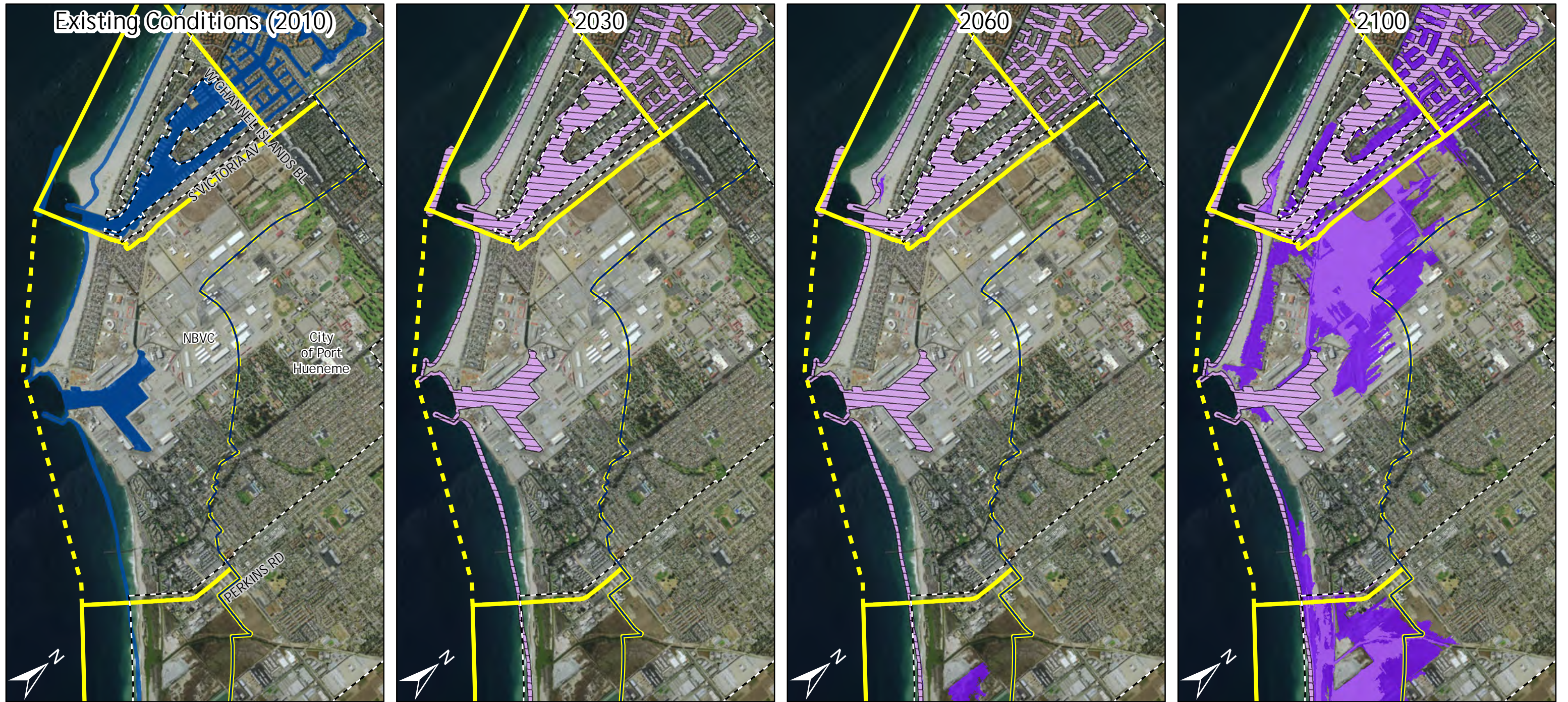


Figure 4.5.1 - Monthly Tidal Inundation Hazard Zones for City of Port Hueneme and County Beach Areas (Not in LCP)

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Monthly Tidal Inundation

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

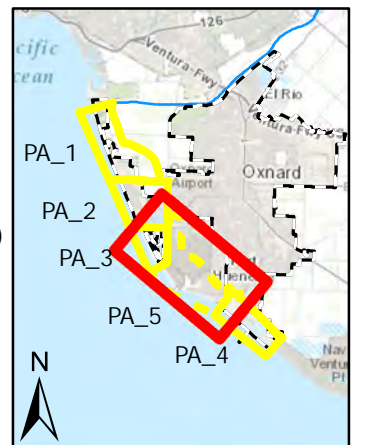
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.5 COASTAL HAZARDS. CITY OF PORT HUENEME AND COUNTY BEACH AREAS.

Background Erosion Hazard Zone

Existing Conditions

The modeled existing erosion background hazard zone for the City of Port Hueneme and County Beach Areas includes the shoreline that begins just east of the Channel Islands Harbor entrance, overlapping some Silver Strand Beach residential units, and extending west to the area adjacent to the Oxnard Wastewater Treatment Plant.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 25 meters (75 feet) in the Silver Strand Beach residential area.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise scenario.

High Sea Level Rise Scenario (8.0" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 50 meters (150 feet) in the Silver Strand Beach residential area.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to the Low Sea Level Rise scenario.

High Sea Level Rise Scenario (25.3" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 100 meters (300 feet) in the Silver Strand Beach residential area.

Moderate Sea Level Rise Scenario (36.5" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 125 meters (375 feet) in the Silver Strand Beach residential area and 25 meters (75 feet) in the area east of the port entrance.

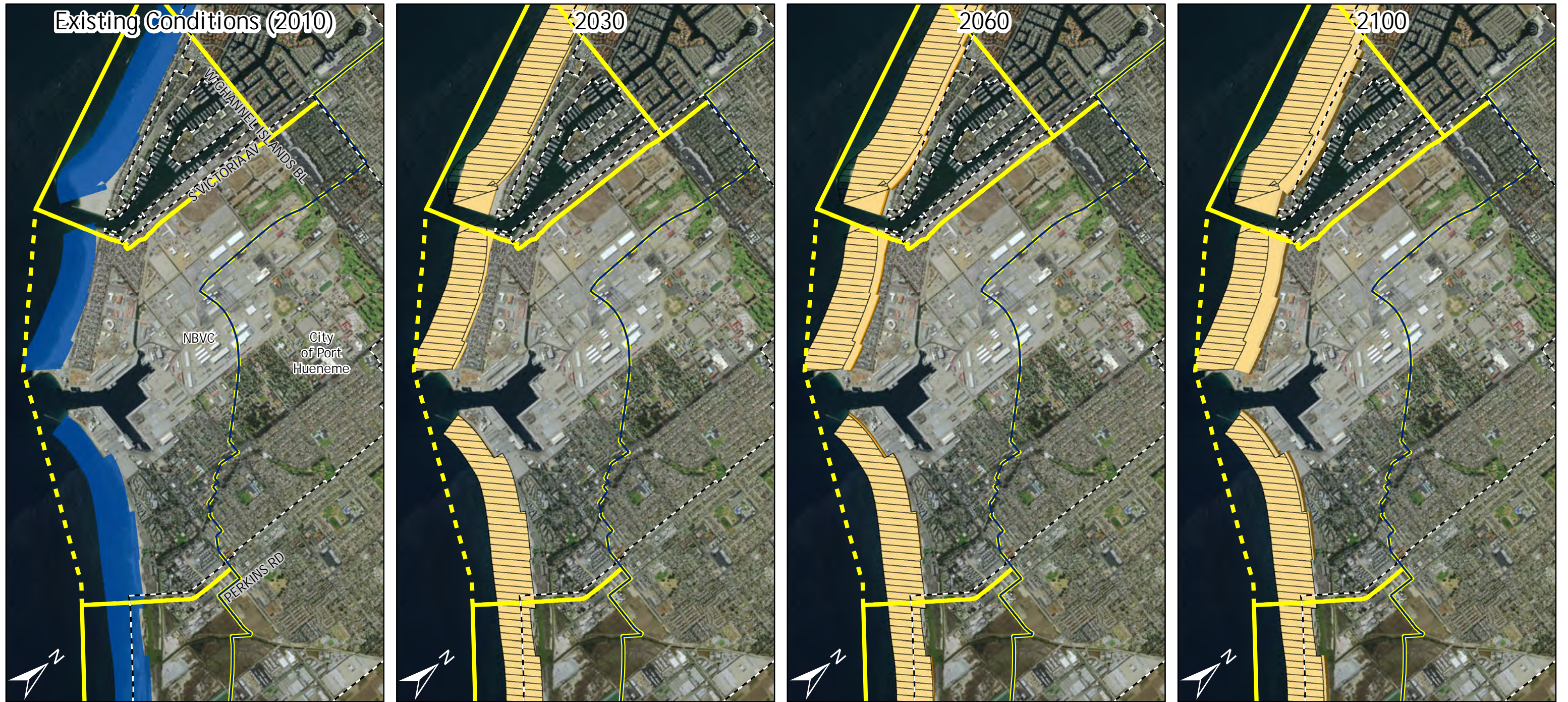


Figure 4.5.2A - Background Erosion Hazard Zones for City of Port Hueneme and County Beach Areas (Not in LCP)

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Background Erosion

Modeling Scenario (2030)

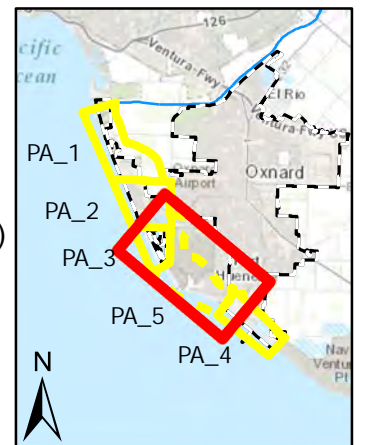
- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)

4.5 COASTAL HAZARDS. CITY OF PORT HUENEME AND COUNTY BEACH AREAS.

100-yr Storm Erosion Hazard Zone

Existing Conditions

The modeled 100-year storm erosion hazard zone for the City of Port Hueneme and County Beach Areas includes the shoreline that begins just east of the Channel Islands Harbor entrance, overlapping some Silver Strand Beach residential units, and extending west to the area adjacent to the City of Oxnard's Advanced Water Purification Facility.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 25 meters (75 feet) in the Silver Strand Beach residential area.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 50 meters (150 feet) in the Silver Strand Beach residential area.

Moderate Sea Level Rise Scenario (16.1" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (25.3" SLR)

Comparable to the Low and Moderate Sea Level Rise Scenarios.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 100 meters (300 feet) in the Silver Strand Beach residential area.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 125 meters (375 feet) in the Silver Strand Beach residential area and 25 meters (75 feet) in the area east of the Port entrance.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 150 meters (450 feet) in the Silver Strand Beach residential area and 50 meters (150 feet) in the area east of the Port entrance.

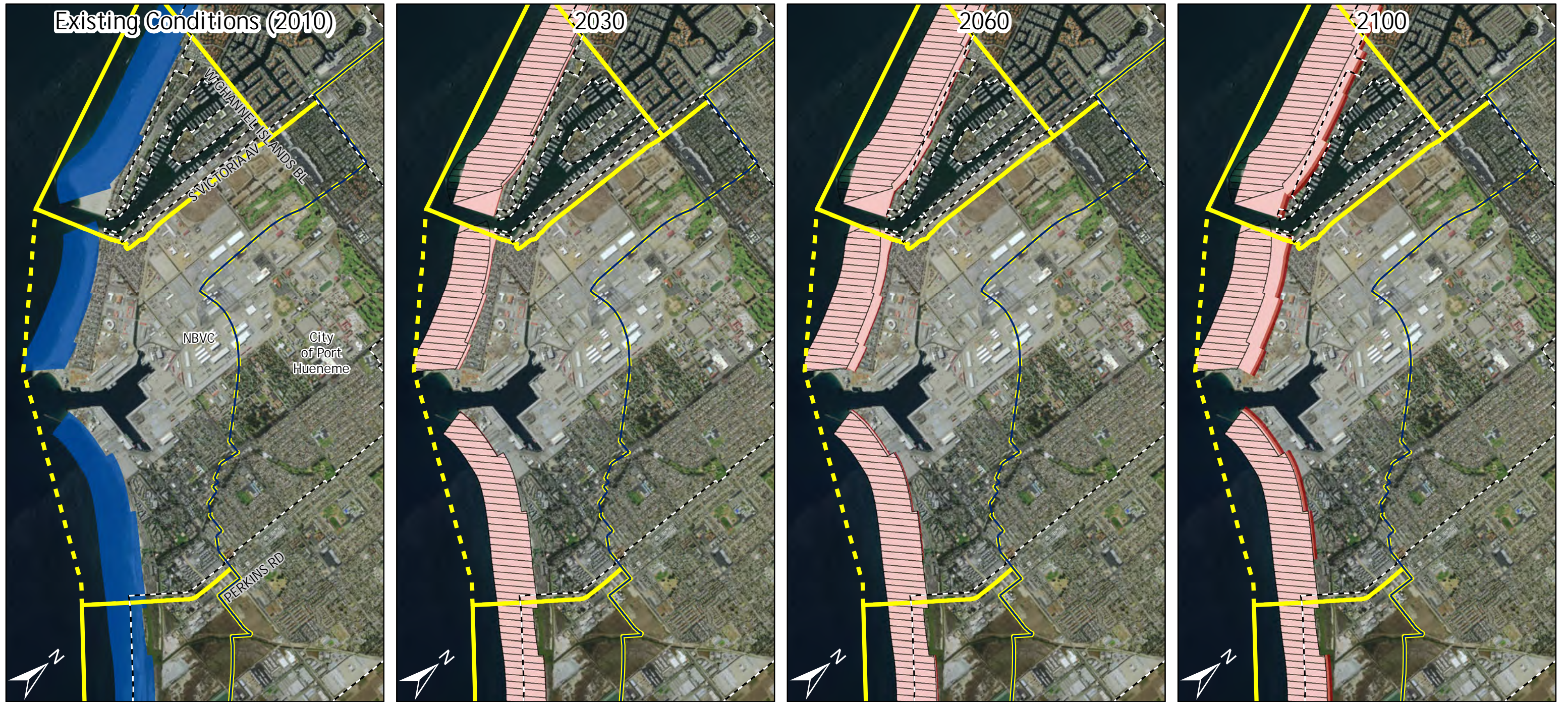


Figure 4.5.2B - 100-yr Storm Erosion Hazard Zones for City of Port Hueneme and County Beach Areas (Not in LCP)

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-100-yr Storm Erosion

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

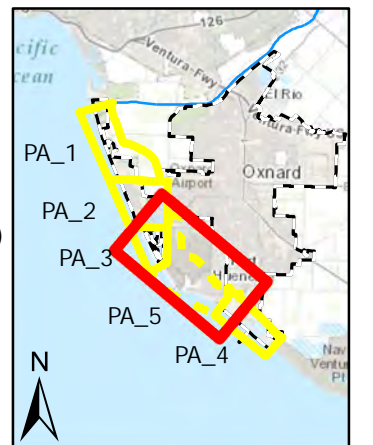
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.5 COASTAL HAZARDS. CITY OF PORT HUENEME AND COUNTY BEACH AREAS.

Coastal Storm Wave Hazard Zone

Existing Conditions

The modeled coastal storm wave hazard zone for the City of Port Hueneme and County Beach Areas includes the shoreline that begins just east of the Channel Islands Harbor entrance, overlapping some Silver Strand Beach residential units, and extending west to the area adjacent to the City of Oxnard's Advanced Water Purification Facility.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 10 meters (30 feet) further than existing conditions on the northern edge of the hazard zone.

Moderate Sea Level Rise Scenario (5.2" SLR)

Extends approximately 25 meters (75 feet) further than existing conditions.

High Sea Level Rise Scenario (8.0" SLR)

Extends approximately 75 meters (150 feet) further than existing conditions.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 50 meters (150 feet) further than existing conditions on the northern edge of the hazard zone.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 75 meters (225 feet) further than existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 100 meters (300 feet) further than existing conditions.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 100 meters (300 feet) further than existing conditions on the northern edge of the hazard zone.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 300 meters (900 feet) further than existing conditions.

High Sea Level Rise Scenario (58.1" SLR)

Extends approximately 500 meters (1,500 feet) further and into the entrance to the Port of Hueneme and the residential area to the east.

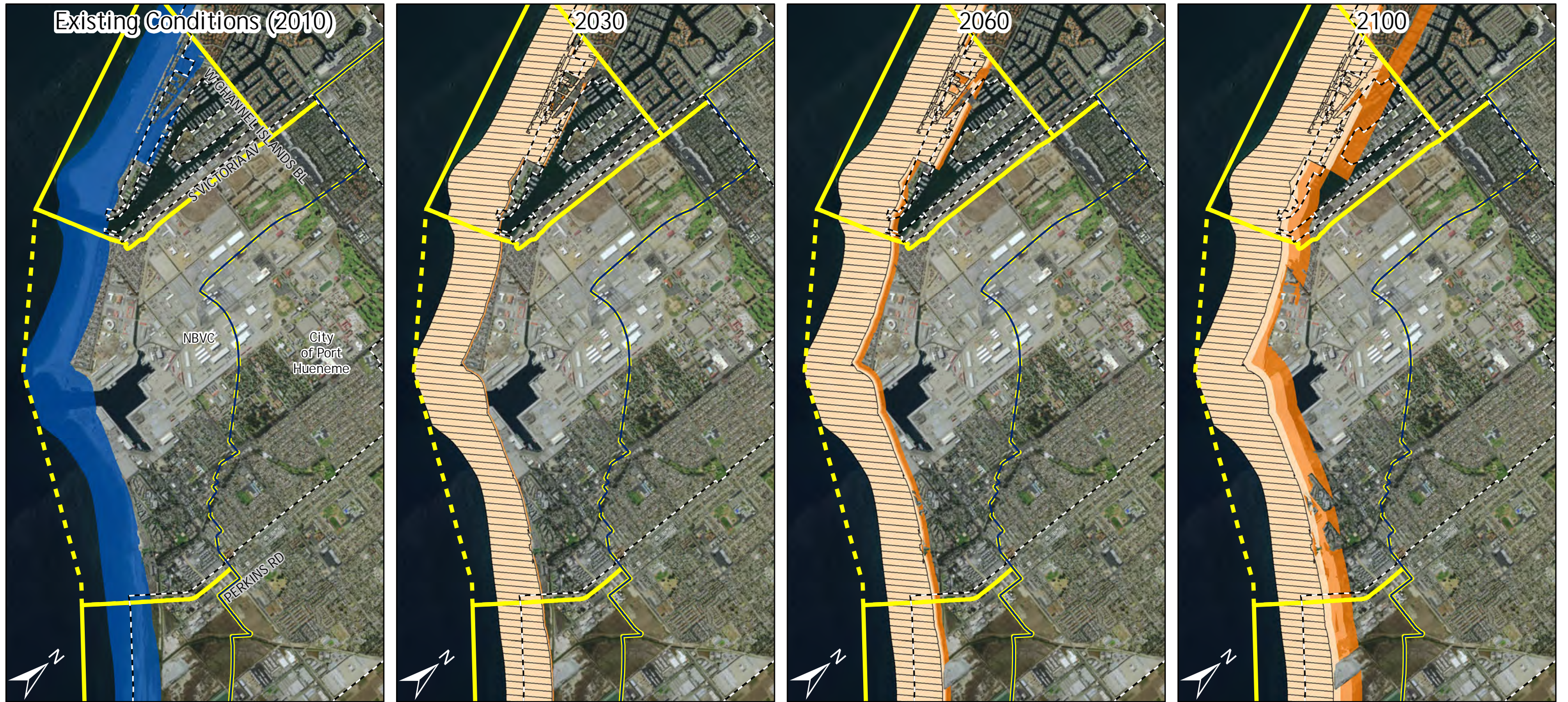


Figure 4.5.3 - Coastal Storm Wave Hazard Zones for City of Port Hueneme and County Beach Areas (Not in LCP)

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Wave

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

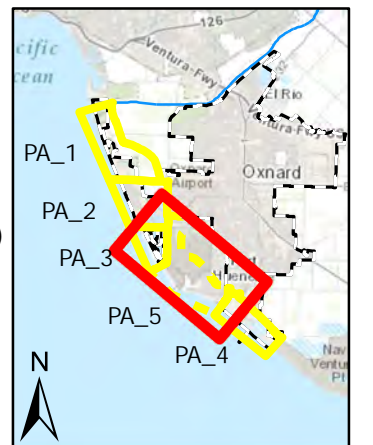
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.5 COASTAL HAZARDS. CITY OF PORT HUENEME AND COUNTY BEACH AREAS.

Coastal Storm Flood Hazard Zone

Existing Conditions

The modeled coastal storm flood hazard zone for the City of Port Hueneme and County Beach Areas includes the shoreline that begins just east of the Channel Islands Harbor entrance and extends west to the area adjacent to the City of Oxnard's Advanced Water Purification Facility. Also included in the coastal storm hazard zone are residential units within Silver Strand Beach and the Port of Hueneme harbor.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends further than existing conditions by approximately 10 meters (30 feet) on the northern edge of the hazard zone.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0 SLR)

Extends further than existing conditions by approximately 20 meters (60 feet) on the northern edge of the hazard zone and approximately 200 meters (600 feet) further into the residential area on the west side of Silver Strand Beach

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends further than existing conditions by approximately 50 meters (150 feet) on the northern edge of the hazard zone and approximately 200 meters further into the residential area on the west side of Silver Strand Beach.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 75 meters (225 feet) further compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends approximately 100 meters (300 feet) further and into the residential area near the Walter B. Moranda Park, into the Naval Construction Battalion Center around Pennsylvania Road, and by approximately 60 meters (180 feet) on the northern edge of the hazard zone.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends approximately 100 meters (300 feet) on the northern edge of the hazard zone and into the residential area near the Walter B. Moranda Park and into the Naval Construction Battalion Center around Pennsylvania Road and approximately 100 meters (300 feet) on the northern edge of the area.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 200 meters (600 feet) further in the northwestern area of the hazard zone.

High Sea Level Rise Scenario (58.1" SLR)

Includes most of the area within the Port Hueneme and County Beach Areas, which includes most of the Port of Hueneme, the Naval Construction Battalion Center, and the surrounding residential neighborhoods.

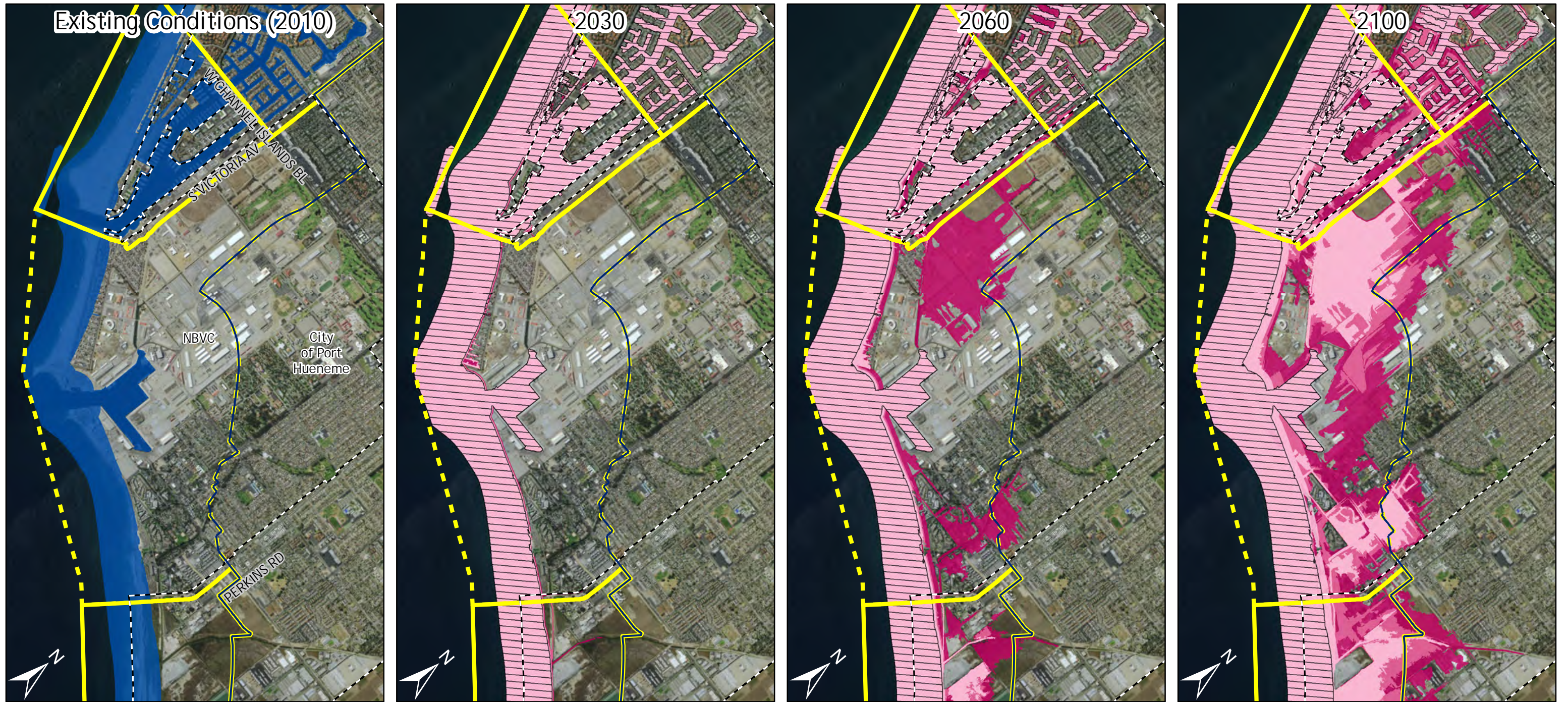


Figure 4.5.4 - Coastal Storm Flood Hazard Zones for City of Port Hueneme and County Beach Areas (Not in LCP)

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Coastal Storm Flood

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

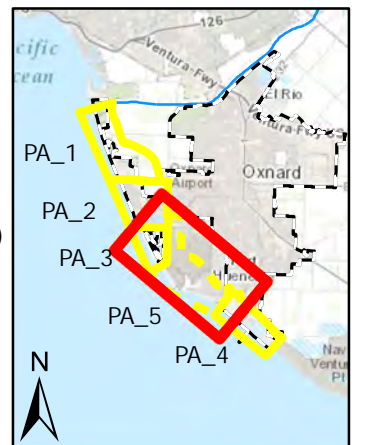
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Storm wave conditions 25 feet at 22 seconds from 279 degrees
 Modeling results from
 Coastal Resilience Ventura (ESA PWA, 2013)



4.5 COASTAL HAZARDS. CITY OF PORT HUENEME AND COUNTY BEACH AREAS.

Combined Hazard

Existing Conditions

The modeled combined hazard zone for the Port Hueneme and County Beach Areas includes the shoreline that begins just east of the Channel Islands Harbor entrance and extends west to the area adjacent to the City of Oxnard's Advanced Water Purification Facility. Also included in the combined hazard zone are residential units in Silver Strand Beach and the Port of Hueneme harbor.

2030 Projection

Low Sea Level Rise Scenario (2.3" SLR)

Extends approximately 200 meters (600 feet) further in the residential area on the west side of Silver Strand Beach compared to existing conditions.

Moderate Sea Level Rise Scenario (5.2" SLR)

Comparable to the Low Sea Level Rise Scenario.

High Sea Level Rise Scenario (8.0" SLR)

Extends approximately 20 meters (60 feet) further compared to existing conditions on the northern edge of the hazard zone and approximately 200 meters (600 feet) further into the residential area on the west side of Silver Strand Beach.

2060 Projection

Low Sea Level Rise Scenario (7.4" SLR)

Extends approximately 20 meters (60 feet) further on the northern edge of the hazard zone compared to existing conditions.

Moderate Sea Level Rise Scenario (16.1" SLR)

Extends approximately 50 meters (150 feet) further compared to existing conditions.

High Sea Level Rise Scenario (25.3" SLR)

Extends into the residential area near the Walter B. Moranda Park, into the Naval Construction Battalion Center around Pennsylvania Road, and approximately 60 meters (180 feet) on the northern edge of the area.

2100 Projection

Low Sea Level Rise Scenario (17.1" SLR)

Extends into the residential area near the Walter B. Moranda Park, into the Naval Construction Battalion Center around Pennsylvania Road, and approximately 100 meters (300 feet) on the northern edge of the area.

Moderate Sea Level Rise Scenario (36.5" SLR)

Extends approximately 200 meters (600 feet) further compared to existing conditions.

High Sea Level Rise Scenario (58.1" SLR)

Includes most of the Port Hueneme and County Beach Areas, which includes most of the Port of Hueneme, the Naval Construction Battalion Center, and the surrounding residential neighborhoods.

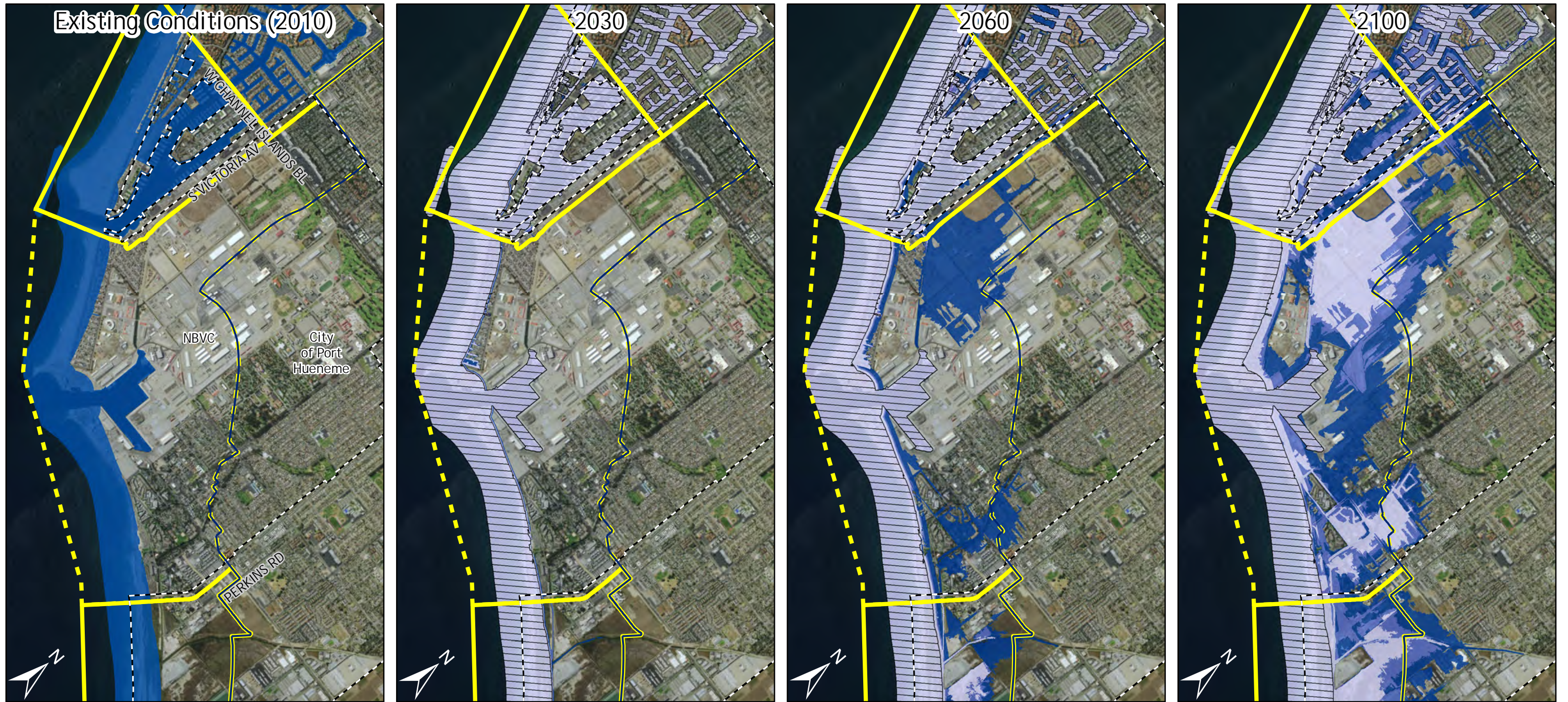


Figure 4.5.5 - Combined Hazard Zones for City of Port Hueneme and County Beach Areas (Not in LCP)

- Coastal Zone Boundary
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Existing Conditions-Combined

Modeling Scenario (2030)

- Existing Conditions
- Low (2.3" SLR)
- Moderate (5.2" SLR)
- High (8.0" SLR)

Modeling Scenario (2060)

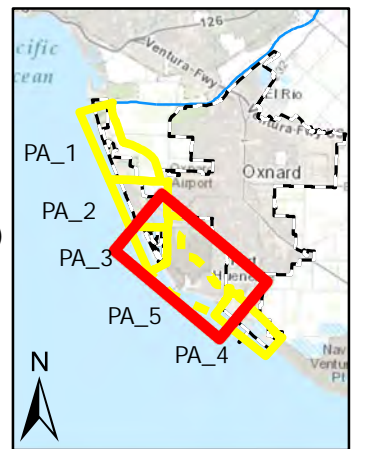
- Existing Conditions
- Low (7.4" SLR)
- Moderate (16.1" SLR)
- High (25.3" SLR)

Modeling Scenario (2100)

- Existing Conditions
- Low (17.1" SLR)
- Moderate (36.5" SLR)
- High (58.1" SLR)



Modeling results from Coastal Resilience Ventura (ESA PWA, 2013)



4.6 TSUNAMI SCENARIOS. PLANNING AREA 1. MCGRATH/MANDALAY BEACH.

Existing Conditions

The modeled potential tsunami inundation area for Planning Area 1 begins at the Santa Clara River and extends south past West Gonzales Road and east past North Harbor Boulevard. It includes most of the western portion of Planning Area 1, which includes the MBGS and the Edison Canal. The potential tsunami inundation area extends along the Edison Canal to the east affecting agricultural plots north of W. 5th Street. McGrath State Beach's coastline, beaches, and campgrounds are currently within the modeled potential tsunami inundation area under existing conditions.

2030 Projection

Inundation based on Japanese Tsunami (99.6" SLR)
Comparable to existing conditions.

Inundation based on Goleta Landslide (183.6" SLR)
Comparable to existing conditions.

2060 Projection

Inundation Based on Japanese Tsunami (117.6" SLR)
Extends further inland by approximately 200 meters (600 feet) in the area near West Gonzales Road.

Inundation based on Goleta Landslide (200.4" SLR)
Extends into the agricultural area in the southeastern portion of the Planning Area near Jeep Trail by approximately 300 meters (900 feet) more, compared to existing conditions.

2100 Projection

Inundation Based on Japanese Tsunami (150.0" SLR)
Encompasses more area on the eastern side of Harbor Boulevard, the open space north of 5th Street and the McGrath State Beach Campground.

Inundation based on Goleta Landslide (234.0" SLR)
Extends into the agricultural area in the southeastern portion of the Planning Area near Jeep Trail by approximately 500 meters (1,500 feet) more, compared to existing conditions.

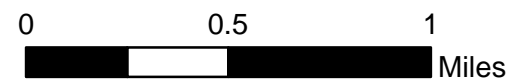


Tsunami Scenario 2015

- Potential inundation area below 7.7' NAVD (J or G Tsunami + 2015 Sea Level)
- Potential inundation area below 14.6' NAVD (G Tsunami + 2015 Sea Level)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Storm Drain Inlet/Catch Basin
- Storm Drain Pipe/Open Channel

Tsunami Scenario 2030

- Potential inundation area below 8.3' NAVD (J or G Tsunami + 2030 Sea Level)
- Potential inundation area below 15.3' NAVD (G Tsunami + 2030 Sea Level)



Abbreviations: J = 2011 Japanese Tsunami; G = Goleta 2 Landslide Tsunami

Tsunami Scenario 2060

- Potential inundation area below 9.8' NAVD (J or G Tsunami + 2060 Sea Level)
- Potential inundation area below 16.7' NAVD (G Tsunami + 2060 Sea Level)

Tsunami Scenario 2100

- Potential inundation area below 12.5' NAVD, (J or G Tsunami + 2100 Sea Level)
- Potential inundation area below 19.5' NAVD (G Tsunami + 2100 Sea Level)

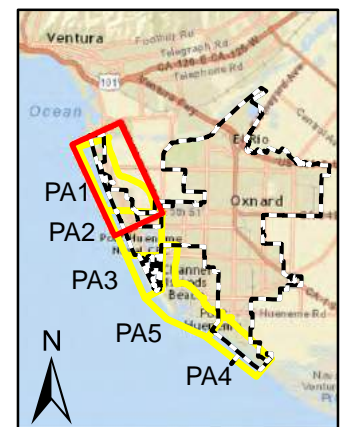


Figure 4.6 Potential Tsunami Inundation Area for Planning Area 1: McGrath / Mandalay Beach

4.7 TSUNAMI SCENARIOS. PLANNING AREA 2. OXNARD SHORES.

Existing Conditions

The modeled potential tsunami inundation area for Planning Area 2 is on the shore between W. 5th Street and W. Channel Islands Boulevard. In the northern section of Planning Area 2, the potential tsunami inundation area extends into the streets of the Oxnard Shores neighborhood. Mandalay Beach is within the potential tsunami inundation area in addition to most of Terramar Way, W. Wooley Road, Whitecap Street, and Seabreeze Way. Other streets within the potential tsunami inundation area include Channel Way, Driftwood Street, and Breakers Way. The entire Mandalay Bay waterway community is also within the potential tsunami inundation area under existing conditions. The inundation area extends from the community along Jeep Trail past W. Wooley Road, reaching agriculture land adjacent to W. 5th Street.

2030 Projection

Inundation based on Japanese Tsunami (99.6" SLR)
Comparable to existing conditions.

Inundation based on Goleta Landslide (183.6" SLR)
Extends further inland by approximately 50 meters (150 feet) in the Oxnard Shores neighborhood and into agricultural land north of West Wooley Road.

2060 Projection

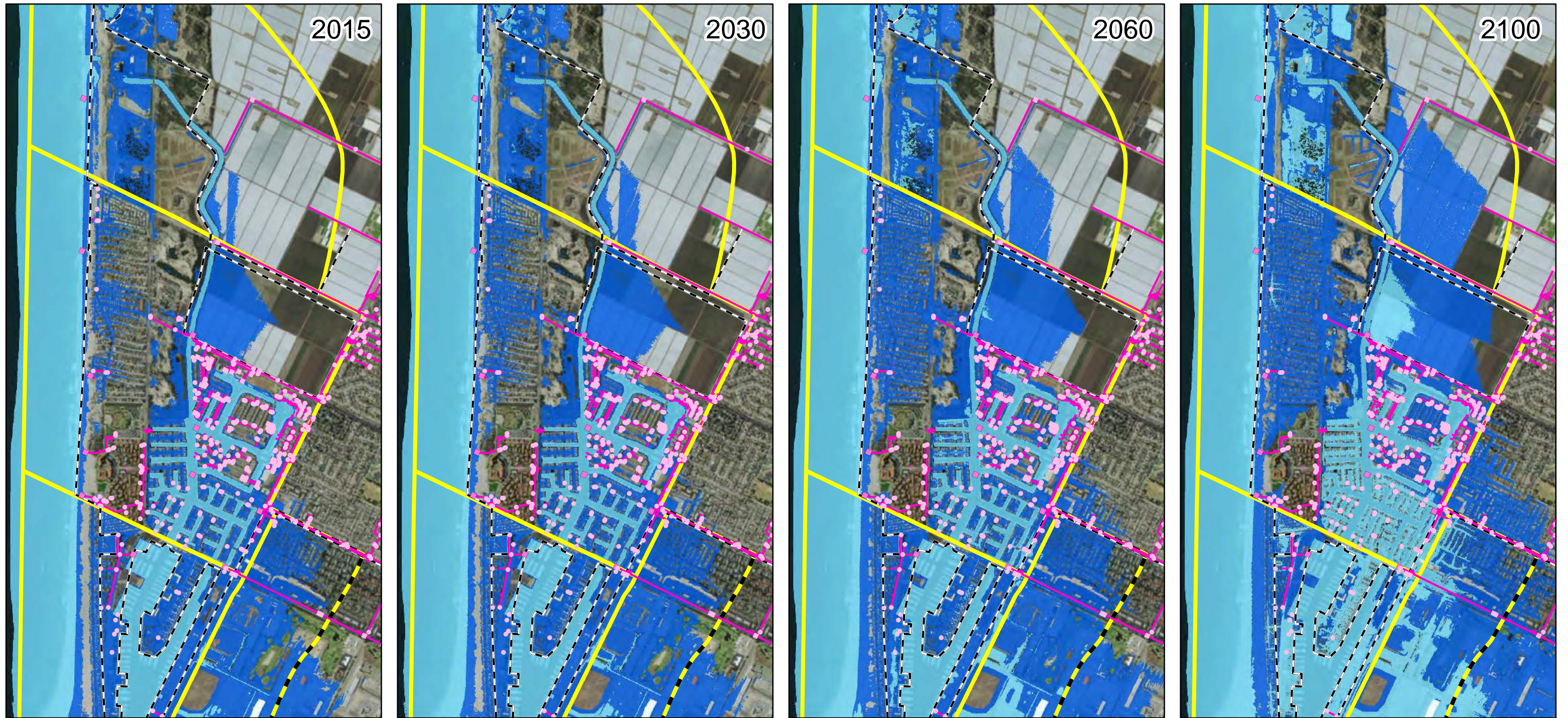
Inundation Based on Japanese Tsunami (117.6" SLR)
Comparable to existing conditions.

Inundation based on Goleta Landslide (200.4" SLR)
Encompasses the entire Oxnard Shores neighborhood and most of the agricultural land north of West Wooley Road.

2100 Projection

Inundation Based on Japanese Tsunami (150.0" SLR)
Extends further inland by approximately 300 meters (900 feet), compared to existing conditions, into the agricultural land north of West Wooley Road.

Inundation based on Goleta Landslide (234.0" SLR)
Encompasses the entire Oxnard Shores neighborhood and almost all of the agricultural land north of West Wooley Road.

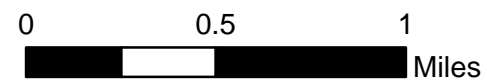


Tsunami Scenario 2015

- Potential inundation area below 7.7' NAVD (J or G Tsunami + 2015 Sea Level)
- Potential inundation area below 14.6' NAVD (G Tsunami + 2015 Sea Level)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Storm Drain Inlet/Catch Basin
- Storm Drain Pipe/Open Channel

Tsunami Scenario 2030

- Potential inundation area below 8.3' NAVD (J or G Tsunami + 2030 Sea Level)
- Potential inundation area below 15.3' NAVD (G Tsunami + 2030 Sea Level)



Abbreviations: J = 2011 Japanese Tsunami; G = Goleta 2 Landslide Tsunami

Tsunami Scenario 2060

- Potential inundation area below 9.8' NAVD (J or G Tsunami + 2060 Sea Level)
- Potential inundation area below 16.7' NAVD (G Tsunami + 2060 Sea Level)

Tsunami Scenario 2100

- Potential inundation area below 12.5' NAVD, (J or G Tsunami + 2100 Sea Level)
- Potential inundation area below 19.5' NAVD (G Tsunami + 2100 Sea Level)

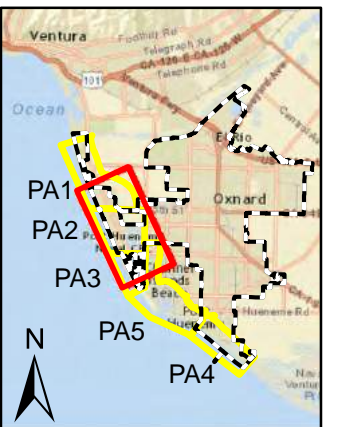


Figure 4.7 Potential Tsunami Inundation Area for Planning Area 2: Oxnard Shores

4.8 TSUNAMI SCENARIOS. PLANNING AREA 3. CHANNEL ISLANDS.

Existing Conditions

The entire Planning Area is within the modeled existing potential tsunami inundation area. These areas include the Hollywood Beach Mobile Home Park, Hollywood Beach Elementary School, the Channel Island Harbor Marina, and houses along the shoreline.

2030 Projection

Inundation based on Japanese Tsunami (99.6" SLR)
Comparable to the range of the existing conditions and encompasses the inlet of the Channel Island Harbor Marina.

Inundation based on Goleta Landslide (183.6" SLR)
Comparable to existing conditions.

2060 Projection

Inundation Based on Japanese Tsunami (117.6" SLR)
Extends outside Channel Islands Harbor by approximately 50 meters (150 feet).

Inundation based on Goleta Landslide (200.4" SLR)
Comparable to existing conditions.

2100 Projection

Inundation Based on Japanese Tsunami (150.0" SLR)
Extends outside Channel Islands Harbor by approximately 150 meters (450 feet).

Inundation based on Goleta Landslide (234.0" SLR)
Comparable to existing conditions.

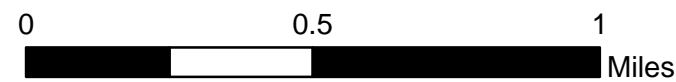


Tsunami Scenario 2015

- Potential inundation area below 7.7' NAVD (J or G Tsunami + 2015 Sea Level)
- Potential inundation area below 14.6' NAVD (G Tsunami + 2015 Sea Level)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Storm Drain Inlet/Catch Basin
- Storm Drain Pipe/Open Channel

Tsunami Scenario 2030

- Potential inundation area below 8.3' NAVD (J or G Tsunami + 2030 Sea Level)
- Potential inundation area below 15.3' NAVD (G Tsunami + 2030 Sea Level)



Abbreviations: J = 2011 Japanese Tsunami; G = Goleta 2 Landslide Tsunami

Tsunami Scenario 2060

- Potential inundation area below 9.8' NAVD (J or G Tsunami + 2060 Sea Level)
- Potential inundation area below 16.7' NAVD (G Tsunami + 2060 Sea Level)

Tsunami Scenario 2100

- Potential inundation area below 12.5' NAVD, (J or G Tsunami + 2100 Sea Level)
- Potential inundation area below 19.5' NAVD (G Tsunami + 2100 Sea Level)

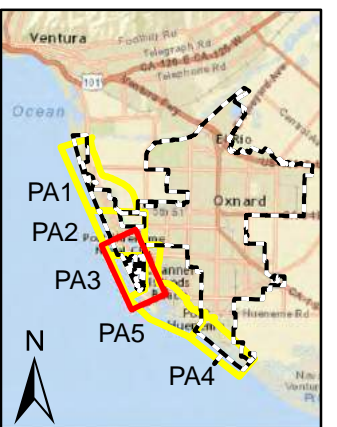


Figure 4.8 Potential Tsunami Inundation Area for Planning Area 3: Channel Islands

4.9 TSUNAMI SCENARIOS. PLANNING AREA 4. ORMOND BEACH.

Existing Conditions

The modeled potential tsunami inundation area for Planning Area 4 encompasses almost all of the planning area, including the Ormond Beach Wetlands, the City of Oxnard's Wastewater Treatment Plant, the Ormond Beach Generating Station, and surrounding agricultural land and open space. The Halaco Superfund site is not in the existing potential tsunami inundation area.

2030 Projection

Inundation based on Japanese Tsunami (99.6" SLR)
Comparable to existing conditions.

Inundation based on Goleta Landslide (183.6" SLR)
Comparable to existing conditions.

2060 Projection

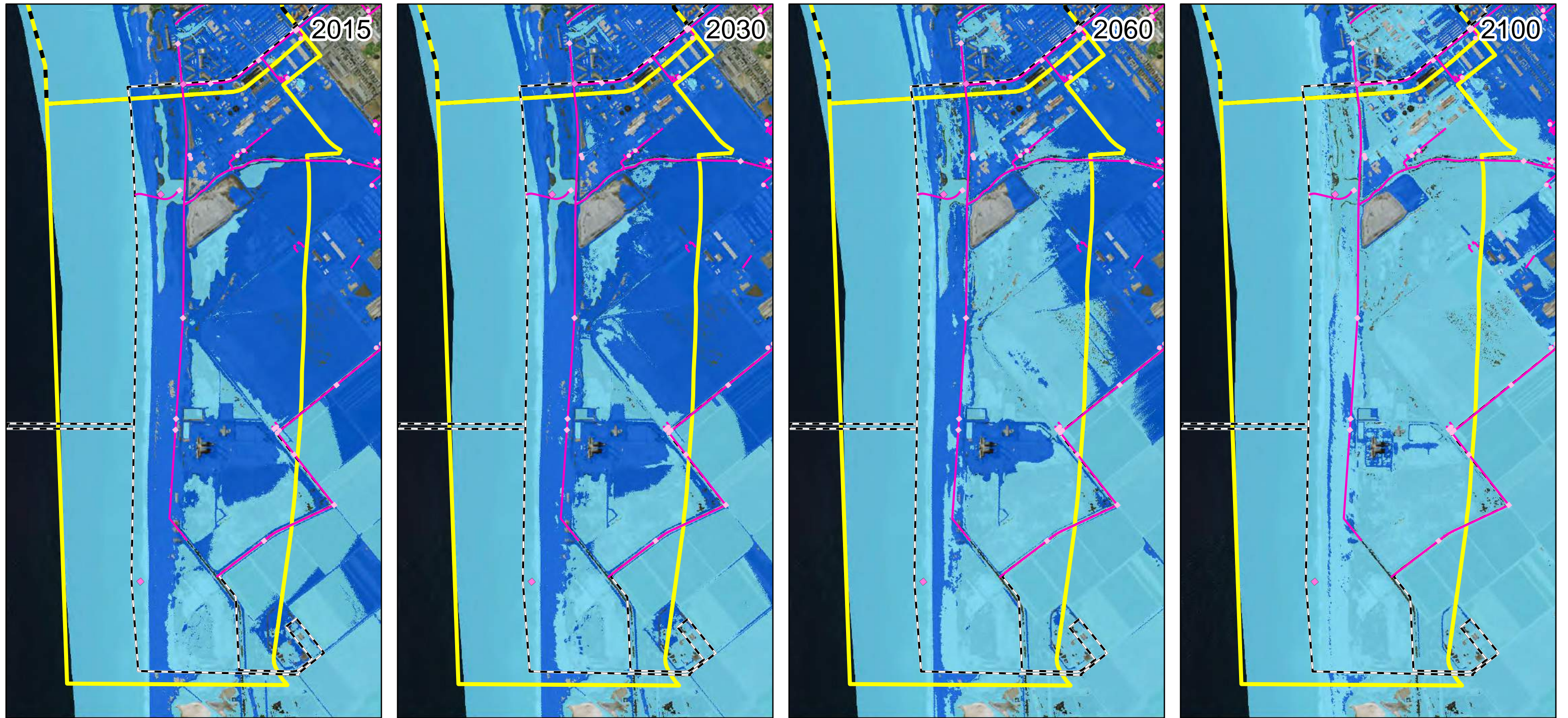
Inundation Based on Japanese Tsunami (117.6" SLR)
Extends inland by approximately 1,000 feet, compared to existing conditions, in the center of the Planning Area which consists of agricultural land.

Inundation based on Goleta Landslide (200.4" SLR)
Comparable to existing conditions.

2100 Projection

Inundation Based on Japanese Tsunami (150.0" SLR)
Encompasses the entire Planning Area except for the Halaco Superfund site.

Inundation based on Goleta Landslide (234.0" SLR)
Comparable to existing conditions.



Tsunami Scenario 2015

- Potential inundation area below 7.7' NAVD (J or G Tsunami + 2015 Sea Level)
- Potential inundation area below 14.6' NAVD (G Tsunami + 2015 Sea Level)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Storm Drain Inlet/Catch Basin
- Storm Drain Pipe/Open Channel

Tsunami Scenario 2030

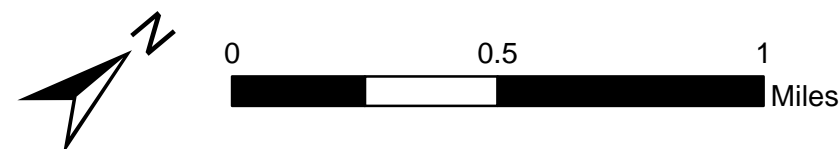
- Potential inundation area below 8.3' NAVD (J or G Tsunami + 2030 Sea Level)
- Potential inundation area below 15.3' NAVD (G Tsunami + 2030 Sea Level)

Tsunami Scenario 2060

- Potential inundation area below 9.8' NAVD (J or G Tsunami + 2060 Sea Level)
- Potential inundation area below 16.7' NAVD (G Tsunami + 2060 Sea Level)

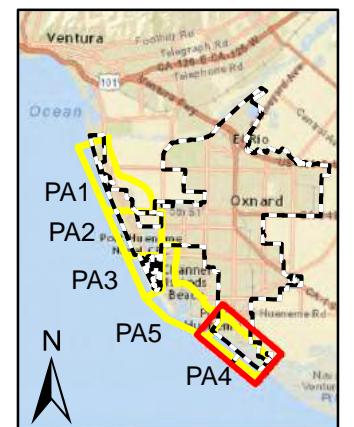
Tsunami Scenario 2100

- Potential inundation area below 12.5' NAVD, (J or G Tsunami + 2100 Sea Level)
- Potential inundation area below 19.5' NAVD (G Tsunami + 2100 Sea Level)



Abbreviations: J = 2011 Japanese Tsunami; G = Goleta 2 Landslide Tsunami

Figure 4.9 Potential Tsunami Inundation Area for Planning Area 4: Ormond Beach



4.10 TSUNAMI SCENARIOS. PORT HUENEME AND COUNTY BEACH AREAS.

Existing Conditions

The modeled potential tsunami inundation area for the City of Port Hueneme and County Beach Areas encompasses most of this area, which includes the Port of Hueneme, the Naval Construction Battalion Center, Silver Strand Beach and the surrounding residential neighborhoods.

2030 Projection

Inundation based on Japanese Tsunami (99.6" SLR)
Comparable to existing conditions.

Inundation based on Goleta Landslide (183.6" SLR)
Comparable to existing conditions.

2060 Projection

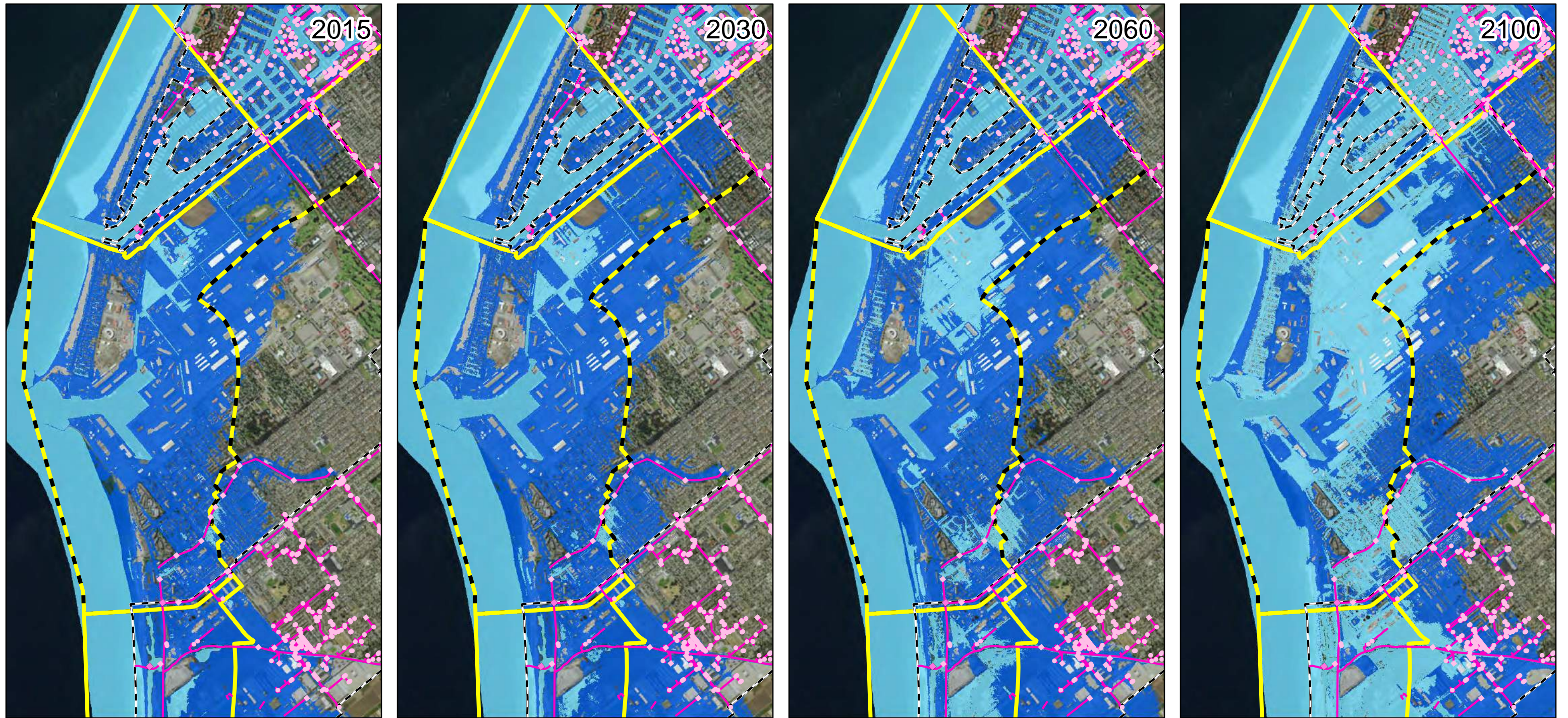
Inundation Based on Japanese Tsunami (117.6" SLR)
Encompasses twice the amount of area that is currently vulnerable north of the residential area near Silver Strand Beach.

Inundation based on Goleta Landslide (200.4" SLR)
Comparable to existing conditions.

2100 Projection

Inundation Based on Japanese Tsunami (150.0" SLR)
Encompasses almost all of this area expect for a few buildings located on higher ground throughout the area.

Inundation based on Goleta Landslide (234.0" SLR)
Comparable to existing conditions.

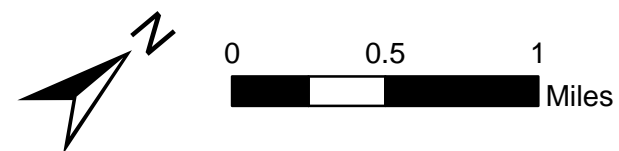


Tsunami Scenario 2015

- Potential inundation area below 7.7' NAVD (J or G Tsunami + 2015 Sea Level)
- Potential inundation area below 14.6' NAVD (G Tsunami + 2015 Sea Level)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Storm Drain Inlet/Catch Basin
- Storm Drain Pipe/Open Channel

Tsunami Scenario 2030

- Potential inundation area below 8.3' NAVD (J or G Tsunami + 2030 Sea Level)
- Potential inundation area below 15.3' NAVD (G Tsunami + 2030 Sea Level)



Abbreviations: J = 2011 Japanese Tsunami; G = Goleta 2 Landslide Tsunami

Tsunami Scenario 2060

- Potential inundation area below 9.8' NAVD (J or G Tsunami + 2060 Sea Level)
- Potential inundation area below 16.7' NAVD (G Tsunami + 2060 Sea Level)

Tsunami Scenario 2100

- Potential inundation area below 12.5' NAVD, (J or G Tsunami + 2100 Sea Level)
- Potential inundation area below 19.5' NAVD (G Tsunami + 2100 Sea Level)

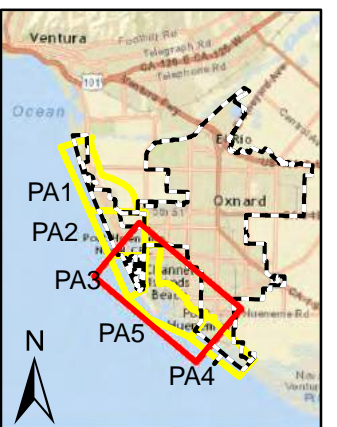


Figure 4.10 Potential Tsunami Inundation Area for City of Port Hueneme and County Beach Areas (Not in LCP)

REFERENCES

- California Coastal Commission [CCC]. 2015. Sea Level Rise Policy Guidance. Available at: http://documents.coastal.ca.gov/assets/slr/guidance/August2015/0_Full_Adopted_Sea_Level_Rise_Policy_Guidance.pdf. Accessed on: February 2016.
- CCC. 2016. Local Coastal Programs. Available at: <http://www.coastal.ca.gov/lcps.html>. Accessed on: February 2016.
- California Department of Finance. 2015. [E-1 Cities, Counties, and the State Population Estimates with Annual Percent Change](#). Accessed on: January 2016.
- California Department of Parks and Recreation. 2015. *McGrath State Beach*. Available at: http://www.parks.ca.gov/?page_id=607. Accessed on: January 2016.
- CAopenspace.org. 2015. *Ormond Wetlands & Beach, Oxnard CA*. Available at: <http://www.caopenspace.org/ormond.html>. Accessed on: February 2016.
- Coastal Resilience. 2015. Ventura County. Available at: www.coastalresilience.org/ventura. Accessed on: January 2016.
- ESA PWA (2013). *Coastal Resilience Ventura* – Technical Report for Coastal Hazards Mapping. Prepared for the Nature Conservancy, 7/31/2013, 59 pgs. Available at: http://maps.coastalresilience.org/ventura/methods/CRV_Hazards_Mapping_Technical_Report.pdf
- Federal Emergency Management Agency (FEMA). 2005. *Final Draft Guidelines: Coastal Flood Hazard Analysis and Mapping for the Pacific Coast of the United States*. Prepared for the U.S. Department of Homeland Security.
- Federal Emergency Management Agency (FEMA). 2010. Flood Insurance Study Ventura County, California and Incorporated Area – Effective National Hazard Flood Layers Panels 06111C0885E and 06111C0905E effective 01/20/2010.
- Hunt, I. 1959. *Design of Seawalls and Breakwaters*. Journal of Waterways and Harbors Division, Proceedings of the American Society of Civil Engineers. Vol 85, No. 3, Part 1, Sept. 1959, pp. 123-152.
- Komar, P.D., W.G. McDougal, J.J. Marra, and P. Ruggiero. 1999. The rational analysis of setback distances: applications to the Oregon Coast Shore and Beach 67(1):41-49.
- Ventura, City of. 2014. *Santa Clara River Estuary: Flood Management Options For McGrath State Beach*. Available at: <http://www.cityofventura.net/files/file/public-works/water/McGrath%20Flood%20Management%20Plan%20Report%2020140828%20Item%2016%20LARWQCB%20Mtg.pdf> Accessed on: January 2016.

National Research Council (NRC). 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. National Academy Press: Washington, D.C.

Oxnard, City of. 2010. Parks Amenities Listing. Available at: http://oxnardrec.org/Uploads/Rec/2010_park_amentities.pdf. Accessed on: February 2016.

Pacific Institute. 2009. *The Impacts of Sea-Level Rise on the California CoaStreet* A paper from the California Climate Change Center, May 2009.

Portofhueneme.org. 2015. The Port of Hueneme Oxnard Harbor District, Overview. Available at: <http://www.portofhueneme.org/about/overview/>. Accessed on: February 2016.

Revell, D.L., Battalio, R., Spear, B., Ruggiero, P., and Vandever, J. 2011. *A Methodology for Predicting Future Coastal Hazards due to Sea-Level Rise on the California CoaStreet* Climatic Change 109:S251-S276.

Seymour, R., 1996. *Wave Climate Variability in Southern California*. Journal of Waterway, Port, Coastal, and Ocean Engineering, July/August 1996, pp. 182-186.

U.S. Army Corps of Engineers (USACE). 1984. *Shore Protection Manual, Volume 2*. pp 7-35 to 7-43.

USACE. 2011. *Sea-Level Change Considerations for Civil Works Programs*. US Army Corps of Engineers, EC 1165-2-212.

USGS. 2010. *Overview of the ARkStorm Scenario*. USGS Open File Report 2010-1312. Available at: <http://pubs.usgs.gov/of/2010/1312/>. Accessed on: February 2016.