Sea Level Rise Assessment for 711 Sand Point Road

Assessment based on California Coastal Commission Sea Level Rise Policy Guidance, August 2015 and revised per Santa Barbara County Vulnerability Assessment dated July 2017

Stantec

Prepared for:
The Cosmoledo Trust

Prepared by:
Craig A. Steward, P.E., CFM

February 21, 2018
PN 2064134300

Sign-off Sheet

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Prepared by _____
(signature)

Craig A. Steward, P.E., CFM

Reviewed by _____
(signature)

David W. Rundle, P.E.

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1.0 PURPOSE OF REPORT

The purpose of the report is to respond to a request from the Santa Barbara County Planning and Development Department to assess the site of a proposed ancillary improvements project for sea level rise. The report has been revised to reflect data recently developed with the release of the County of Santa Barbara Coastal Resiliency Project, Sea Level Rise & Coastal Hazards Vulnerability Assessment dated July 2017.

2.0 BACKGROUND

The proposed project is located at 711 Sand Point Road, Carpinteria, California (Assessor's Parcel Number 005-460-046). See Figure 1. The project proposes to remove the existing

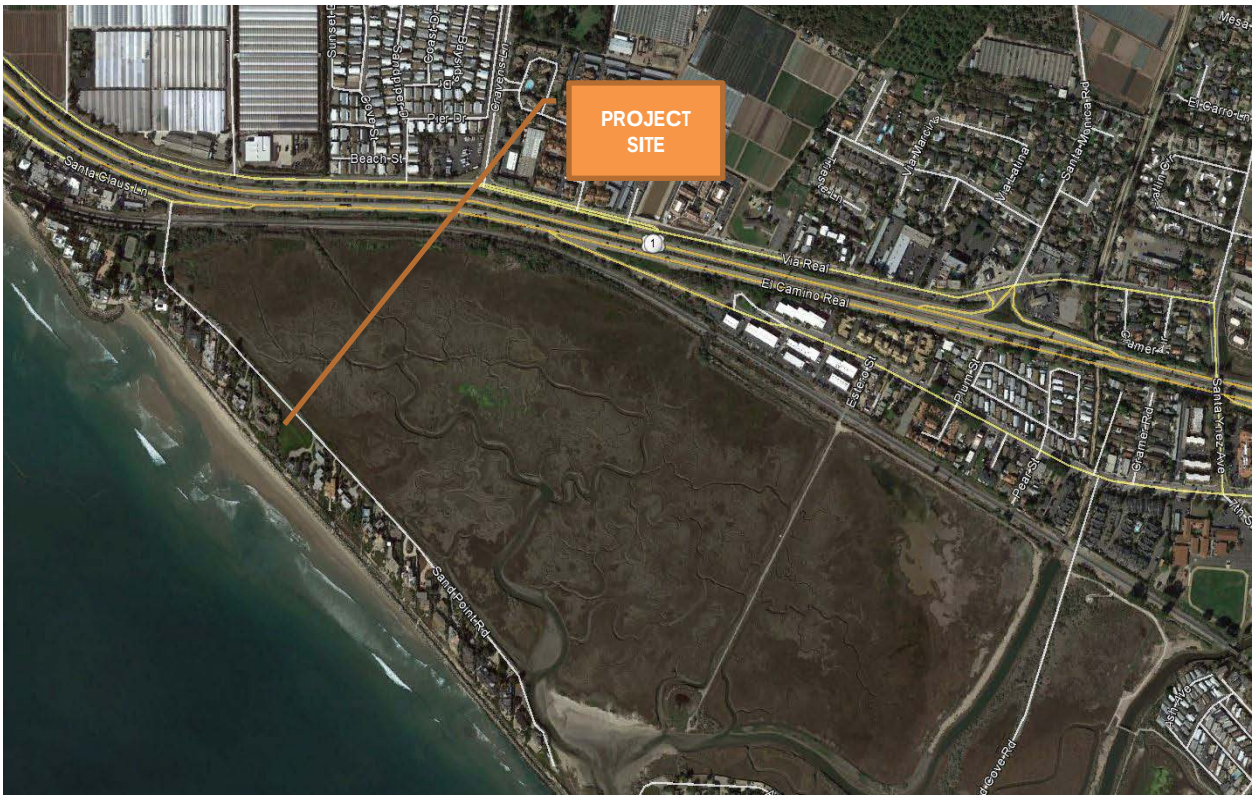


Figure 1 - Vicinity Map

residence and construct a new proposed residence. The proposed finish floor elevation is 17.1 feet for the main floor (elevations are on NAVD1988 datum). The parcel fronts on the beach and is separated from the beach by a sea wall followed by a rock revetment. The rear of the

parcel backs up to the Carpinteria Salt Marsh and is subject to both coastal high hazard conditions as well as alluvial flooding condition. The existing ground elevation around the proposed improvements varies from 9 feet to 13 feet NAVD1988.

While the existing and proposed structures are not located within either of the flood zones noted above, this portion of the coast has been identified likely to be affected by repetitive flood loss and is designated as a Coastal High Hazard area. County policy indicates that Coastal High Hazard areas (generally areas between the coast line and the Union Pacific Railroad) must meet special design standards. Currently, the design standards indicate that new structures located within the Coastal High Hazard area but not within a regulated flood zone must have the finish floor elevated to two (2) feet above the Coastal High Hazard elevation (which is elevation 13.6 feet NAVD88) resulting in a minimum finish floor elevation of 15.6 feet NAVD88.

3.0 METHODS

The methods for sea level rise assessment are explained in the California Coastal Commission Sea Level Rise Policy Guidance adopted August 12, 2015, Appendix B (see referenced pages below). It includes a six-step analysis for the following:

1. Develop temporally and spatially-appropriate sea level rise projections (pages 226-230)
2. Determine tidal range and future inundation (pages 231-233)
3. Determine still water changes from surge, El Nino events and PDOs (pages 233-236)
4. Estimate beach, bluff and dune change from erosion (pages 237-243)
5. Determine wave, storm wave, wave runup, and flooding conditions (pages 243-248)
6. Examine potential flooding from extreme events (pages 248-250)

The County of Santa Barbara Office of Long Range Planning has released the County of Santa Barbara Coastal Resiliency Project, Sea Level Rise & Coastal Hazards Vulnerability Assessment dated July 2017. It has been reviewed and accepted by the California Coastal Commission staff as an acceptable method for estimating local sea level rise and is now required by the County of Santa Barbara to be used for the purposes of setting building floor elevations for new coastal structures.

One of the purposes of the sea level rise assessment is to provide a precautionary approach to planning and to build in adaptive capacity for the highest amounts of sea level rise. It may be appropriate to design for the local hazard conditions that will result from more moderate sea level rise scenarios, as long as decision makers and project applicants plan to implement additional adaptation strategies if conditions change more than anticipated in the initial

design.[1] Santa Barbara County has indicated that if the proposed structure is significantly damaged, the property owner must agree to demolish the building and not attempt to rebuild.

A factored water elevation will be evaluated consisting of the following items:

+ Mean Higher High Water (MHHW), NAVD1988
+ Sea Level Rise Estimate
+ Surge Estimate
+ El Nino Effects
+ Pacific Decadal Oscillation Effects
+ Wave Run-up

= Factored Water Elevation, NAVD1988

Extreme events will be considered separately.

Note that a rock revetment lines the shore-side of the parcel. The evaluation has not applied any protective value to this feature.

4.0 FINDINGS

The findings in this assessment are as follows:

- The planning horizon is 75 years for these types of ancillary improvements indicating an approximate design life extending to the year 2093.
- The projected sea level rise high range estimate is 4.9 feet.
- The projected high estimated tidal ranges will extend from 4.7 feet to 10.1 feet NAVD1988.
- The BFE as provided by Santa Barbara County Flood Control District is 13.6 feet.
- The short term and long-term rate of shoreline change in the area south of Santa Barbara has been evaluated by several studies. One study indicates that the short-term rate of change near our project site is 1.60 feet of erosion per year. The long-term rate of change is 3.3 feet of accretion per year. Another study indicates that the short-term rate of change is 3.9 feet of erosion per year and the long-term rate of change is 0.7 feet of erosion per year. We have conservatively taken the worst – case estimate for both short-

[1] Sea Level Rise Guidance, Chapter 2, page 38.

term and long-term coastal change. The application of this factor is shown in Exhibit 3 of the Attachments.

- The application of the Preliminary Coastal Mapping products is not applicable. According to the County, the current Coastal High Hazard policy will remain in effect even after adoption of the Preliminary Coastal Mapping anticipated late in 2018. Therefore, the Coastal High Hazard policy results in a minimum finish floor of 15.6 feet NAVD88 (13.6 ft + 2 ft).
- The projected design sea level elevations for the year 2093 are as follows:
    - Lower estimate = 12.0 feet NAVD1988
    - Moderate estimate = 14.1 feet NAVD1988
    - Higher estimate = 16.9 feet NAVD1988
- Tsunami wave heights have low range from 3 feet to 10 feet and a high range for 20 feet to 50 feet. The site is located with the tsunami inundation zone as shown in Figure 3. The tsunami wave heights will not be added to the tidal ranges for the various scenarios.

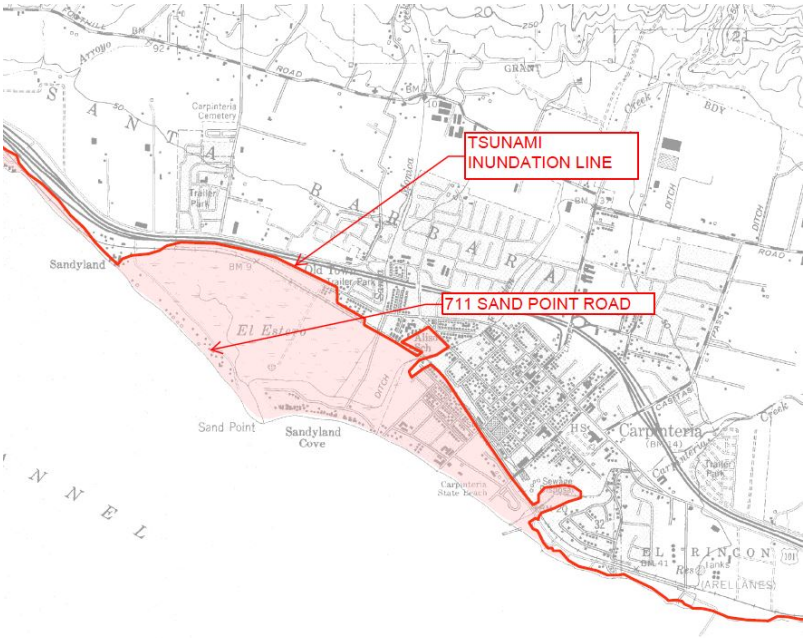


Figure 2 - Tsunami Inundation Limits

Detailed calculations and sources are attached.

The 75-year projected 'higher estimate' factored water elevation for 711 Sand Point Road is 16.9 feet NAVD1988. The main finish floor of the home is expected to be at approximately 17.1 feet

NAVD1988. Therefore, the project as proposed meets the minimum finish floor elevation for the 75-year projected 'higher estimate' factored water surface elevation. See Figure 4 for a section through the parcel and associated water elevations and erosion limits.

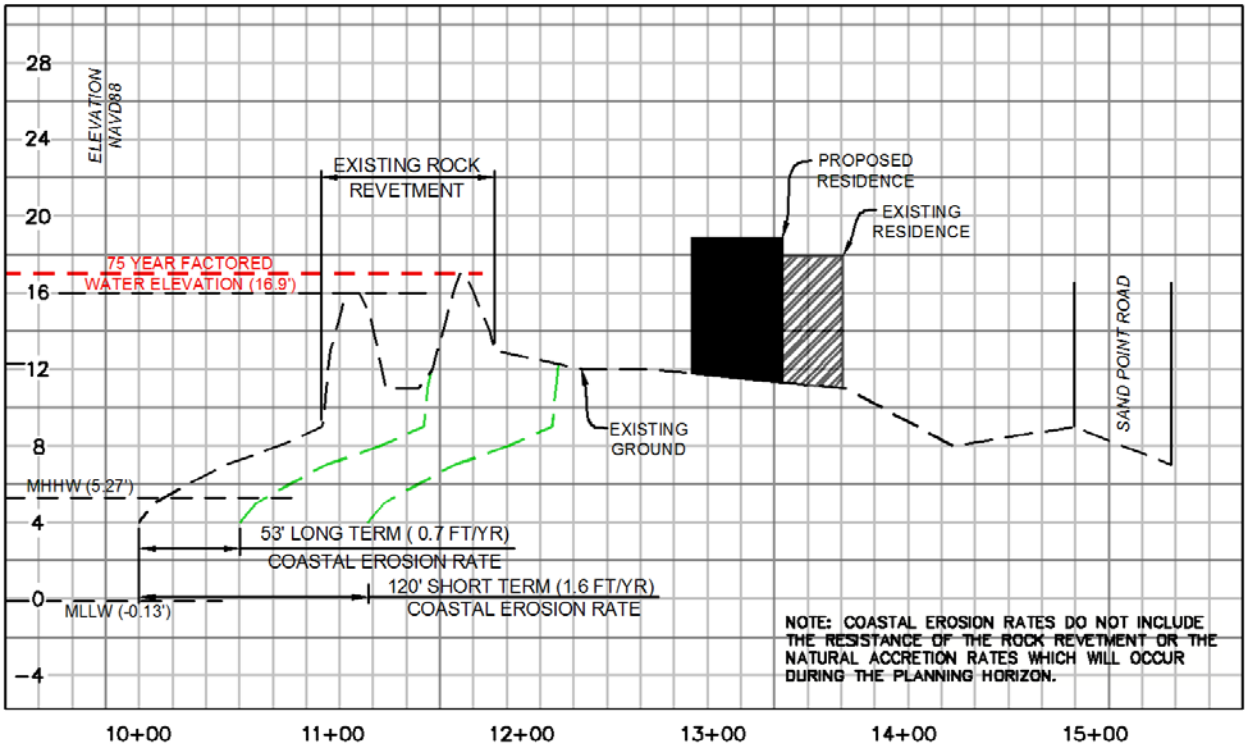


Figure 4 - Section Through Project Site Showing Worst-Case Coastal Retreat and 'Higher Estimate" Factored Water Elevation for Year 2093.

5.0 CONCLUSIONS

Based on the information provided in the analysis and consultation with Santa Barbara County Flood Control and Planning and Development Staff, we conclude that:

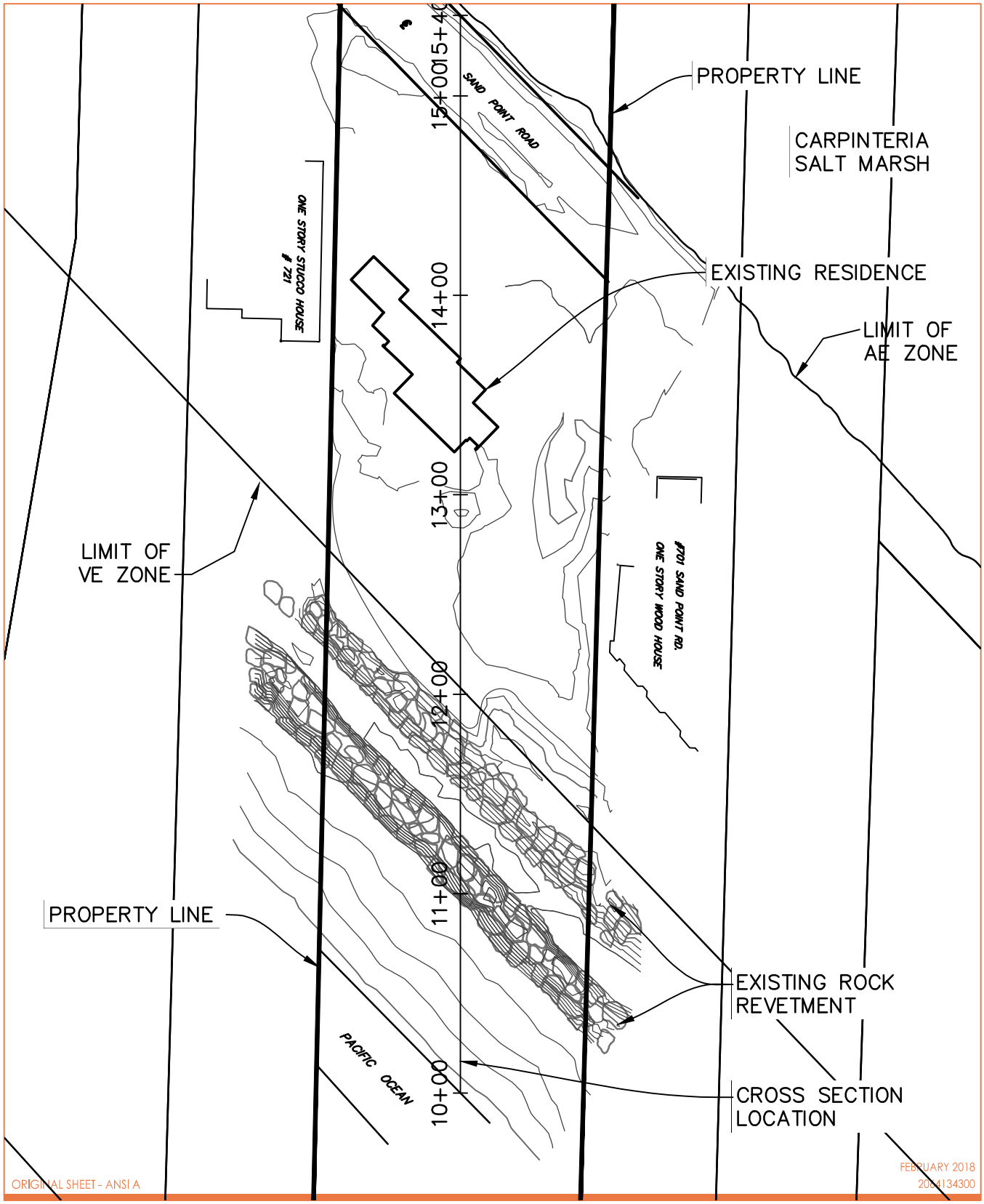
- The 75-year projected 'higher estimate' factored water surface elevation for this location is 16.9 feet NAVD88 per staff consultation, we understand that the 'high estimate' is likely to be applied by the California Coastal commission Staff to provide project consistency with Coastal Plan Policies. The proposed finish floor elevation of 17.1 feet NAVD88 meets the minimum finish floor elevation for the 'higher estimate'.

- Projected coastal erosion does not appear to impact the proposed residence under worst case conditions.

- A small to medium tsunami event (3 to 10 feet) may significantly impact the proposed residence during the 75-year planning horizon. A large tsunami event (20 to 50 feet) will significantly impact the residence. Preparation of a personal evacuation plan to higher ground, at least to areas north of US Route 101, should be considered by the residents.

- Public access along the beach is not likely to be impacted over the 75-year planning horizon.

ATTACHMENTS



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ORIGINAL SHEET - ANSI A

FEBRUARY 2018
20641134300

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111 East Victoria Street
Santa Barbara CA
www.stantec.com

Client/Project
THE COSMOLEDO TRUST
711 SAND POINT ROAD
CARPINTERIA, CALIFORNIA

Figure No.
1.0

Title
SEA LEVEL RISE EVALUATION
EXISTING CONDITION

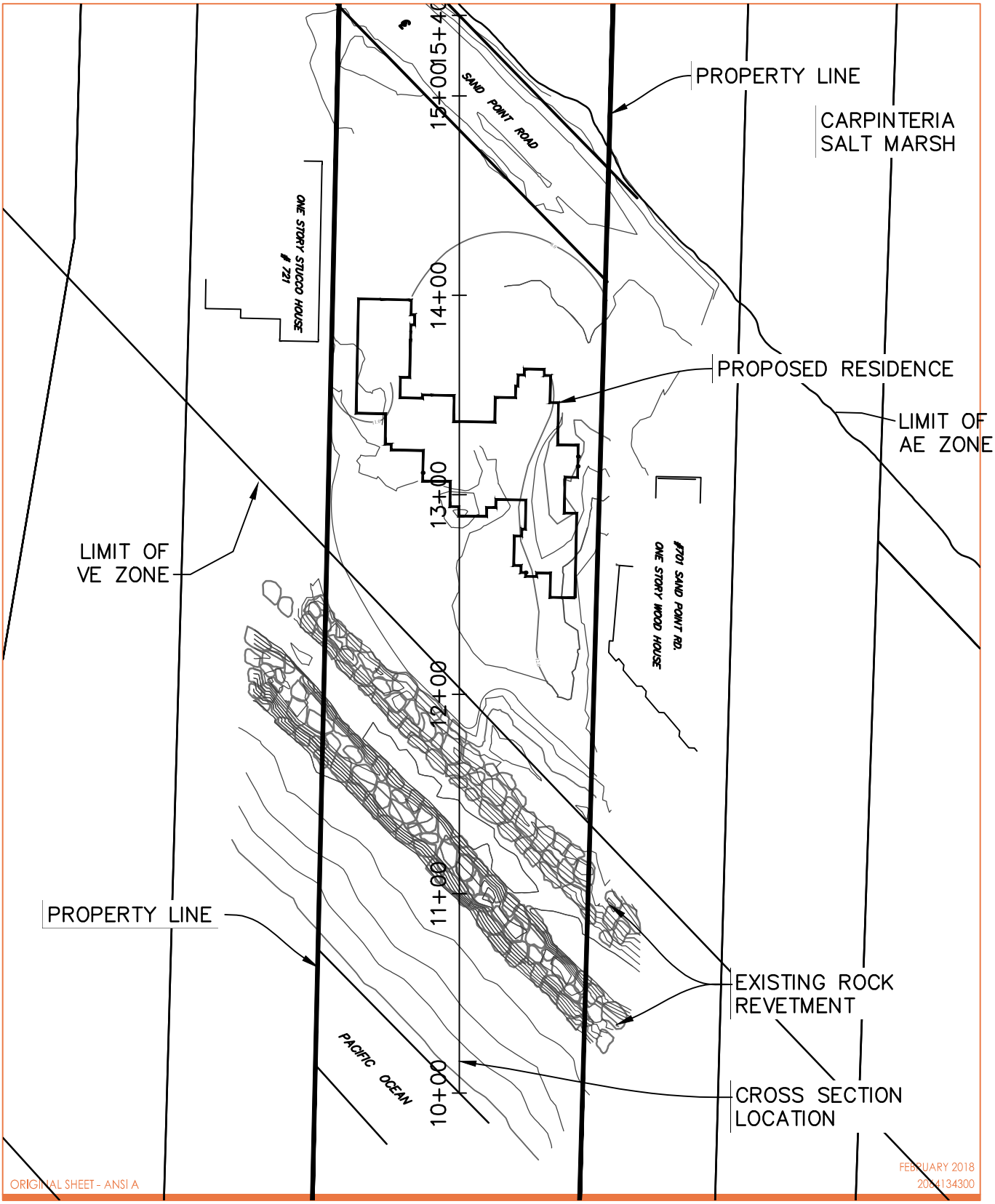

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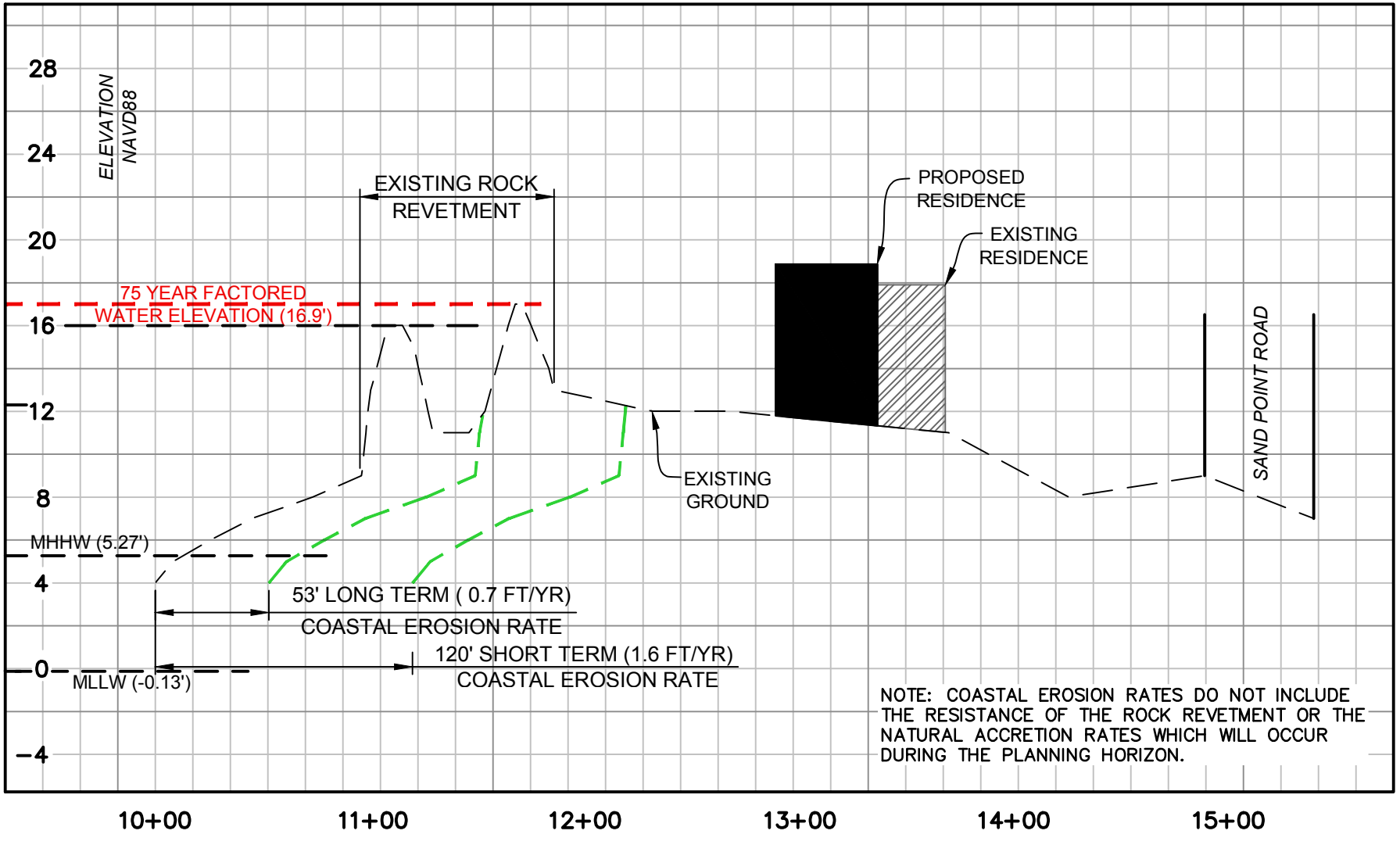
Figure No.
2.0

Title
SEA LEVEL RISE EVALUTION
PROPOSED CONDITION



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Santa Barbara, CA 93101

ELEVATIONS BASED ON PRELIMINARY FEMA INFORMATION

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CARPINTERIA, CALIFORNIA

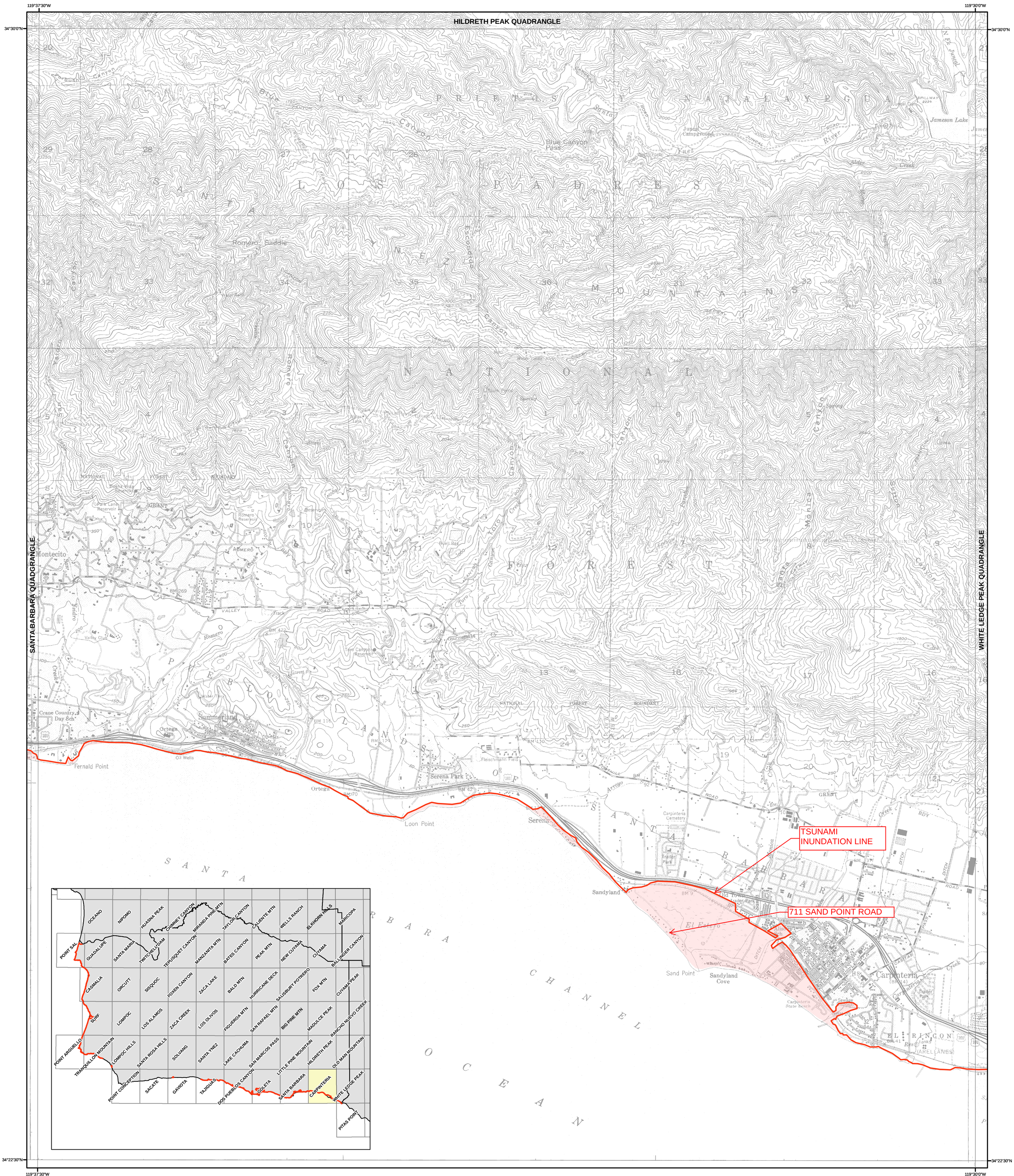
Figure No.
3.0

Title
2018 SEA LEVEL RISE EVALUATION
PROPOSED HOME SITE SECTION

California Emergency Management Agency
California Geological Survey
University of Southern California

Tsunami Inundation Map for Emergency Planning
Carpinteria Quadrangle

State of California
County of Santa Barbara



METHOD OF PREPARATION

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST (Method of Splitting Tsunamis) computational program (Version 0), which allows for wave evolution over a variable bathymetry and topography used for the inundation mapping (Titov and Gonzalez, 1997; Titov and Synolakis, 1998).

The bathymetric/topographic data that were used in the tsunami models consist of a series of nested grids. Near-shore grids with a 3 arc-second (75- to 90-meters) resolution or higher, were adjusted to "Mean High Water" sea-level conditions, representing a conservative sea level for the intended use of the tsunami modeling and mapping.

A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides (Table 1). Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

In order to enhance the result from the 75- to 90-meter inundation grid data, a method was developed utilizing higher-resolution digital topographic data (3- to 10-meters resolution) that better defines the location of the maximum inundation line (U.S. Geological Survey, 1993; Intermap, 2003; NOAA, 2004). The location of the enhanced inundation line was determined by using digital imagery and terrain data on a GIS platform with consideration given to historic inundation information (Lander, et al., 1993). This information was verified, where possible, by field work coordinated with local county personnel.

The accuracy of the inundation line shown on these maps is subject to limitations in the accuracy and completeness of available terrain and tsunami source information, and the current understanding of tsunami generation and propagation phenomena as expressed in the models. Thus, although an attempt has been made to identify a credible upper bound to inundation at any location along the coastline, it remains possible that actual inundation could be greater in a major tsunami event.

This map does not represent inundation from a single scenario event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not likely be inundated during a single tsunami event.

References:

Intermap Technologies, Inc., 2003, Intermap product handbook and quick start guide: Intermap NEXTmap document on 5-meter resolution data, 112 p.

Lander, J.F., Lockridge, P.A., and Kozuch, M.J., 1993, Tsunamis Affecting the West Coast of the United States 1806-1992: National Geophysical Data Center Key to Geophysical Record Documentation No. 29, NOAA, NESDIS, NGDC, 242 p.

National Atmospheric and Oceanic Administration (NOAA), 2004, Interferometric Synthetic Aperture Radar (IfSAR) Digital Elevation Models from GeoSAR platform (EarthData): 3-meter resolution data.

Titov, V.V., and Gonzalez, F.I., 1997, Implementation and Testing of the Method of Tsunami Splitting (MOST): NOAA Technical Memorandum ERL PMEL – 112, 11 p.

Titov, V.V., and Synolakis, C.E., 1998, Numerical modeling of tidal wave runup: Journal of Waterways, Port, Coastal and Ocean Engineering, ASCE, 124 (4), pp 157-171.

U.S. Geological Survey, 1993, Digital Elevation Models: National Mapping Program, Technical Instructions, Data Users Guide 5, 48 p.

TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of Santa Barbara

CARPINTERIA QUADRANGLE

January 31, 2009

SCALE 1:24,000

0.5 0.25 0 0.5 1 Miles

1,000 500 0 1,000 2,000 3,000 4,000 5,000 Feet

0.5 0.25 0 0.5 1 Kilometers

Table 1: Tsunami sources modeled for the Santa Barbara County coastline.

Sources (M = moment magnitude used in modeled event)		Areas of Inundation Map Coverage and Sources Used		
		Lompoc	Santa Barbara	Santa Barbara – Ventura
Local Sources	Anacapa-Dume Fault		X	
	Channel Island Thrust Fault		X	X
	Goleta Offshore Landslide #1		X	X
	Goleta Offshore Landslide #2		X	X
	1927 Point Arguello Earthquake (M7.3)	X		
Distant Sources	Central Aleutians Subduction Zone#1 (M8.9)	X		X
	Central Aleutians Subduction Zone#2 (M8.9)	X		
	Central Aleutians Subduction Zone#3 (M9.2)	X	X	X
	Chile North Subduction Zone (M9.4)	X	X	X
	1960 Chile Earthquake (M9.3)	X	X	
	1964 Alaska Earthquake (M9.2)	X		X
	Cascadia Subduction Zone #2 (M9.2)	X		
	Japan Subduction Zone #2 (M8.8)	X		
	Kuril Islands Subduction Zone #2 (M8.8)	X		
	Kuril Islands Subduction Zone #3 (M8.8)	X		
	Kuril Islands Subduction Zone #4 (M8.8)	X		

Cal EMA CALIFORNIA EMERGENCY MANAGEMENT AGENCY

CGS CALIFORNIA GEOLOGICAL SURVEY

USC UNIVERSITY OF SOUTHERN CALIFORNIA

MAP EXPLANATION

Tsunami Inundation Line

Tsunami Inundation Area

PURPOSE OF THIS MAP

This tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only. This map, and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:

State of California Emergency Management Agency, Earthquake and Tsunami Program:
http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/B1EC51BA215931768825741F005E8D80?OpenDocument

University of Southern California – Tsunami Research Center:
http://www.usc.edu/dept/tsunamis/2005/index.php

State of California Geological Survey Tsunami Information:
http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/index.htm

National Oceanic and Atmospheric Agency Center for Tsunami Research (MOST model):
http://nctr.pmel.noaa.gov/time/background/models.html

MAP BASE

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

DISCLAIMER

The California Emergency Management Agency (CalEMA), the University of Southern California (USC), and the California Geological Survey (CGS) make no representation or warranties regarding the accuracy of this inundation map nor the data from which the map was derived. Neither the State of California nor USC shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.

DETERMINE APPROPRIATE PLANNING HORIZON OR EXECTED PROJECT LIFE

Type of development:	Residence Structure
Base Year for Projection:	2000
Current Year:	2018
Typcial Life Span:	75
Location:	Coastal - harsh weathering conditions
Use:	75 years
Projected End of Useful Life:	2093
Length of Projection:	93 years

PROJECT SEA LEVEL RISE FOR 2030, 2060, AND 2100

Reference: County of Santa Barbara Long Range Planning Division Vulnerability Assessment, July 2017
Page 1-5, Table 1-1. Rise in reference to base year 2000.

Table 1-1. Sea Level Rise (SLR) Projections (in inches) for Los Angeles, California

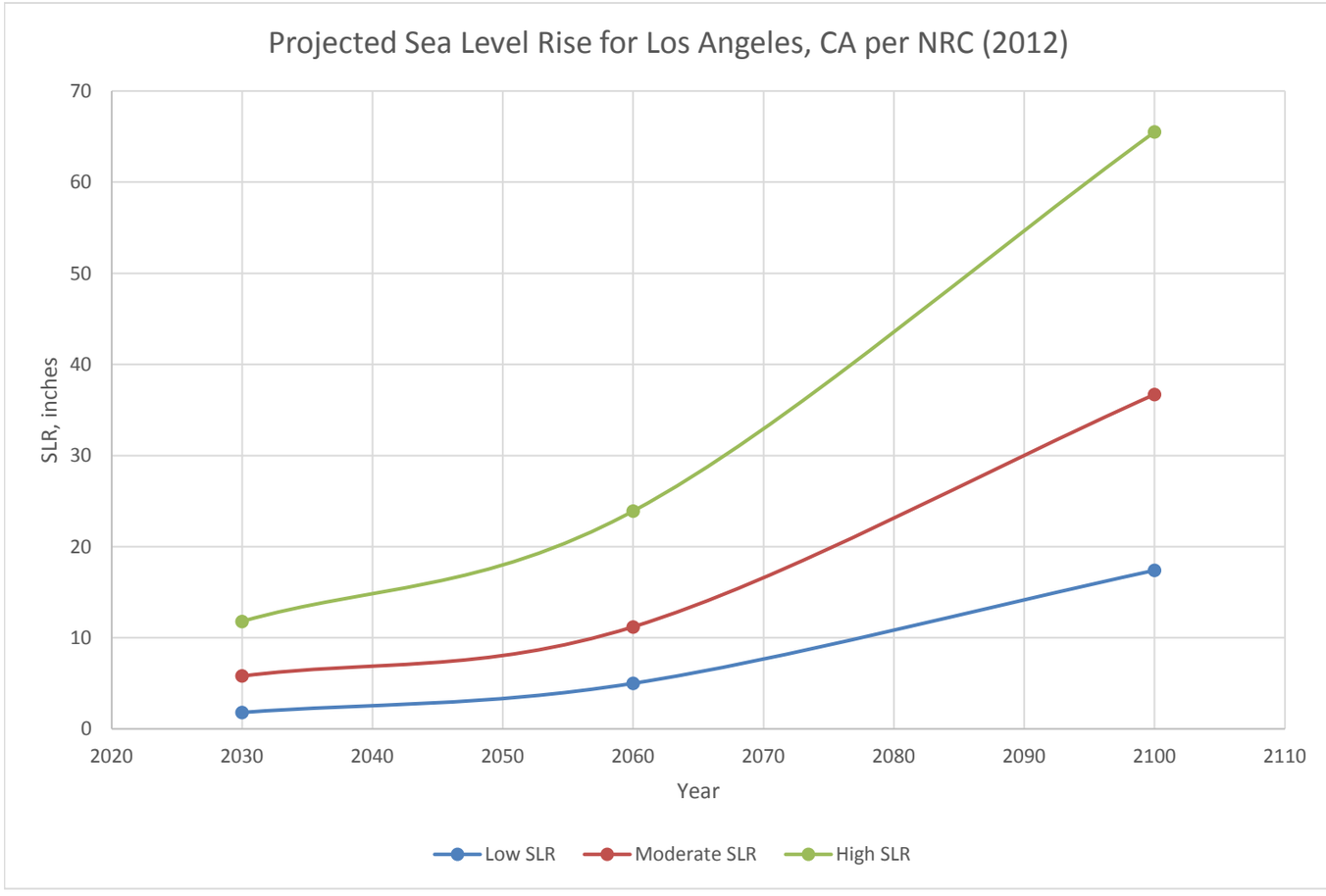
Time Period	Low SLR	Medium SLR	High SLR
By 2030	1.8	5.8	11.8
By 2060	5.0	11.2	23.9
By 2100	17.4	36.7	65.5

Note: Sea level rise projections (in inches) for California as determined by NRC (2012) and in reference to sea levels in the year 2000. Information included is for the Los Angeles area south of Cape Mendocino and assumes a uniform 1.5mm/year subsidence rate.

Source: NRC Table 5-3, p. 117.

Straight Line Interpolation for intermediate values.

Project Year =	2093			
Low SLR =	15.2	inches =	1.3	feet
Medium SLR =	32.2	inches =	2.7	feet
High SLR =	58.2	inches =	4.9	feet



DETERMINE TIDAL RANGE AND FUTURE INUNDATION

Reference: California Coastal Commission Sea Level Rise Policy Guidance, Appendix B, Step 2

NOAA Tidal Data

Datums for 9411340, Santa Barbara CA

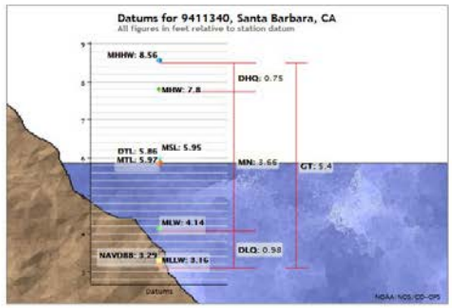
Elevations on Station Datum
Station: 9411340, Santa Barbara, CA
Status: Accepted (Dec 5 2011)
Units: Feet
T.M.: 120
Epoch: 1983-2001
Datum: STND

Datum	Value	Description
MHHW	8.56	Mean Higher-High Water
MHW	7.80	Mean High Water
MTL	5.97	Mean Tide Level
MSL	5.95	Mean Sea Level
DTL	5.86	Mean Diurnal Tide Level
MLW	4.14	Mean Low Water
MLLW	3.16	Mean Lower-Low Water
NAVD88	3.29	North American Vertical Datum of 1988
STND	0.00	Station Datum
GT	5.40	Great Diurnal Range
MN	3.66	Mean Range of Tide
DHQ	0.75	Mean Diurnal High Water Inequality
DLQ	0.98	Mean Diurnal Low Water Inequality
HWI	5:52	Greenwich High Water Interval (in hours)
LWI	11:57	Greenwich Low Water Interval (in hours)
Maximum	10.55	Highest Observed Water Level
Max Date & Time	01/19/1992 16:24	Highest Observed Water Level Date and Time
Minimum	0.27	Lowest Observed Water Level
Min Date & Time	12/17/1933 08:00	Lowest Observed Water Level Date and Time
HAT	10.38	Highest Astronomical Tide
HAT Date & Time	12/02/1990 16:24	HAT Date and Time
LAT	1.15	Lowest Astronomical Tide
LAT Date & Time	01/01/1967 00:18	LAT Date and Time

Tidal Datum Analysis Periods

01/01/1991 - 12/31/1997

04/01/2006 - 03/31/2010



Showing datums for
9411340 Santa Barbara, CA
Data Units: Feet / Meters
Epoch: Present (1983-2001) / Superseded (1960-1978)
Submit

Project Plan Datum: NAVD1988
Station Datum: 3.29 ft Station Datum = 0 ft NAVD1988

Mean Higher High Water (MHHW) =	8.56	ft Station Data =	5.27	ft NAVD88
Mean Lower Low Water (MLLW) =	3.16	ft Station Data =	-0.13	ft NAVD88

Tidal Range (MHW - MLW)= 5.4 ft

Current Tidal Range:

MLW = -0.13 ft NAVD88
MHW = 5.27 ft NAVD88

Future Tidal Range (75 years)

Low Estimate
MLLW = 1.1 ft NAVD1988
MHHW = 6.5 ft NAVD1988

Moderate Estimate
MLLW = 2.7 ft NAVD1988
MHHW = 2.7 ft NAVD1988

High Estimate (to be used in the evaluation)
MLLW = 4.7 ft NAVD1988
MHHW = 10.1 ft NAVD1988

DETERMINE STILL WATER CHANGES FROM SURGE, EL NINO AND PDOs

Referernce: California Coastal Commission Sea Level Rise Policy Guidance,Appendix B, Step 3, page 234.

Surge Ranges

$Estimate_{low}$ =	1.0 ft
$Estimate_{high}$ =	2.0 ft

El Nino

$Estimate_{low}$ =	0.4 ft
$Estimate_{high}$ =	0.7 ft
$Estimate_{peak}$ =	1.0 ft

Atmospheric Forcing and Pacific Decadal Oscillation

$Estimate_{typcial}$ =	1.5 ft (Table B-7, pg 250)

ESTIMATE BEACH EROSION

Reference: California Coastal Commission Sea Level Rise Policy Guidance, Appendix B, Step 4

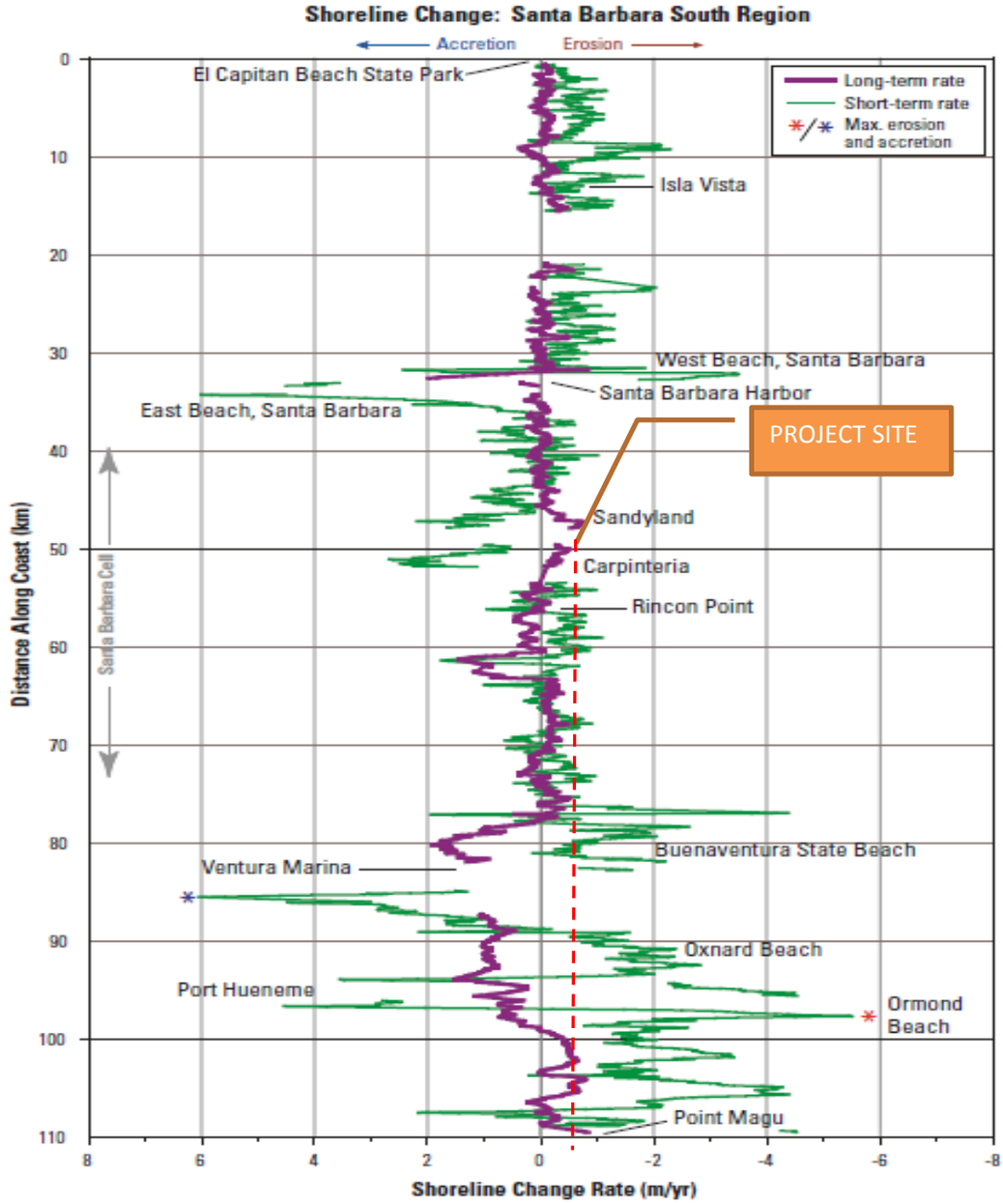


Figure 35. Shoreline change rates for the Santa Barbara South region. The analysis begins at El Capitan Beach State Park in the north, and extends 110 km southeast to Point Magu. The maximum long-term erosion rate was –0.7 m/yr at Ormond Beach and the maximum short-term erosion rates was –5.5 m/yr, also at Ormond Beach.

Source: USGS, National Assessment of Shorline Change Part 3: Historical Shoreline Change and Associated Coastal Land Loss Along Sandy Shorelines of the California Coast; Open-File Report 2006-1219; p 58.

Table 6C. Average shoreline change rates for Southern California

	No. of Transects		Average of Rates (m/yr)		Erosion Rate (m/yr)		% Erosion		Accretion Rate (m/yr)		% Accretion	
Analysis Region	**LT**	**ST**	**LT**	**ST**	**LT**	**ST**	**LT**	**ST**	**LT**	**ST**	**LT**	**ST**
Santa Barbara S	1692	1760	0.1±0.1	-0.5±0.4	-0.2±0.1	-1.2±0.4	56	72	0.5±0.1	1.1±0.4	44	28
Santa Monica	1319	1504	0.4±0.1	-0.1±0.4	-0.1±0.1	-0.5±0.4	31	60	0.7±0.1	0.9±0.4	69	40
San Pedro	605	925	0.5±0.1	0.5±0.4	-0.3±0.2	-0.5±0.4	12	35	0.6±0.1	1.0±0.4	88	65
Oceanside	1561	1587	0.2±0.1	-0.1±0.4	-0.1±0.1	-0.6±0.4	31	67	0.3±0.1	0.9±0.4	69	33
San Diego	437	524	0.9±0.1	-0.8±0.4	-0.1±0.1	-1.0±0.4	21	90	1.2±0.2	0.5±0.4	79	10
So. California	5614	6300	0.3±0.1	-0.1±0.4	-0.2±0.1	-0.8±0.4	36	64	0.6±0.1	0.9±0.4	64	35

Note: LT = long-term; ST = short-term

Source: USGS, National Assessment of Shorline Change Part 3: Historical Shoreline Change and Associated Coastal Land Loss Along Sandy Shorelines of the California Coast; Open-File Report 2006-1219; p 12.

Short-term Rate =	-0.5	m/yr =	-1.60 ft/yr erosion (from chart)
Long-term Rate =	1.0	m/yr =	3.30 ft/yr accretion (from chart)
Short-term Rate =	-1.2	m/yr =	-3.9 ft/yr erosion (from table)
Long-term Rate =	-0.2	m/yr =	-0.7 ft/yr erosion (from table)

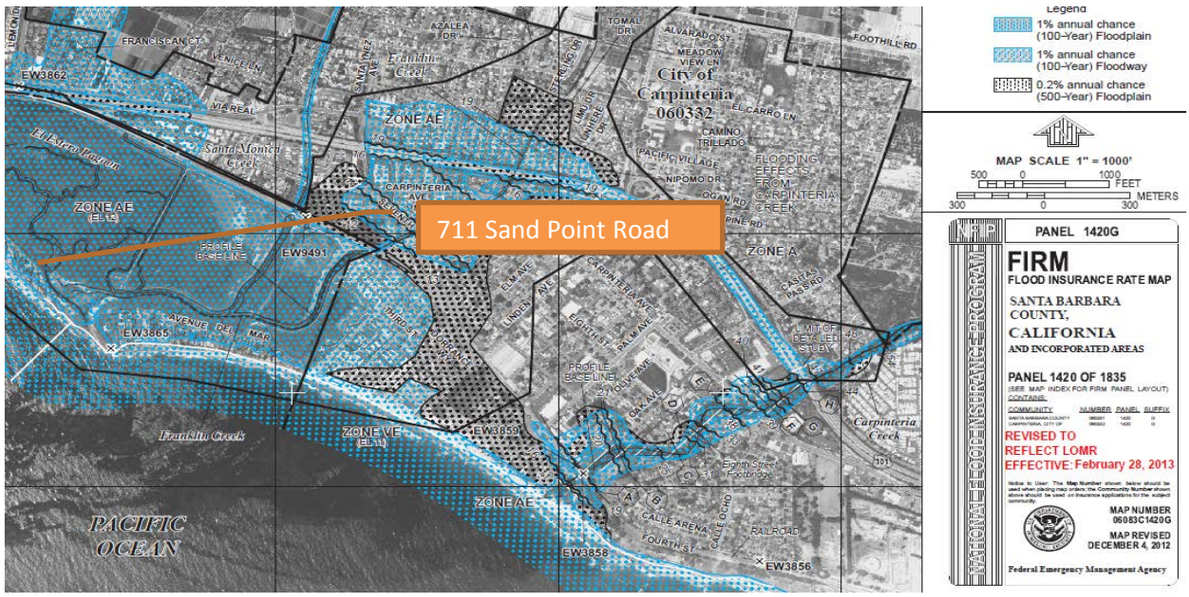
Using 75-yr Short-Term Rate From Chart =	-120 feet erosion
Using 75-yr Long-Term Rate From Table =	-53 feet erosion

Conclusion: There is the potential for shoreward erosion that may seriously impact the proposed

DETERMINE WAVE, STORM WAVE, WAVE RUNUP, AND FLOODING CONDITIONS

Reference: California Coastal Commission Sea Level Rise Policy Guidance, Appendix B, Step 5

FEMA Data:



Project Site Information:

Zone VE Elevation:	11	ft NAVD88
Zone AE Elevation:	12	ft NAVD88
Coastal High Hazard Elevation:	13.6	ft NAVD88

The Coastal High Hazard Elevation is specified as elevation 13.6 because the project site is located within the Repetitive Loss Zone as adopted by County Resolution 92-138. All new structures within the specified Repetitive Loss Zone are to have a finish floor elevation established at 2 feet above the Coastal High Hazard Elevation regardless of FEMA FIRM mapping.

Wave Runup

Source: California Coastal Commission Sea Level Rise Policy Guidance, Appendix B

$Estimate_{low}$ = 3 ft

$Estimate_{high}$ = 15 ft

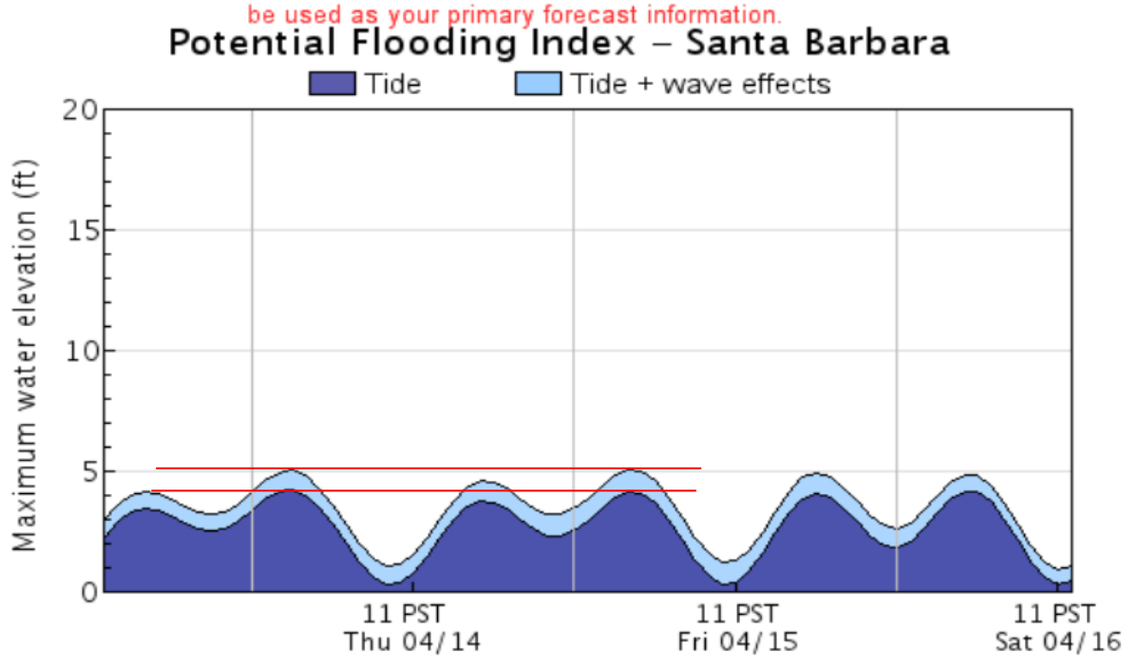
Reference:

Wave Runup and Overtopping, FEMA Coastal Flood Hazard Analysis and Mapping Guidelines Focused Study Report; February 2005, page 21.

Source: The Coastal Data Information Program, Scripps Institute of Oceanography Flood Index Projection Site

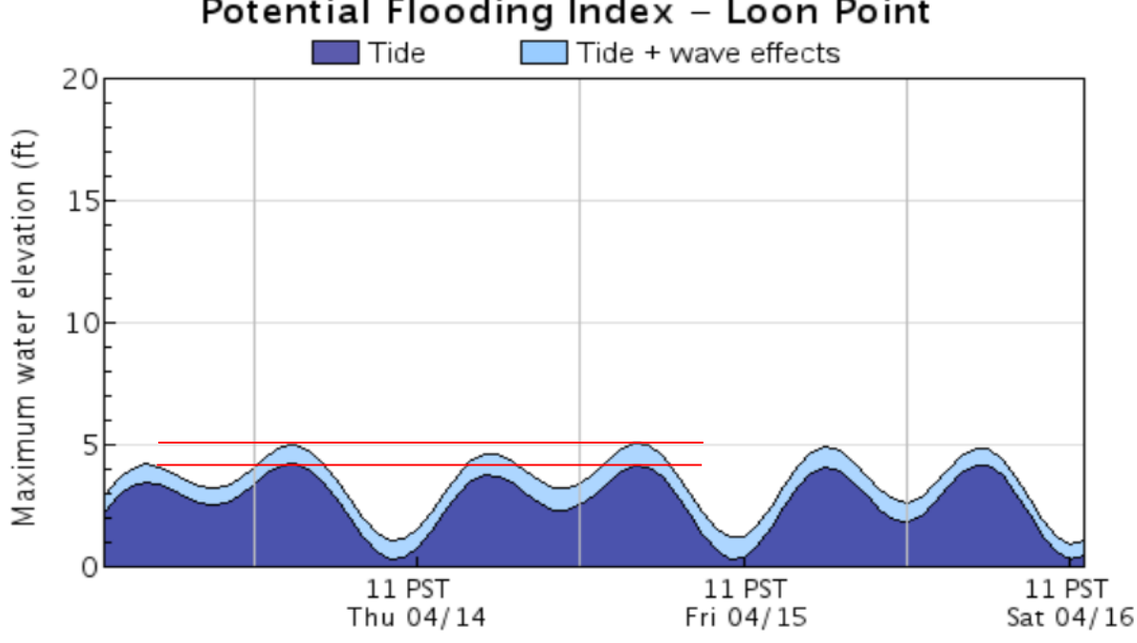
CDIP/SIO

Water level elevation (relative to MLLW) forecasts use Stockdon (2006), are HIGHLY experimental, and should not be used as your primary forecast information.



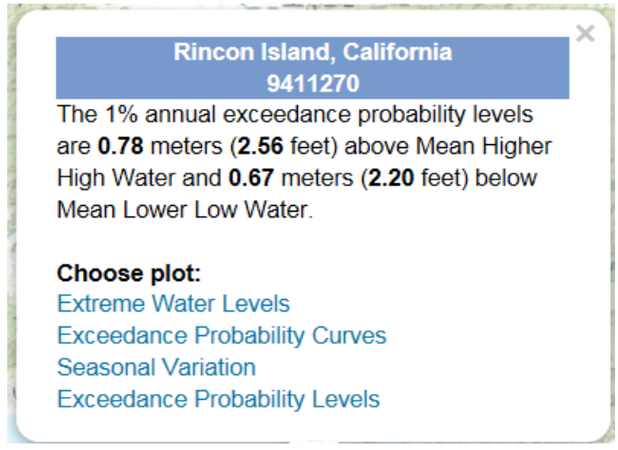
CDIP/SIO

Water level elevation (relative to MLLW) forecasts use Stockdon (2006), are HIGHLY experimental, and should not be used as your primary forecast information.



Wave Effects: 5.1 4.1 = 1 ft

Alternate method: Use 1 percent annual exceedance probability levels



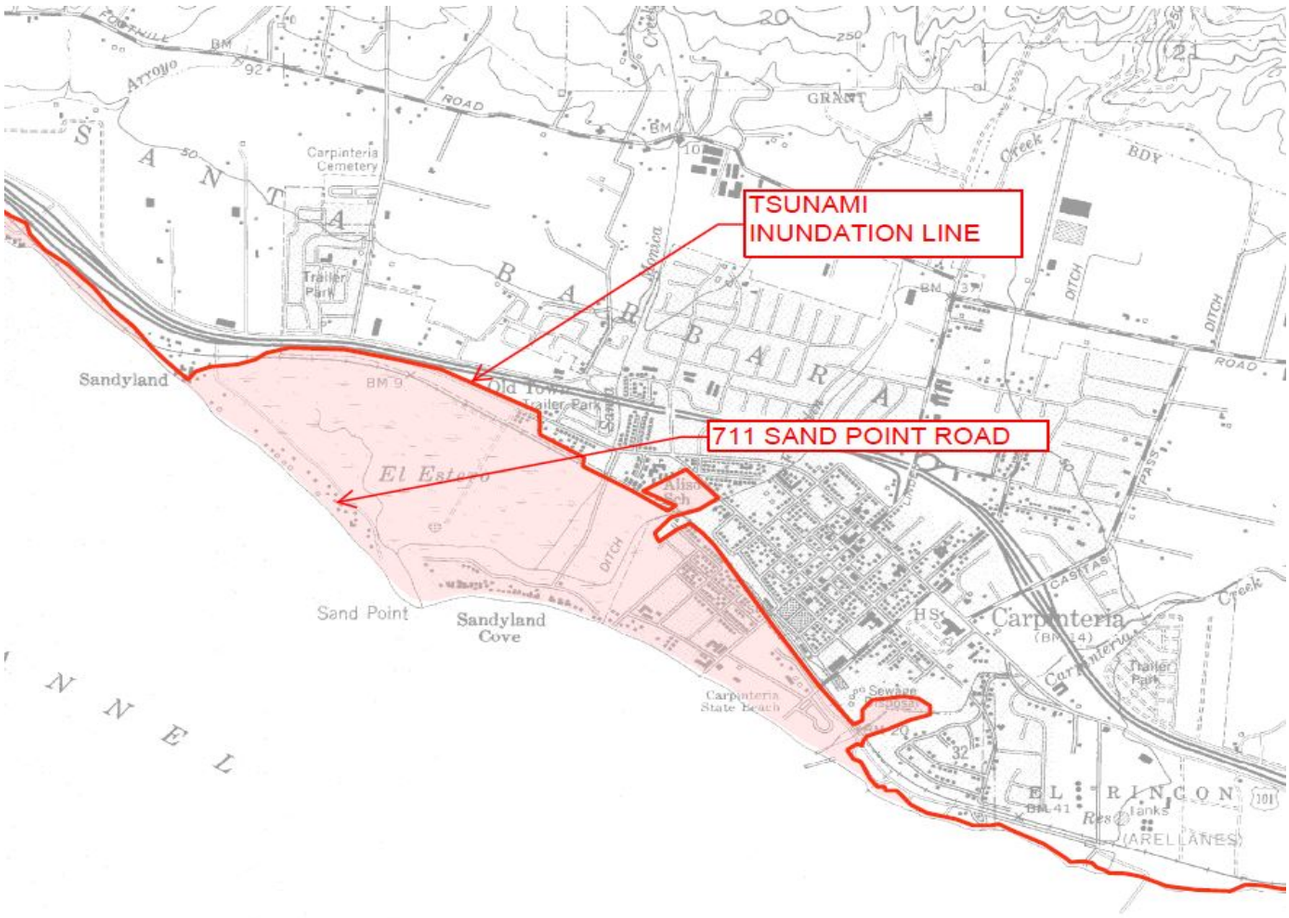
1% chance = 2.56 ft above MHHW Use this method

EXAMINE POTENTIAL FLOODING FROM EXTREME EVENTS

Reference: California Coastal Commission Sea Level Rise Policy Guidance, Appendix B, Step 6

Tsunami Waves

$Estimate_{typical\ low}$ =	3 ft
$Estimate_{typical\ high}$ =	10 ft
$Estimate_{extreme\ low}$ =	20 ft
$Estimate_{extreme\ high}$ =	50 ft



Portion of Tsunami Inundation Map for Emergency Planning published by the State of California, Carpinteria Quadrangle

See attachments for entire exhibit

SUMMARY

Proposed Finish Floor Elevation: 17.1 ft NAVD1988
Current Flood Control Minimum Requirement (13.6' + 2'): 15.6 ft NAVD1988

Planning Horizon: 75 years

Factored Water Surface Elevations Using Coastal Commission Guidance Manual dated August 12, 2015 and Santa Barbara County Vulnerability Assessment dated July 2017

Factors	Mean Higher High Water Elevation (NAVD1988)	SLR	Surge	El Nino	PDOs	Wave Runup	Factored Water Elevation (NAVD1988)
	$ft_{vertical}$	$ft_{vertical}$	$ft_{vertical}$	$ft_{vertical}$	$ft_{vertical}$	$ft_{vertical}$	$ft_{vertical}$
Year 2093 (75 years) lower estimate	5.27	1.3	1	0.4	1.5	2.56	12.0
Year 2093 (75 years) moderate estimate	5.27	2.7	1.5	0.6	1.5	2.56	14.1
Year 2093 (75 years) higher estimate	5.27	4.9	2	0.7	1.5	2.56	16.9

CONCLUSION:	The finish floor for the proposed residence is set at 17.1 feet NAVD1988 and is therefore sufficiently high to meet the higher estimated sea level rise requirements and Santa Barbara County Flood Control District requirements.

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Carpinteria Santa Barbara County California	NO PROJECT	REISSUANCE
	COMMUNITY NO.: 060332		
IDENTIFIER	Franklin Creek Zone A Study (Reissuance of LOMR 08-09-1482P)	APPROXIMATE LATITUDE & LONGITUDE: 34.401, -119.517 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 06083C1420G DATE: December 4, 2012	DATE OF EFFECTIVE FLOOD INSURANCE STUDY REPORT: December 4, 2012 PROFILE(S): 75P

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Franklin Creek- from the Santa Monica Creek confluence to approximately 3,700 feet upstream of Malibu Drive

Santa Monica Creek - from the El Estero Lagoon confluence to just downstream of the Southern Pacific Railroad

Carpinteria Creek Overflow - from the Carpinteria Creek confluence to approximately 300 feet upstream of Linden Avenue

SUMMARY OF REVISIONS

This Letter of Map Revision (LOMR) is a reissuance of a LOMR dated May 15, 2009 (Case No. 08-09-1482P), which revised the Special Flood Hazard Areas (SFHAs), the areas subject to inundation by the base (1-percent-annual-chance) flood, and Base Flood Elevations (BFEs) along Franklin Creek, Santa Monica Creek, and Carpinteria Creek Overflow. The May 15 LOMR was not accurately incorporated into the newly effective FIRM and FIS report for Santa Barbara County, California and Incorporated Areas dated December 4, 2012; therefore, this LOMR reissues the May 15 LOMR on the new FIRM and FIS report.

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.02.BKR.13090817P.H20 102-D

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 060331 **Name:** Santa Barbara County, California

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM* NO.: 06083C1420G DATE: December 4, 2012	DATE OF EFFECTIVE FLOOD INSURANCE STUDY REPORT: December 4, 2012 PROFILE(S): 75P

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

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Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the base (1-percent-annual-chance flood) discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

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Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

This revision is effective as of the date of this letter. Any requests to review or alter this determination should be made within 30 days and must be based on scientific or technical data.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at http://www.fema.gov/business/nfip.

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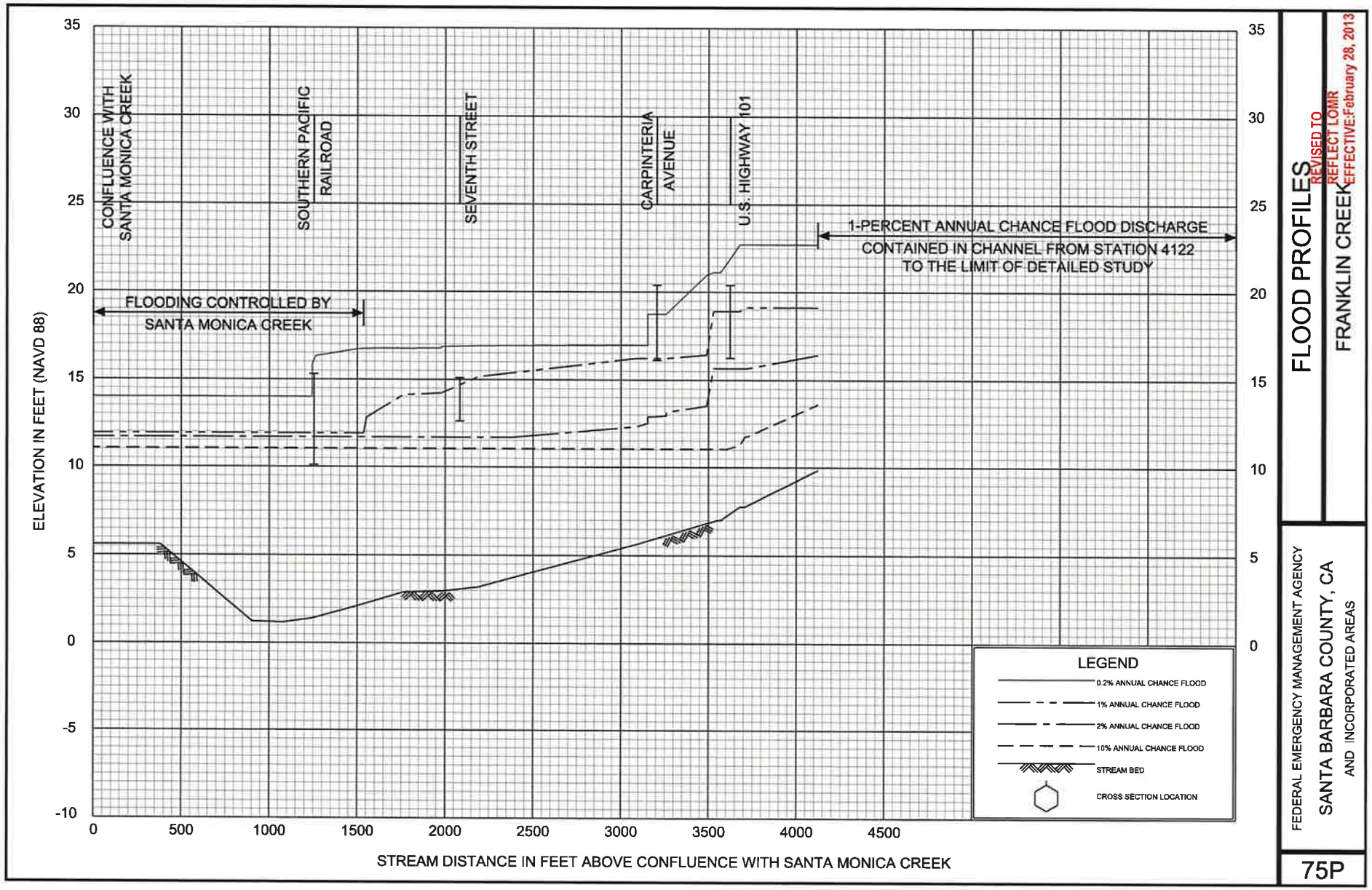
Federal Insurance and Mitigation Administration



FLOOD PROFILES

REVISED TO REFLECT LOMR EFFECTIVE:February 28, 2013

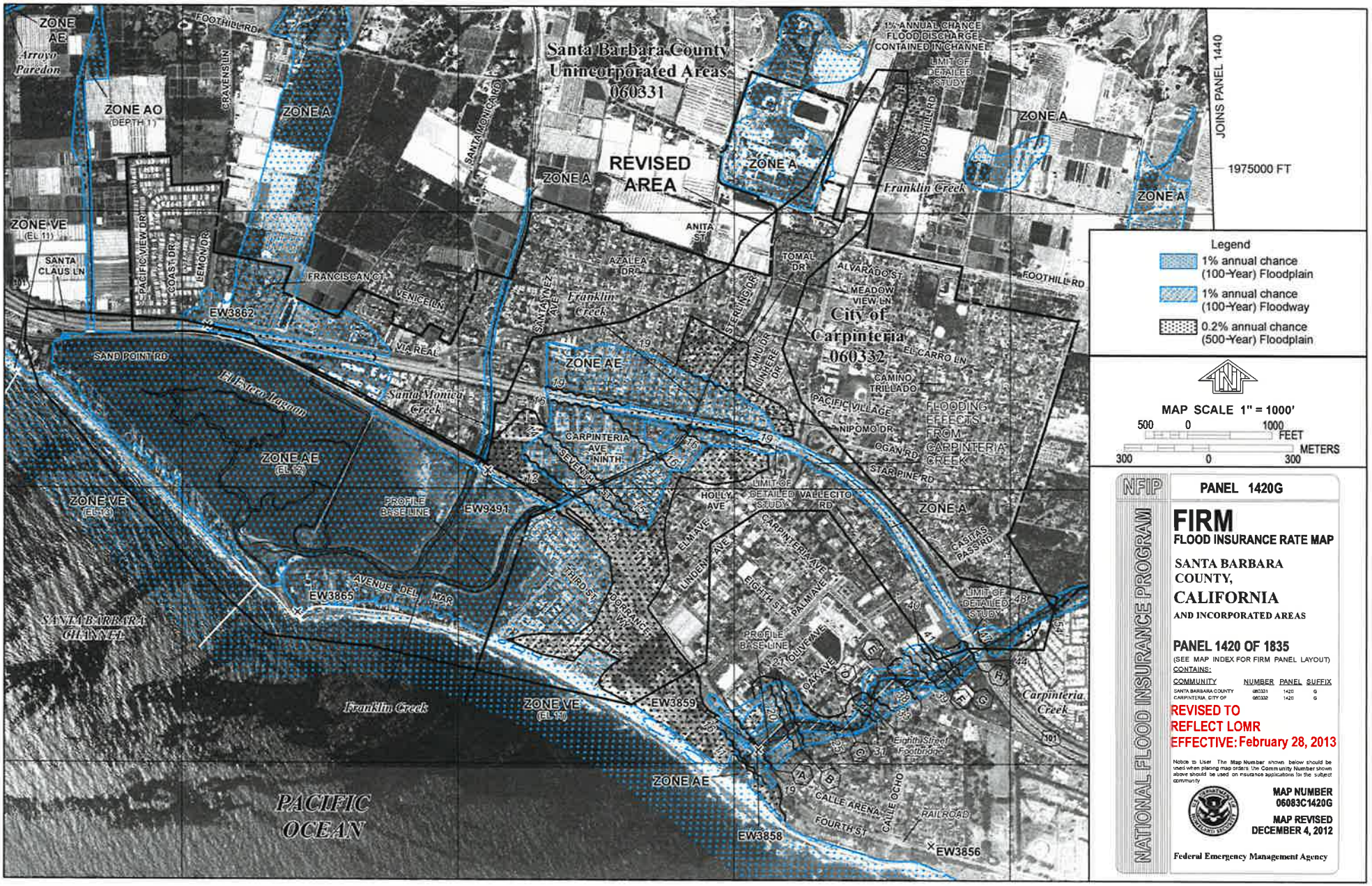
FRANKLIN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

SANTA BARBARA COUNTY, CA

AND INCORPORATED AREAS

75P


Santa Barbara County
Unincorporated Areas
060331
City of
Carpinteria
060332
REVISED
AREA
ZONE A
ZONE AE
ZONE AO
(DEPTH 1)
ZONE VE
(EL 11)
ZONE AE
(EL 12)
ZONE VE
(EL 13)
1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CHANNEL
LIMIT OF
DETAILED
STUDY
JOINS PANEL 1440
1975000 FT
Legend
1% annual chance
(100-Year) Floodplain
1% annual chance
(100-Year) Floodway
0.2% annual chance
(500-Year) Floodplain
MAP SCALE 1" = 1000'
500 0 1000
FEET
300 0 300
METERS
FLOODING
EFFECTS
FROM
CARPINTERIA
CREEK
Arroyo
Paredon
Franklin Creek
Santa Monica
Creek
El Estero Lagoon
Carpinteria
Creek
SANTA BARBARA
CHANNEL
PACIFIC
OCEAN
EW3862
EW9491
EW3865
EW3859
EW3858
EW3856
PROFILE
BASE LINE
FOOTHILL RD
SAND POINT RD
CARPINTERIA
AVE
VIA REAL
ANITA
ST
AZALEA
DR
TOMAL
DR
ALVARADO ST
MEADOW
VIEW LN
EL CARRO LN
CAMINO
TRILLADO
PACIFIC VILLAGE
NIPOMO DR
OGAN RD
STAR PINE RD
HOLLY
AVE
VALLECITO
RD
CASITAS
PASS RD
CARPINTERIA AVE
EIGHTH ST
PALM AVE
OLIVE AVE
OAK AVE
LINDEN AVE
ELM AVE
THIRD ST
TORRANCE WY
AVENUE DEL MAR
CALLE ARENA
CALLE OCHO
FOURTH ST
RAILROAD
Eighth Street
Footbridge
SANTA CLAUS LN
PACIFIC VIEW DR
COAST DR
LEMON DR
FRANCISCAN CT
VENICE LN
SANTA MONICA RD
SAN ANTONIO
AVE
STERLING DR
LIMONERA
DR
RAVENSLN
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 1420G
FIRM
FLOOD INSURANCE RATE MAP
SANTA BARBARA
COUNTY,
CALIFORNIA
AND INCORPORATED AREAS
PANEL 1420 OF 1835
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
SANTA BARBARA COUNTY 060331 1420 G
CARPINTERIA, CITY OF 060332 1420 G
REVISED TO
REFLECT LOMR
EFFECTIVE: February 28, 2013
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
06083C1420G
MAP REVISED
DECEMBER 4, 2012
Federal Emergency Management Agency