CITY OF OXNARD CALIFORNIA

LOCAL COASTAL PROGRAM UPDATE

Agenda

Meeting #1 – General Information (1 – 1:45 pm)

- Introductions and Background
- Grants involved
- What is a Local Coastal Program ?
- What is required?
- LCP Update tasks and schedule
- Progress to date
- Next steps

Meeting #2 – Technical Discussion (2 – 3 pm)

- Oxnard Sea Level Rise Atlas
- Oxnard Sea Level Rise Vulnerability Assessment Tsunami Analyses
- Oxnard Sea Level Rise Storm Drain System Vulnerability Assessment

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Introductions: City and Consultant Team

- **Development Services Dept.**
- **Rincon Consultants**
  - *Project management*
  - *Technical Analysis*
  - *Adaptation Strategies*
  - *Environmental Impact Analysis*
- **RRM Design Group**
  - *Community Engagement*
  - *LCP Policy Development*
- **Revell Coastal**
  - *Coastal Hazards Modeling*
- **Everest International**
  - *Drainage Technical Analysis*
- **Philip King**
  - *Economic Analysis*
- **UCLA School of Law**
  - *Model SLR Ordinance*

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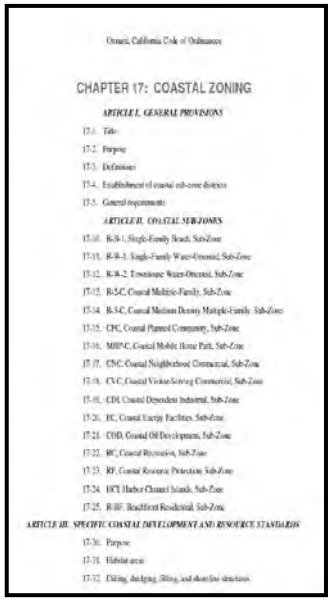
Background: Oxnard's Current LCP

- 1972, Proposition 20 passed by voters regulating the coast
- 1976, Coastal Act adopted by State Legislature, funding to develop local LCP's
- 1982, Oxnard adopts its Coastal Land Use Plan
- 1986, Oxnard adopts Chapter 17, Coastal Zoning Ordina
- Amendments over almost 30 years
- Four LCP Planning Areas:
  1. *McGrath State Beach/Mandalay Beach*
  2. *Oxnard Shores*
  3. *Channel Islands Harbor*
  4. *Ormond Beach*


Oxnard, California Code of Ordinances

CHAPTER 17: COASTAL ZONING

ARTICLE I. GENERAL PROVISIONS

17-1. Title.
17-2. Purpose.
17-3. Definitions.
17-4. Establishment of coastal sub-zone districts.
17-5. General requirements.

ARTICLE II. COASTAL SUB-ZONES

17-10. R-B-1, Single-Family Beach, Sub-Zone.
17-11. R-W-1, Single-Family Water-Oriented, Sub-Zone.
17-12. R-W-2, Townhouse Water-Oriented, Sub-Zone.
17-13. R-3-C, Coastal Multiple-Family, Sub-Zone.
17-14. R-3-C, Coastal Medium Density Multiple-Family, Sub-Zone.
17-15. CPC, Coastal Planned Community, Sub-Zone.
17-16. MHP-C, Coastal Mobile Home Park, Sub-Zone.
17-17. CNC, Coastal Neighborhood Commercial, Sub-Zone.
17-18. CVC, Coastal Visitor-Serving Commercial, Sub-Zone.
17-19. CDI, Coastal Dependent Industrial, Sub-Zone.
17-20. EC, Coastal Energy Facilities, Sub-Zone.
17-21. COD, Coastal Oil Development, Sub-Zone.
17-22. RC, Coastal Recreation, Sub-Zone.
17-23. RF, Coastal Resource Protection, Sub-Zone.
17-24. HCI, Harbor Channel Islands, Sub-Zone.
17-25. R-BF, Beachfront Residential, Sub-Zone.

ARTICLE III. SPECIFIC COASTAL DEVELOPMENT AND RESOURCE STANDARDS

17-30. Purpose.
17-31. Habitat areas.
17-32. Diking, dredging, filling, and shoreline structures.

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Background: Updating and Funding

- Many policies no longer appropriate (LNG, Ormond Beach zoning, etc.)
- Coastal Conservancy begins Ormond Beach Wetland Restoration planning
- Development completed (Seabridge, Westport, Harbour Island, park…)
- Need for LCP Update identified in 2005 during 2030 General Plan Update
- 2030 General Plan adopted in 2011

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Funding

- City applies for four LCP Update grants between 2012 and 2014
- California Coastal Commission and Ocean Protection Council grants
- $150,000 grant awarded in 2014, contracts completed in 2015, started.
- Development fees adding additional City funding.

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What is an LCP?

- Required by the California Coastal Act (1976)
- Community's blue print for managing official Coastal Zone
  - *Land Use*
  - *Public Access*
  - *Recreation*

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What is required?

- Achieve consistency with the Coastal Act
  - *Use best available science*
  - *Minimize coastal hazards through planning and development standards*
  - *Maximize protection of public access, recreation, and sensitive coastal resources*
  - *Maximize agency coordination and public participation*
  - *NEW! Anticipate and adapt to sea level rise.*

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Why an LCP update?

- Reflect current best practices for coastal planning
- Coastal Commission LCP Update Guide (2007)
  - *Part 1 – Updating LCP Land Use Plan Policies*
  - *Part 2 – Updating LCP Implementation Plan Procedures*
- Coastal Commission Sea Level Rise Policy Guidance (August 2015)

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LCP Update: 9 Tasks and Schedule

LCP Update: 9 Tasks and Schedule

1.	Set up Public, Agency, and Technical outreach and committees	Continuous
2.	Finalize the Coastal Hazards with Sea Level Rise Map Atlas	Now
3.	Risk Assessments and Economic Impacts	March-Sept 2016
4.	Review LCP Policies and Programs Sept. 2016	
5.	Update the LCP Document, Hearings and Adoption	Sept. 2016
6.	Parallel Environmental Review Continuous	
7.	Submit to the Coastal Commission early 2017	
8.	Respond, Resubmit, and Coastal Commission Certification	late 2017
9.	Project Management Continuous	

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What we've done so far

- Coastal Hazards with Sea Level Rise Mapping
  - *Revell Coastal using TNC Coastal Resilience Ventura model*
- Tsunami and Drainage Vulnerability Sea Level Rise Mapping
  - Everest International Consultants, Inc.
- LCP Policy Review
- Mapped Sensitive Habitat Areas (ESHA)
- Coordination with Coastal Commission, County, State Parks.
- Public Outreach

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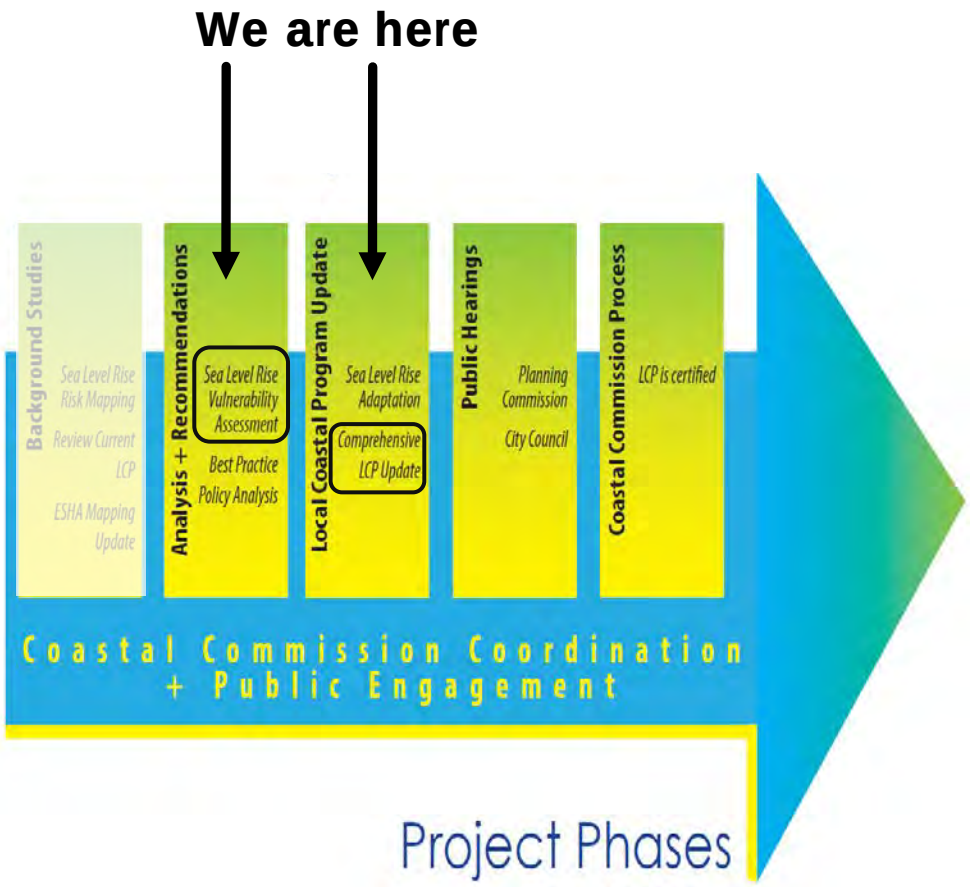
Next steps this spring

- Update Coastal Land Use Plan
  - Describe existing conditions
  - Develop policies accordingly
  - Integrate information from other agencies
- Coordinate with UCLA School Of Law for incorporation of SLR ordinances
- Complete LCP Planning Area Vulnerability Assessments
- Economic Analysis



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Break

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Coastal Hazard Maps with Sea Level Rise

- Four Coastal Hazards:
  - *Monthly High Tide Inundation*
  - *Beach and Dune Erosion*
  - *Coastal Storm Wave (El Nino event)*
  - *Coastal Storm Flood (El Nino event)*
  - *Combined Hazards (occurring at same time)*
- Four Planning Areas and Area 5: Port Hueneme and County Areas
  - McGrath/Mandalay
  - Oxnard Shores
  - CI Harbor
  - Ormond Beach

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Coastal Hazard Maps with Sea Level Rise

- Sea Level Rise: 2030, 2060, and 2100 BY low, medium, and high

Table 2. Sea Level Rise Scenario elevations by planning horizon

Year	Low SLR (inches)	Moderate SLR (inches)	High SLR* (inches)
2030	2.3	5.2	8.0
2060	7.4	16.1	25.3
2100	17.1	36.5	58.1

** The NRC 2012 High scenario for the South of Cape Mendocino is 2030- 11.8 inches, 2100- 65.5 inches*

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Coastal Hazard Maps with Sea Level Rise

Map Atlas format:

- Oxnard LCP Planning Areas 1 to 4, and Port Hueneme/County
- 5 map pages for each Planning Area
- Four hazards, each has 4 maps per page showing:
  - Existing (2010 to 2015)
  - 2030 with low, medium, and high sea level rise
  - 2060 with low, medium, and high sea level rise
  - 2100 with low, medium, and high sea level rise

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Planning Area 1. All Hazards at High Tide (worst case)

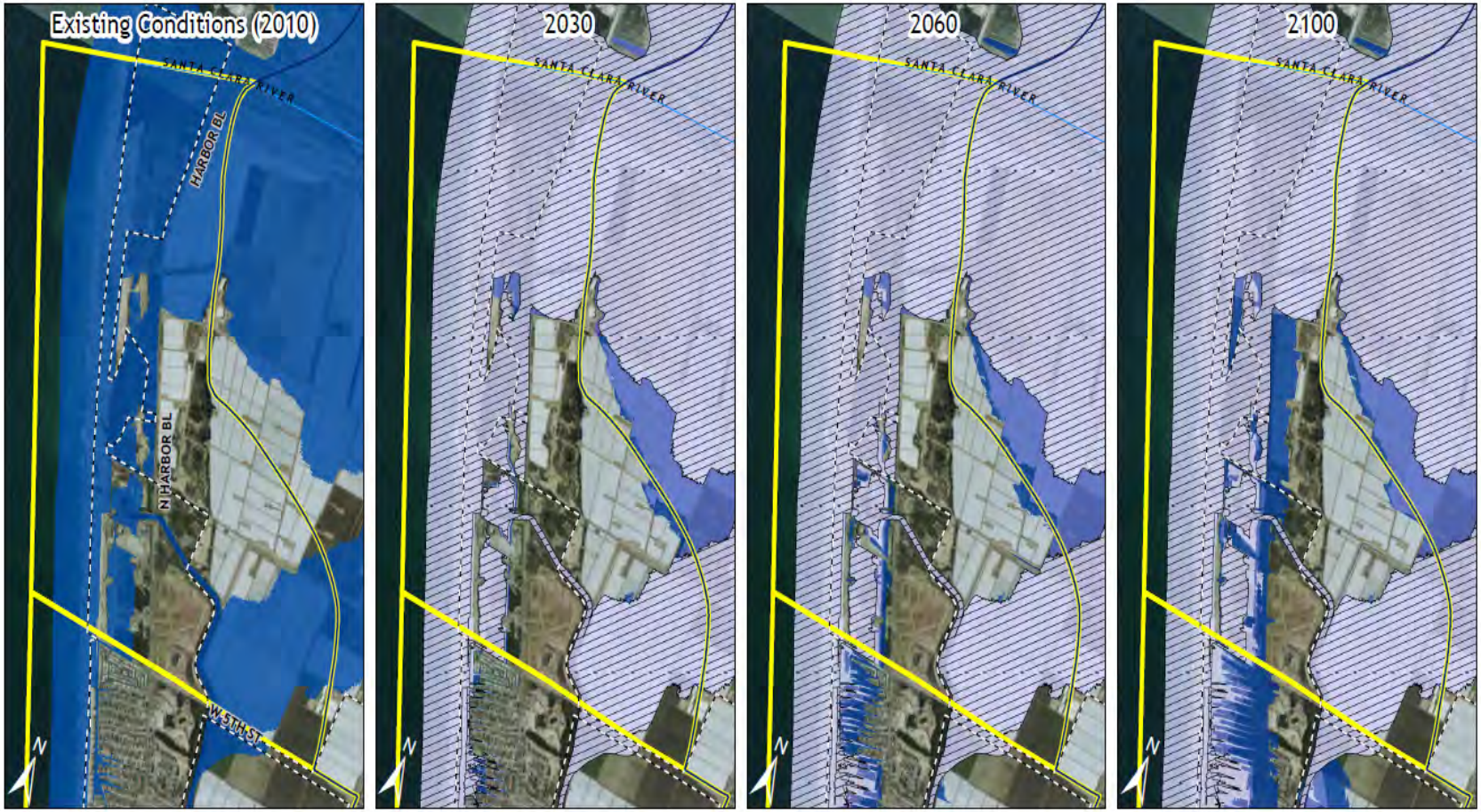


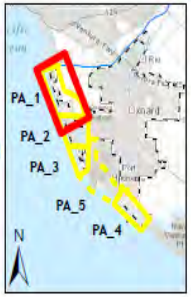
Figure 1.5 - Combined Hazard Zones for Planning Area 1: McGrath / Mandalay Beach

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)

Environmentally Sensitive Habitat Areas (ESHA)

- Update to the 1982 LUP Sensitive Habitat Areas
  - ESHA Map Layers Restricted to City Limits Within the Coastal Zone

- Per the LCP update, ESHA based on:
  - California Natural Diversity Data Base of Special Status Species Occurrence
  - Critical Habitat Areas
  - Local Biological Studies and Reports
    - Ormond Beach
    - Mandalay Bay
    - Santa Clara River
  - Existing Native Habitat and Vegetation Communities
  - USFWS Wetlands Mapper
  - Marine Resource Information

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Tsunami Analysis

- Same sea level rise projections as the SLR modeling
- Used Japanese tsunami data since it represents highest experienced wave condition (2.41 feet)
- Used Goleta 2 Landslide as a local tsunami source (12 feet)
  - Used by City for emergency evacuation planning
- Results
  - Planning Areas 1-3 not vulnerable to Japanese type tsunami (up to 2060)
  - All planning areas vulnerable to Goleta type tsunami, with or without sea level rise.

Year	Japanese Tsunami Inundation Elevation (Ft)	Goleta 2 Landslide Tsunami Inundation Elevation (Ft)
2015	7.7	14.6
2030	8.3	15.3
2060	9.8	16.7
2100	12.5	19.5

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Tsunami Analysis. Planning Area 1.

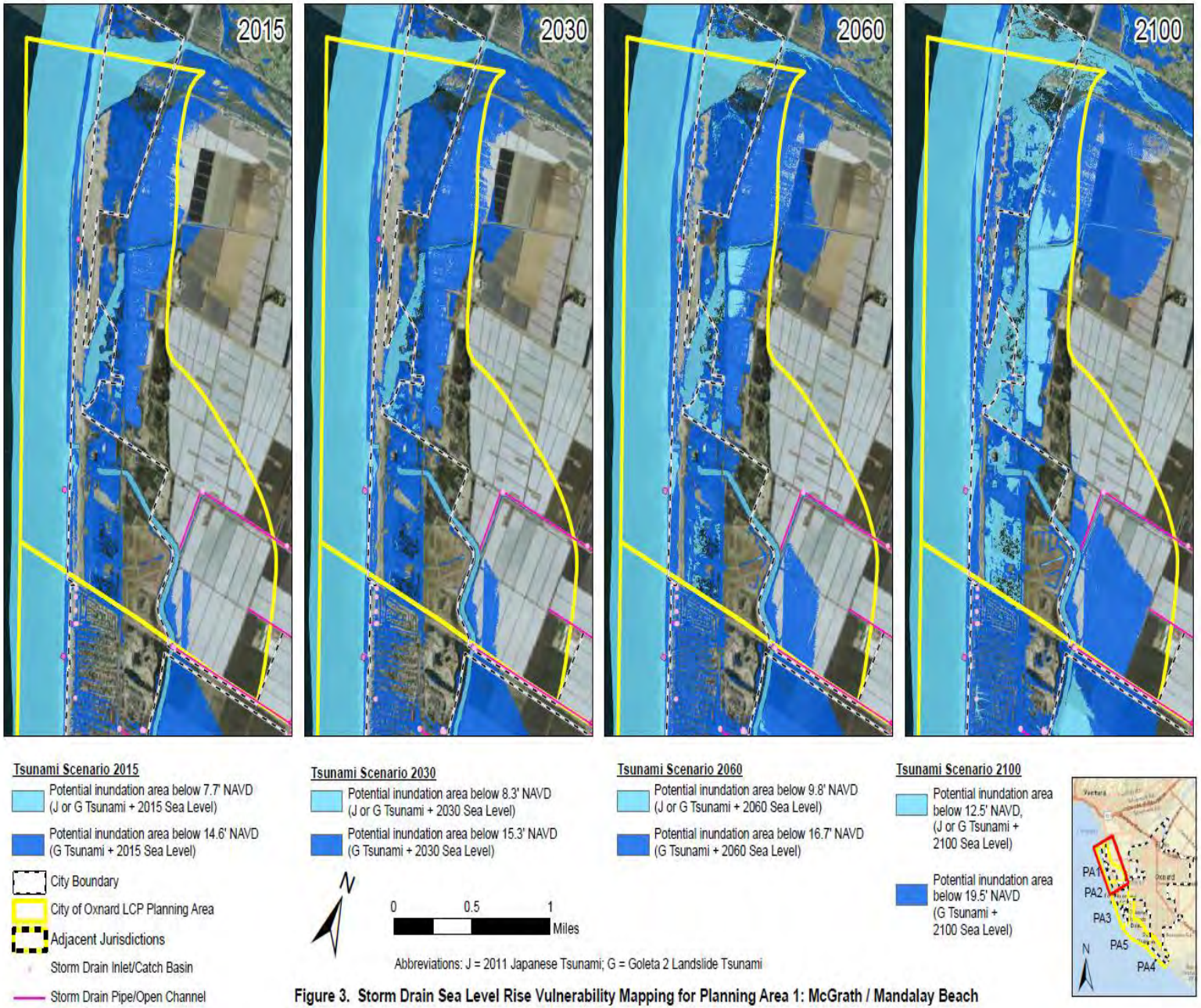


Figure 3. Storm Drain Sea Level Rise Vulnerability Mapping for Planning Area 1: McGrath / Mandalay Beach

Sea Level Rise Drainage Scenarios

- All but 1 storm drain in the Planning Areas are currently vulnerable during extreme events
- More frequently submerged as sea level rises

Figure 2. Storm Drain Sea Level Rise Vulnerability Mapping for Planning Area 2: Oxnard Shores

Oxnard LCP Update
SLR Vulnerability Assessment Tsunami Flooding Analysis, Extreme High Ocean Water Level Inundation Analysis, And Storm Drain Vulnerability Assessment

Everest International Consultants, Inc.

David Cannon, M.C.E., P.E.

February 25, 2016

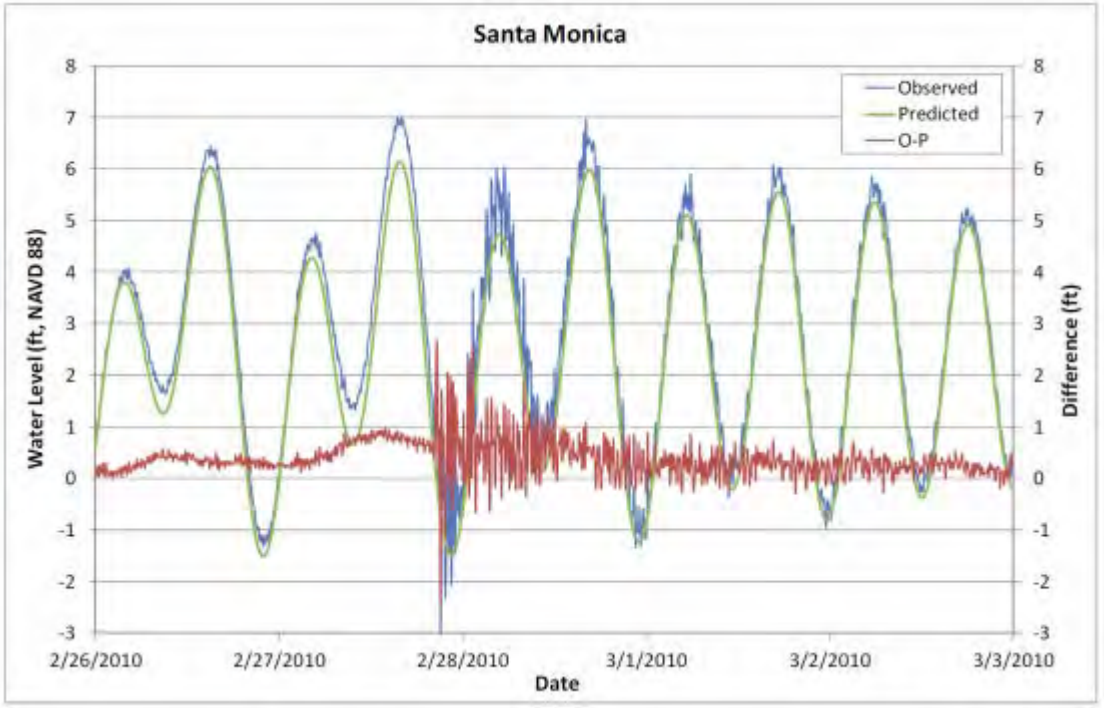
Sea Level Rise Vulnerability Assessment Tsunami Analysis

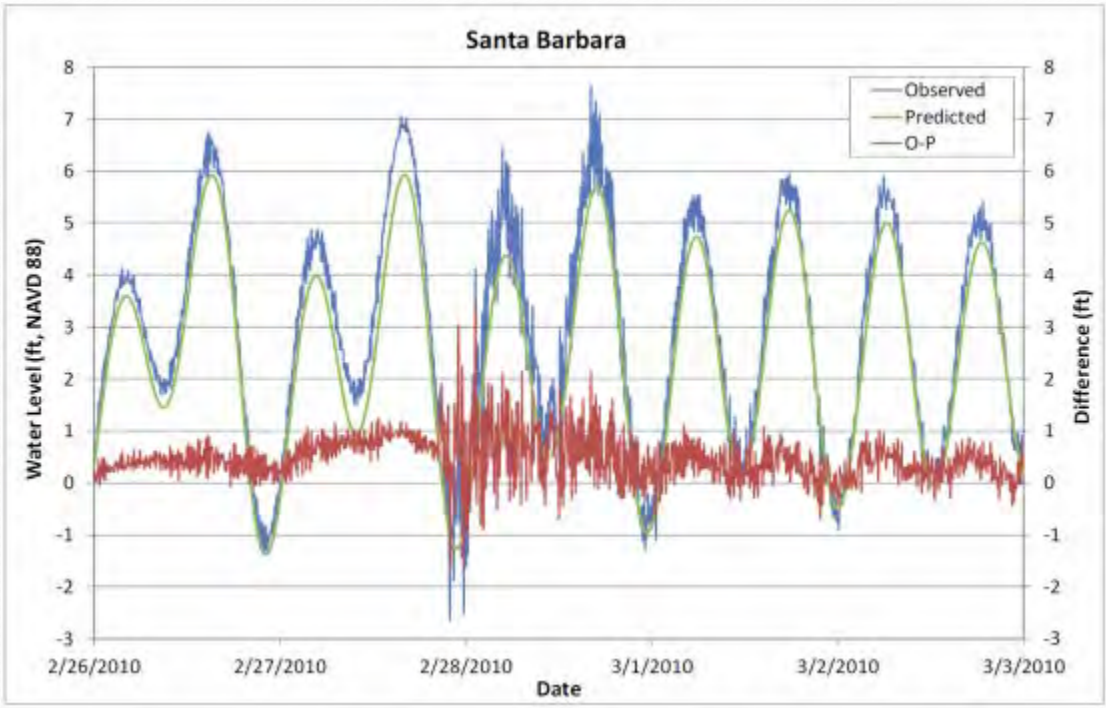
Approach

- Select tide condition – MHHW from NOAA Santa Barbara and Santa Monica Stations
- Select future sea level rise conditions for 2030, 2060, and 2100
- Select tsunami events
  - Historical Tsunami: 2011 Japanese Tsunami
  - Local Tsunami: Goleta 2 Landslide
- Estimate maximum water levels for Year 2015, 2030, 2060, & 2100 from potential tsunami inundation
- Prepare NOAA topographic/bathymetric data in GIS
- Add storm drains to show additional potential hydraulic connections
- Delineate area below maximum water levels in GIS

2010 Chilean Tsunami

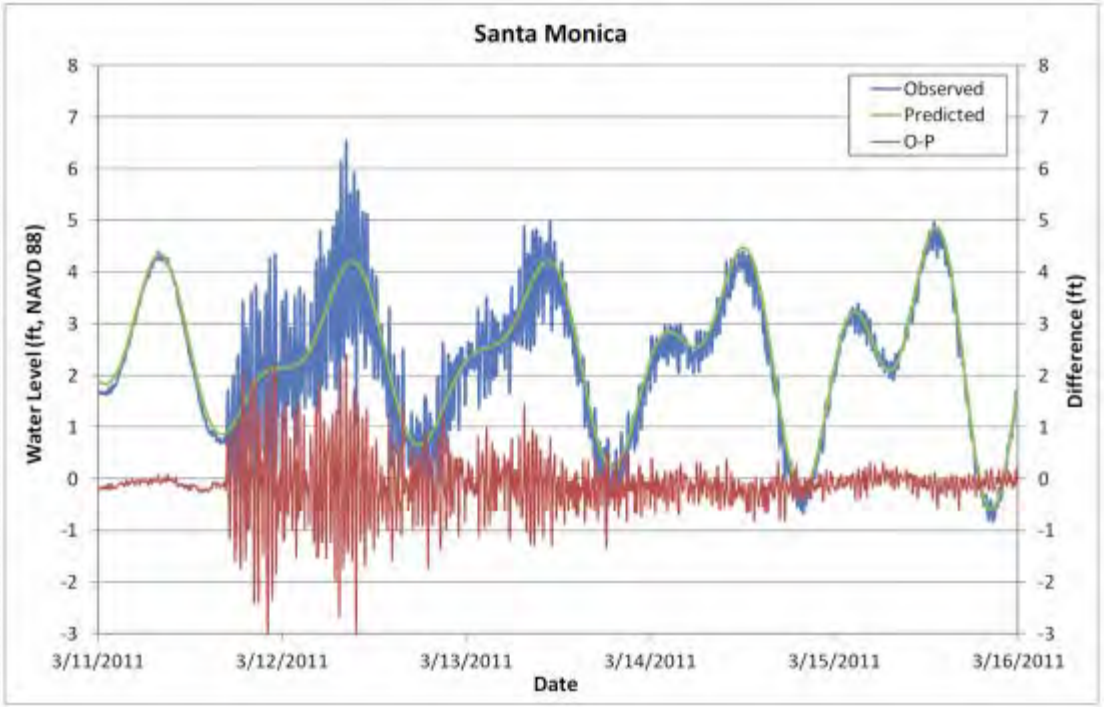
NOAA Water Levels

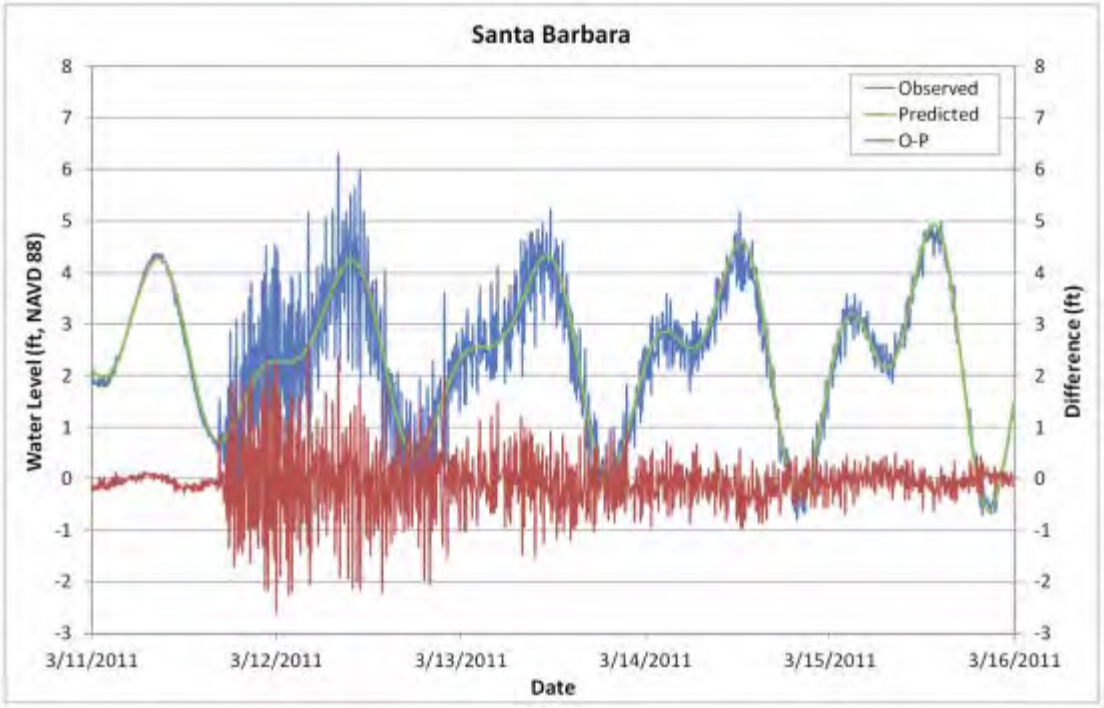




2011 Japanese Tsunami

NOAA Water Levels



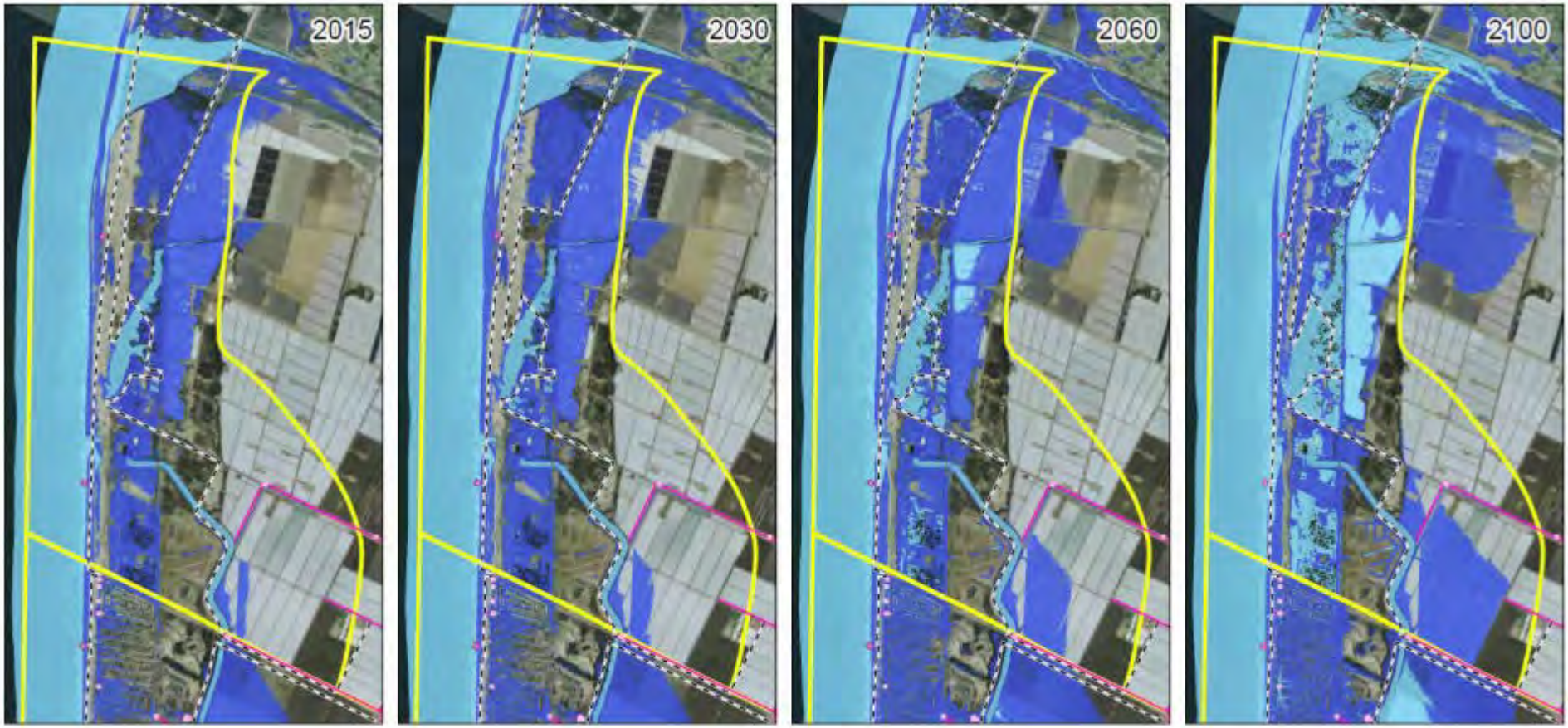


Potential Tsunami Flood Elevation Summary

Year	Flood Elevation (ft, NAVD88)	
	2011 Japanese Tsunami	Goleta 2 Landslide Tsunami
2015	7.7	14.6
2030	8.3	15.3
2060	9.8	16.7
2100	12.5	19.5

SLR Vulnerability Assessment: Tsunami Analysis

PA 1: McGrath/Mandalay Beach



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)

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)

- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions
- Storm Drain Inlet/Catch Basin
- Storm Drain Pipe/Open Channel

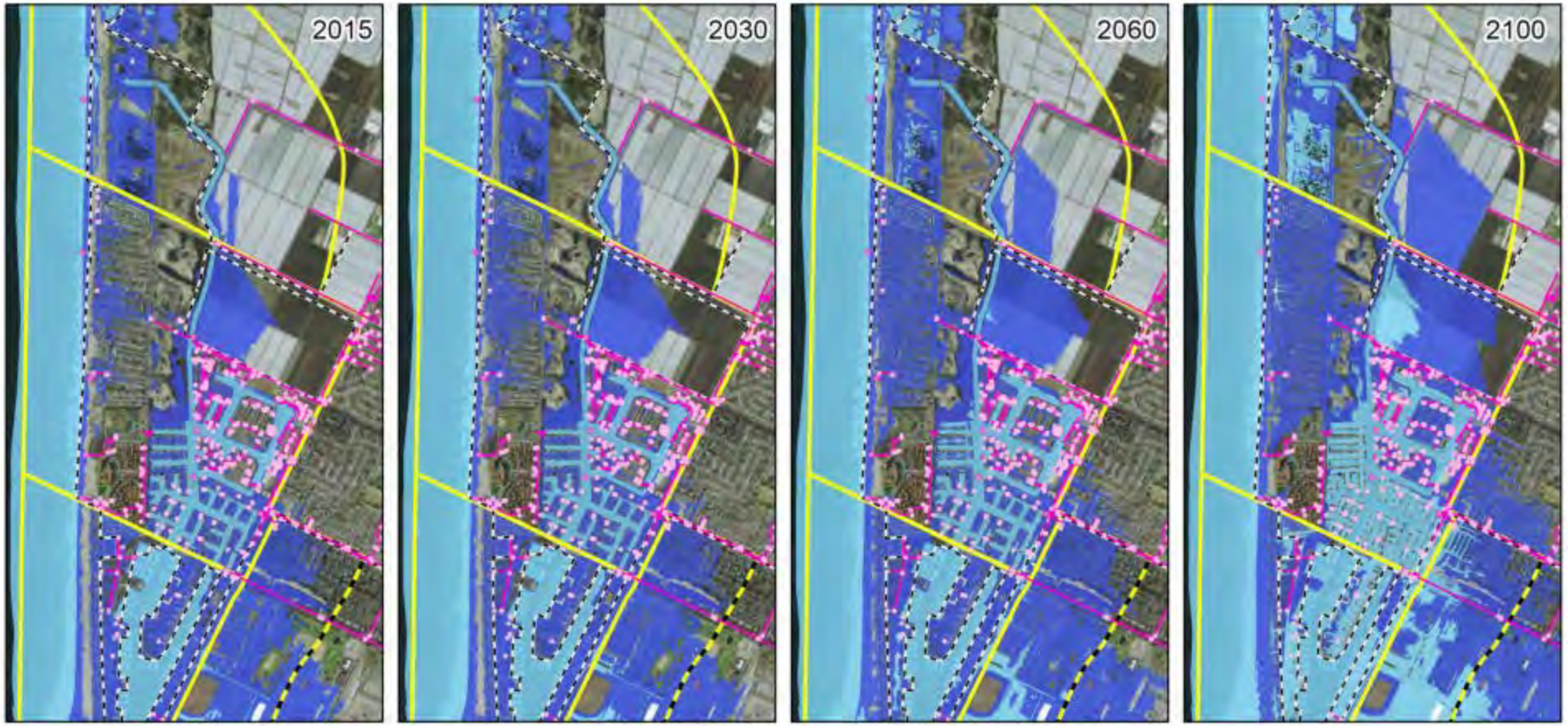
N

0 0.5 1 Miles

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

SLR Vulnerability Assessment: Tsunami Analysis

PA 2: Oxnard Shores



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)

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)

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N

0 0.5 1 Miles

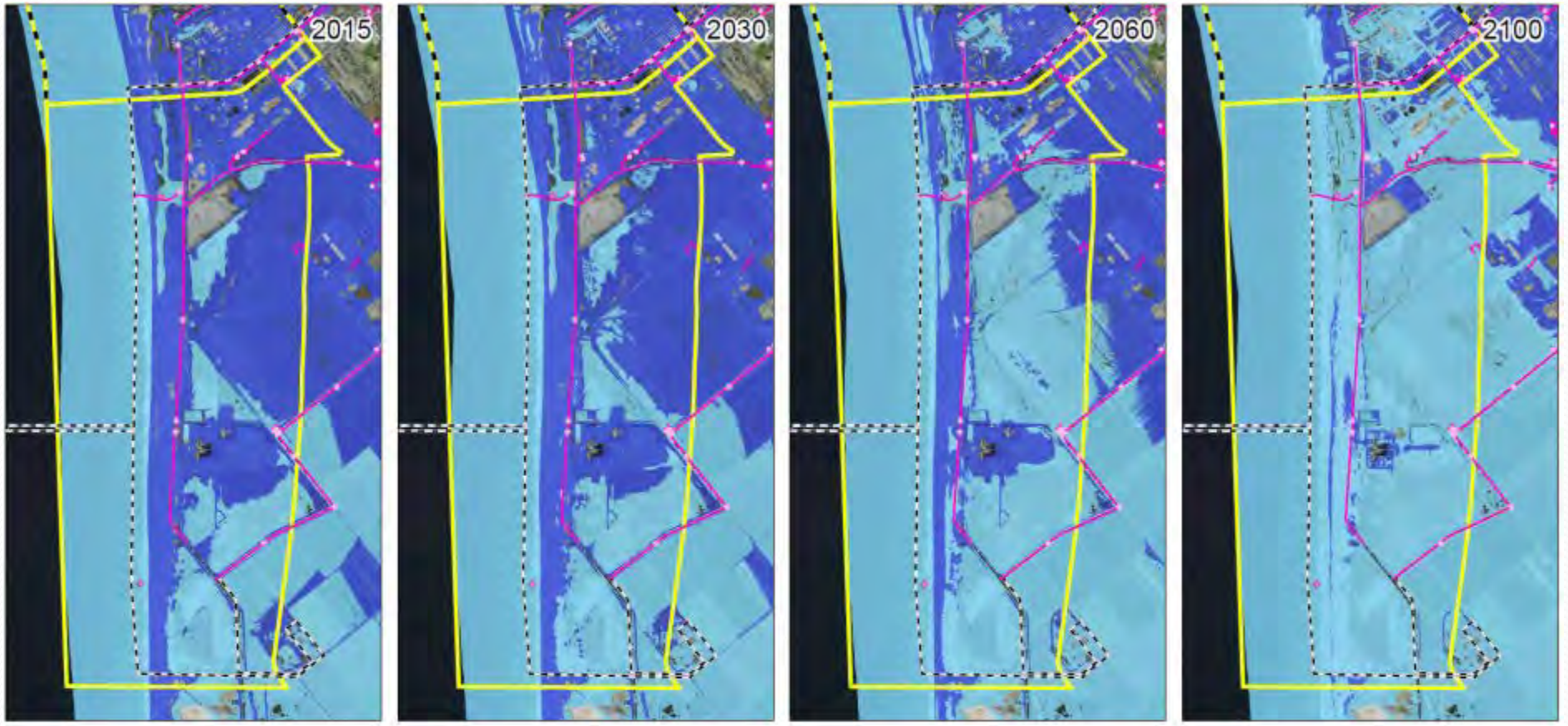
Abbreviations: J = 2011 Japanese Tsunami; G = Goleta 2 Landslide Tsunami

SLR Vulnerability Assessment: Tsunami Analysis

PA 3: Channel Islands

SLR Vulnerability Assessment: Tsunami Analysis

PA 4: Ormond Beach



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
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- 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

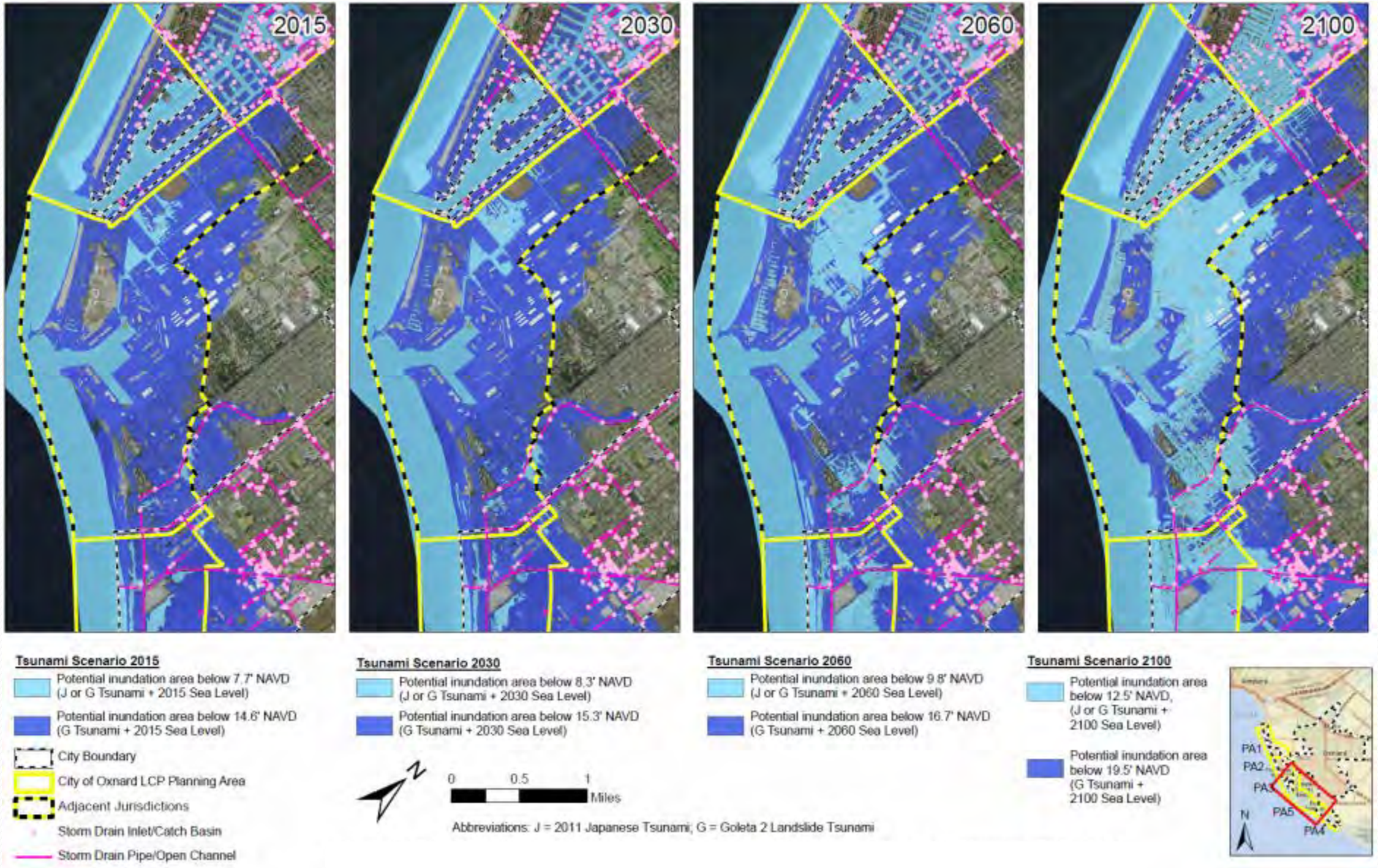
- Potential inundation area below 12.5' NAVD, (J or G Tsunami + 2100 Sea Level)
- Potential inundation area below 19.5' NAVD (G Tsunami + 2100 Sea Level)

0 0.5 1 Miles

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

SLR Vulnerability Assessment: Tsunami Analysis

PA 5: Port Hueneme



Sea Level Rise Vulnerability Assessment Hydrodynamic Modeling

Approach

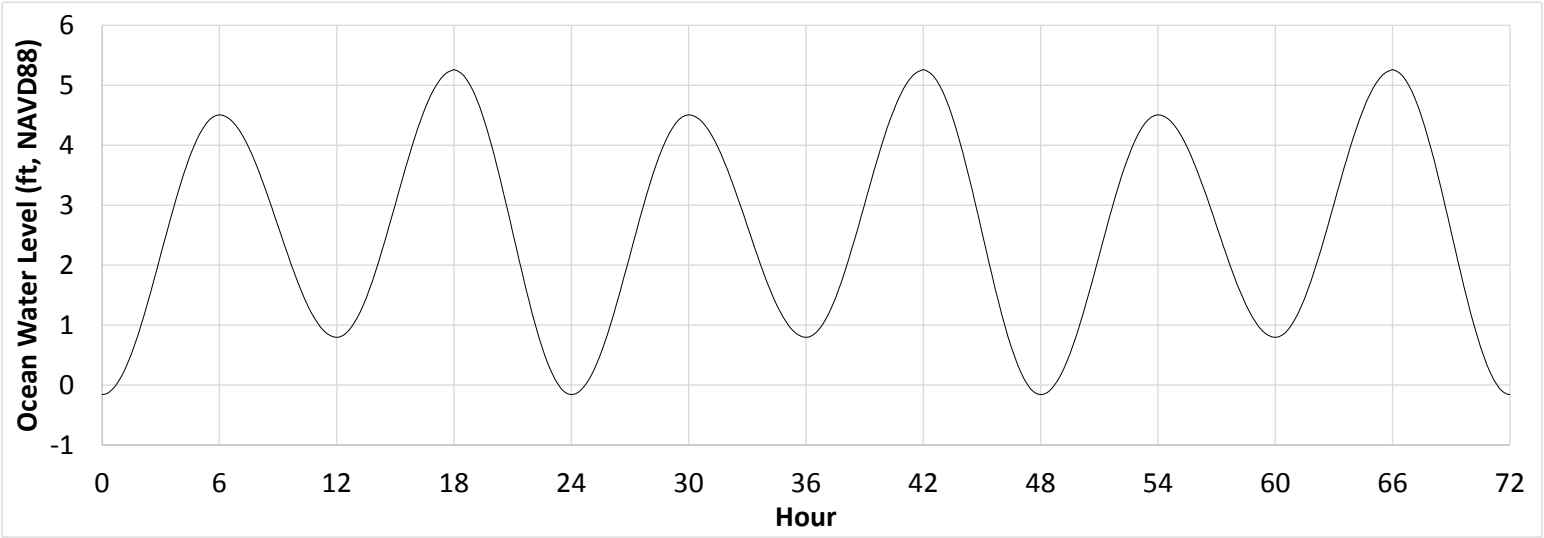
- Select tide condition
  - Tsunami Analysis: Mean Tide (MHHW-MLLW-MLHW-MHLW)
  - Extreme Ocean Water Level: King Tide + El Niño SLA
- Select future sea level rise conditions
- Select tsunami events
- Select hydrodynamic model
- Conduct hydrodynamic modeling
  - Estimate extent of tsunami-induced flooding
  - Estimate extent of extreme ocean water level inundation

NOAA Tidal Datums

Tide	Elevation (Feet, NAVD88)	
	Santa Barbara (Station 9411340)	Santa Monica (Station 9410840)
Highest Observed Water Level	7.26	8.31
Mean Higher High Water (MHHW)	5.27	5.24
Mean High Water (MHW)	4.51	4.50
Mean Sea Level (MSL)	2.66	2.60
Mean Low Water (MLW)	0.85	0.74
North American Vertical Datum – 1988 (NAVD88)	0.00	0.00
Mean Lower Low Water (MLLW)	-0.13	-0.19
Lowest Observed Water Level	-3.02	-3.03

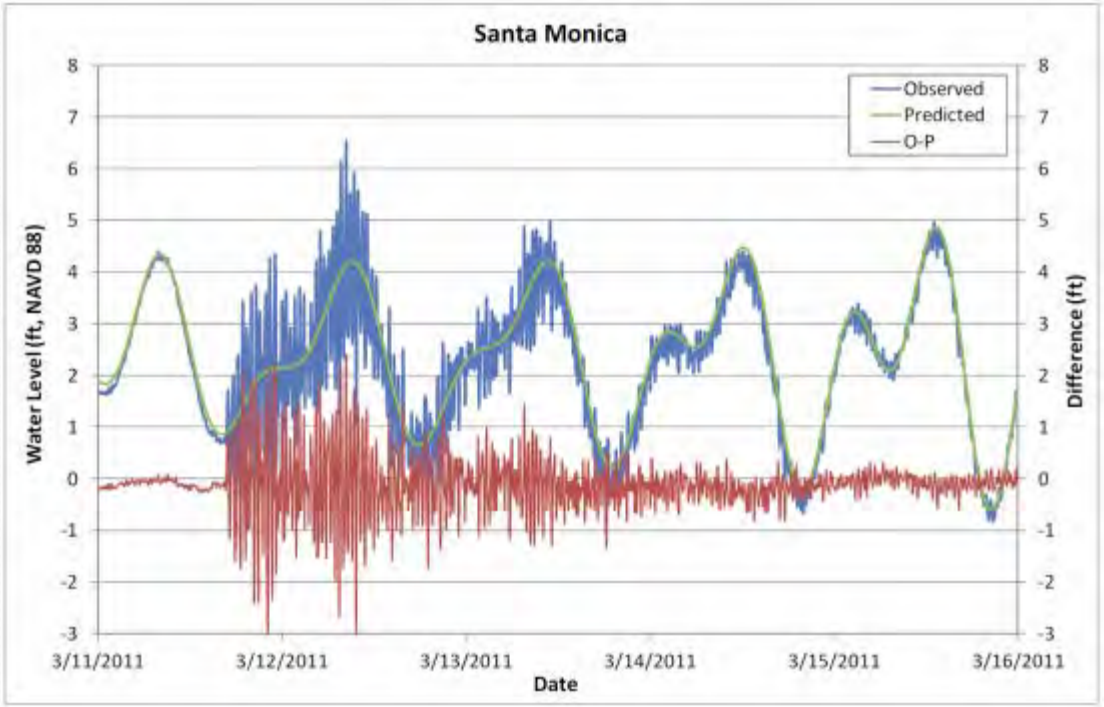
Mean Tide Series

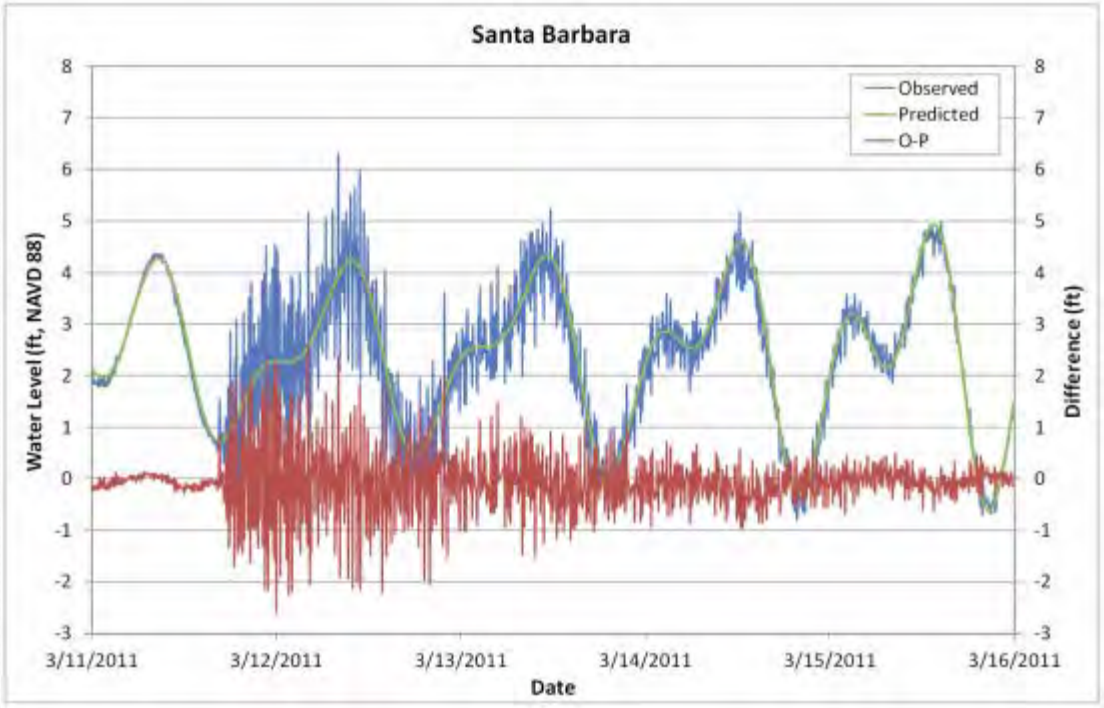
Latest Tidal Epoch (1983-2001)



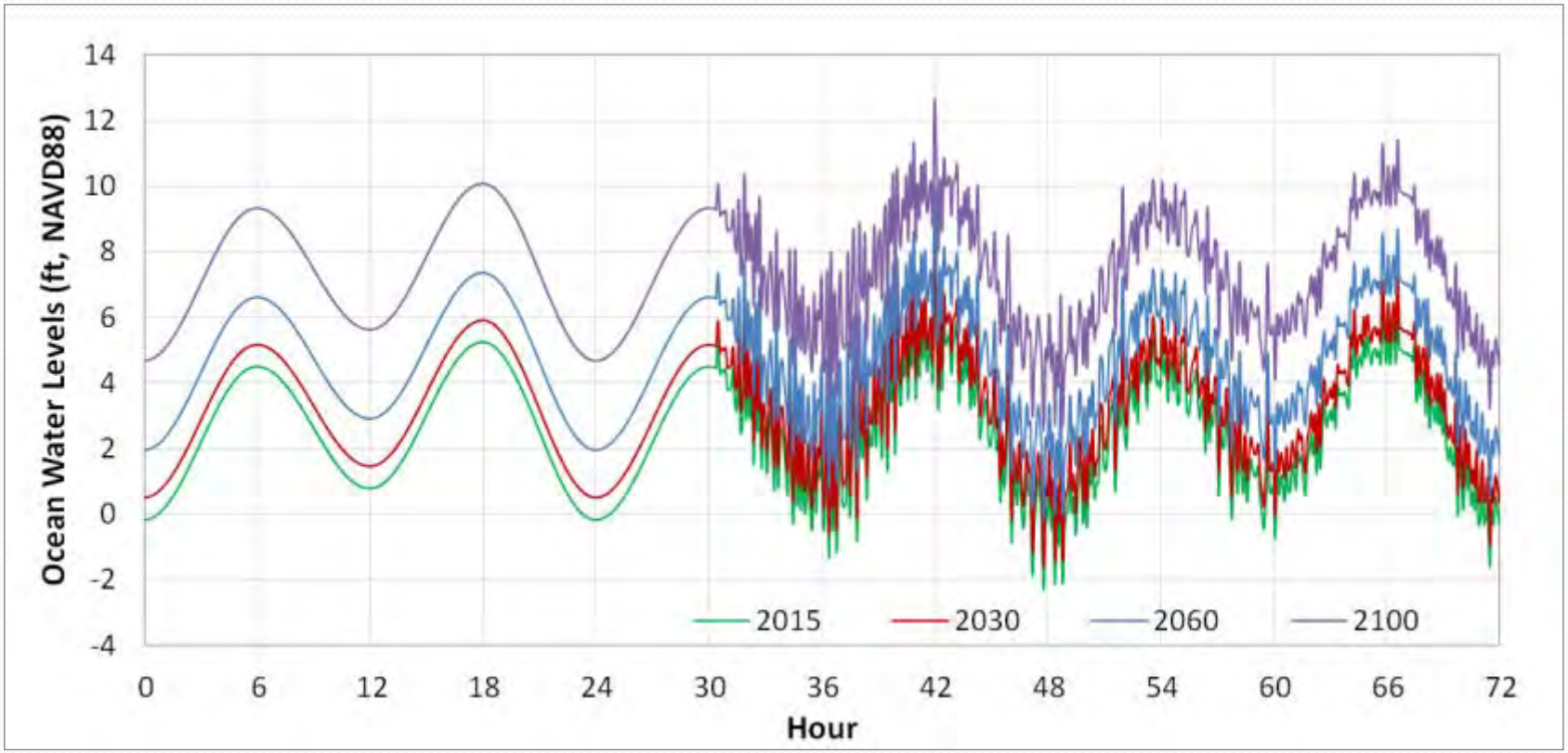
2011 Japanese Tsunami

NOAA Water Levels

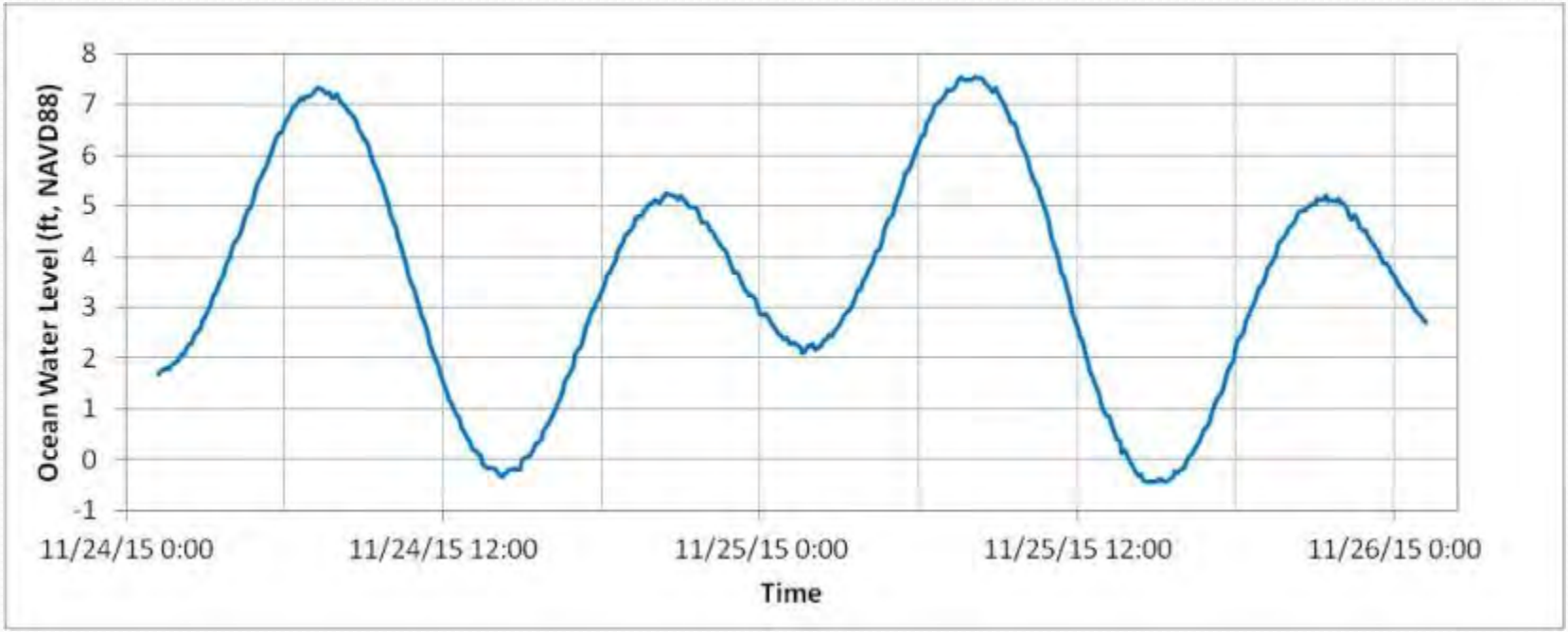




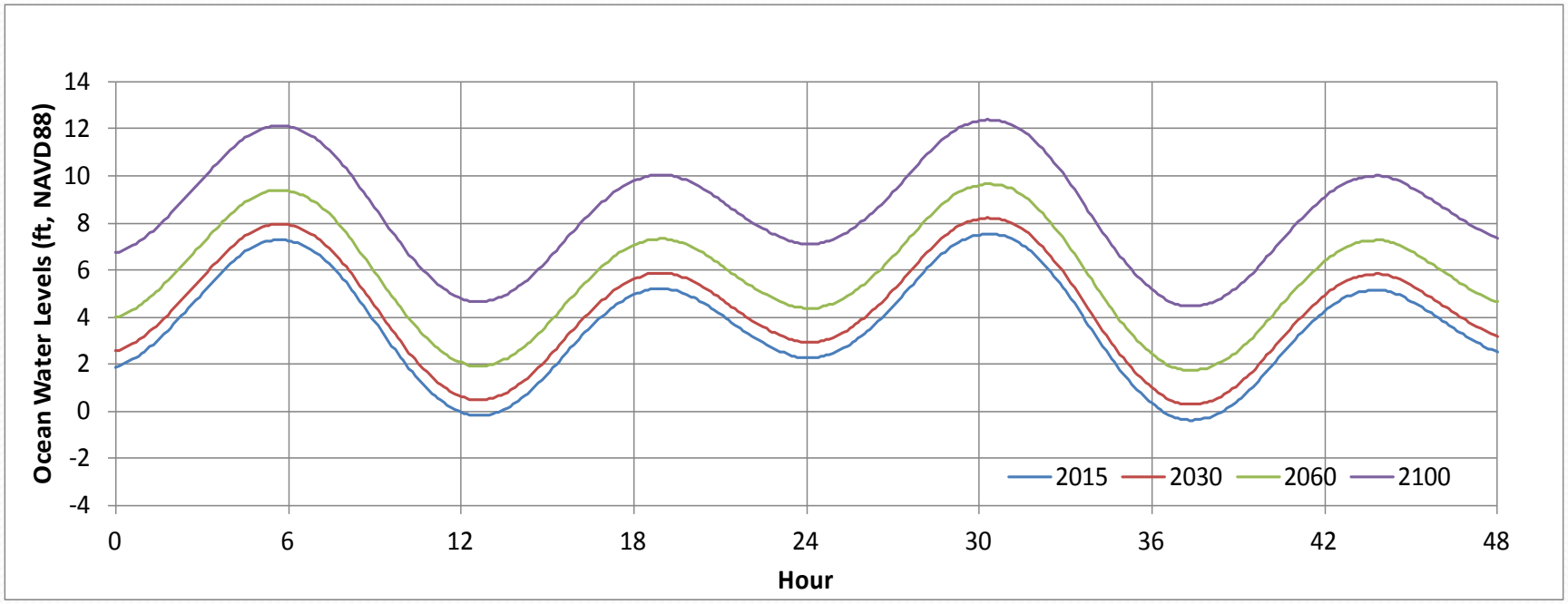
Water Level Time Series at Model Ocean Boundary for Tsunami Flooding Analysis



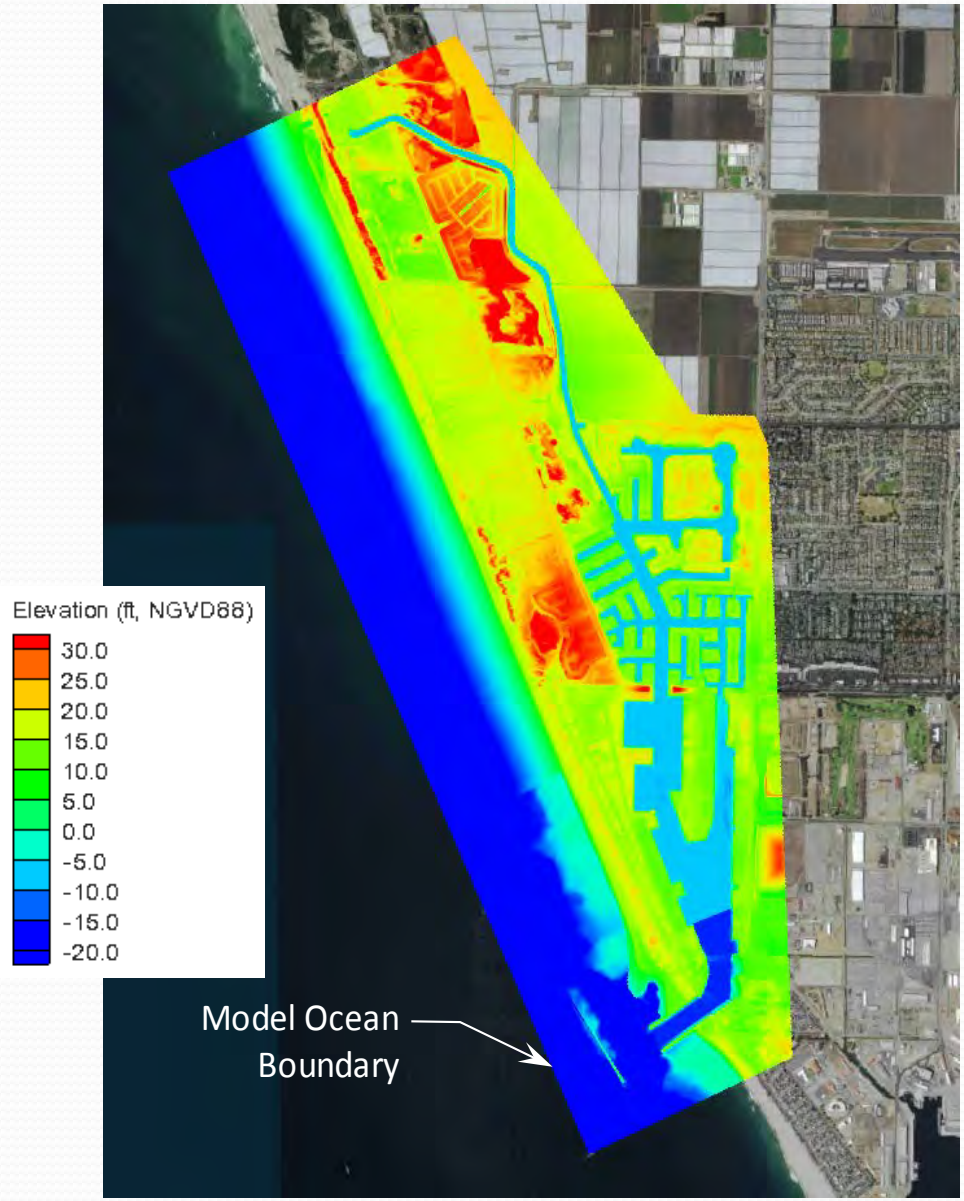
Water Levels Recorded at NOAA Santa Monica Tide Station on November 24 to 25, 2015



Water Level Time Series at Model Ocean Boundary for Extreme High Ocean Water Level Inundation Analysis

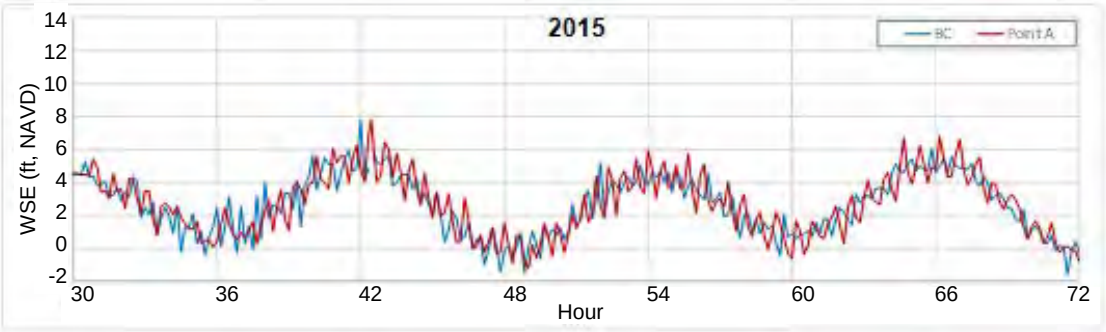


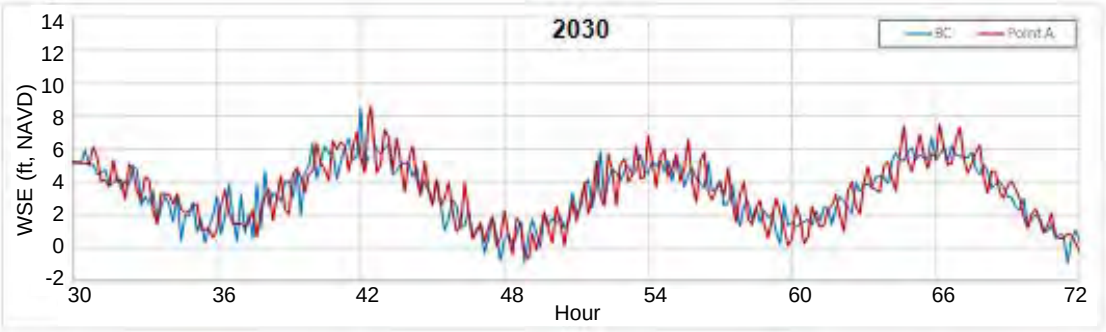
TUFLOW Model Domain and Bathymetry

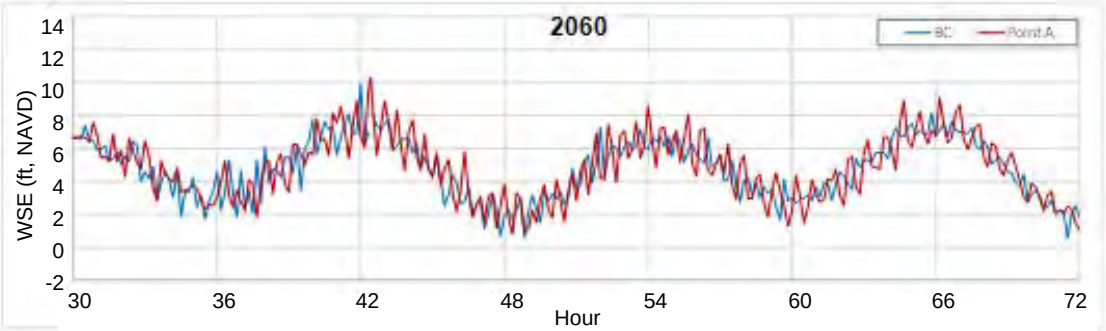


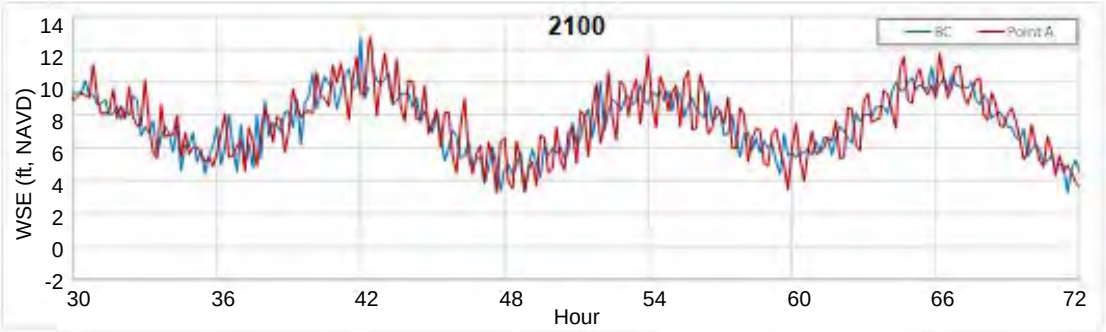
Tsunami Scenarios

Water Surface Elevations at Points A and BC





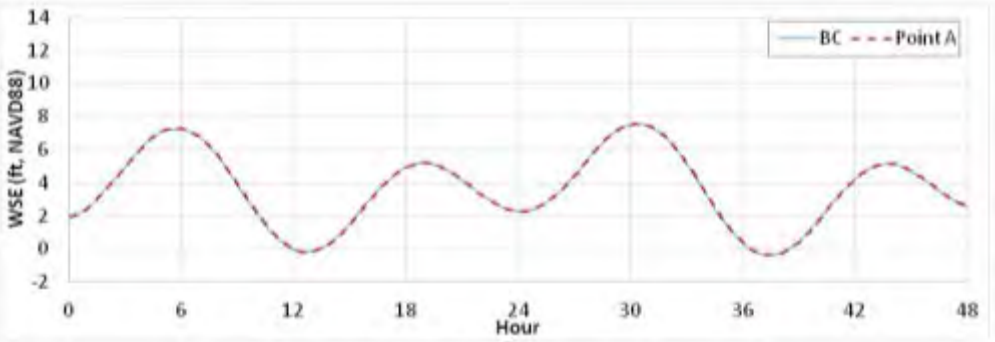


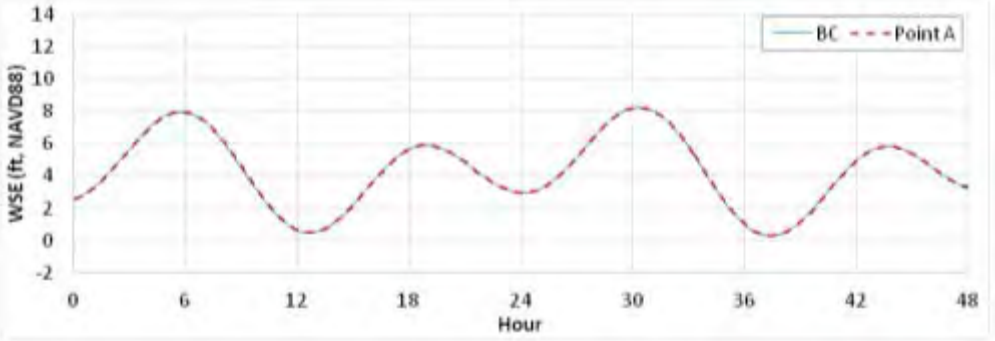


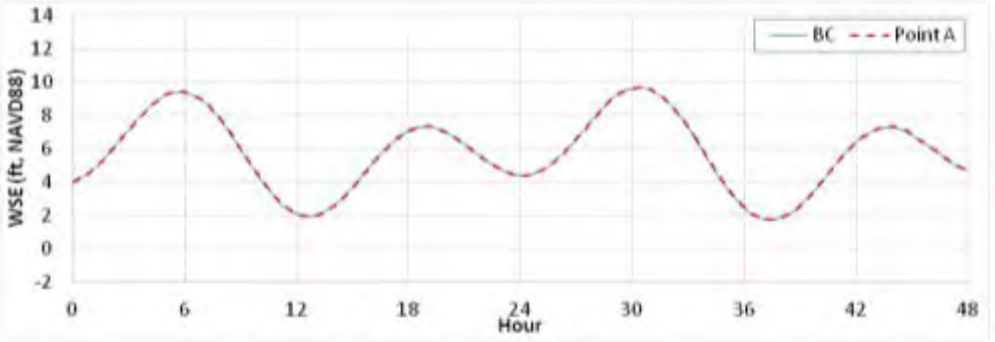
Maximum Water Elevations and Potential Tsunami Flooded Areas

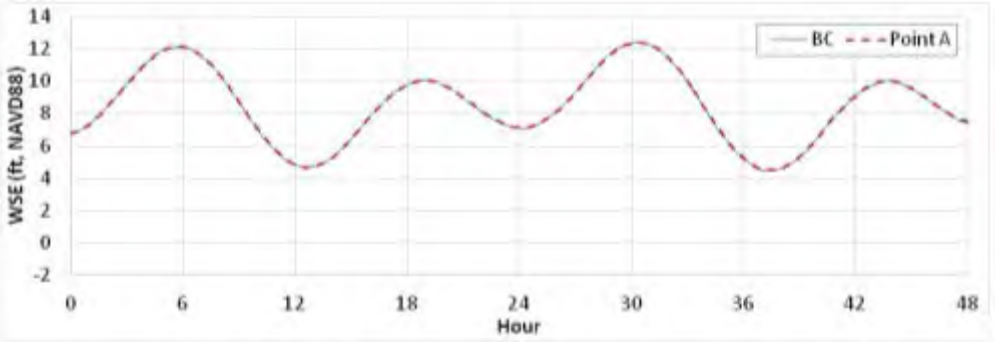
Extreme High Ocean Water Level Scenarios

Water Surface Elevations at Points A and BC









Maximum Water Elevations and Potential Inundation Areas for

Extreme High Ocean Water Level Scenarios

Sea Level Rise Vulnerability Assessment Storm Drain Vulnerability Mapping

Approach

- Select tide condition
  - Extreme water level data (King Tide + El Niño SLA) from NOAA Santa Barbara and Santa Monica Stations
- Select future sea level rise conditions for 2030, 2060, and 2100
- Estimate maximum water levels for Year 2015, 2030, 2060, and 2100 from potential extreme high water inundation
- Prepare storm drain GIS data obtained from City of Oxnard
- Map outfalls if invert elevations are lower than maximum water levels using red, yellow, and green to indicate degrees of SLR vulnerability

Extreme Ocean Water Levels at Santa Barbara and Santa Monica NOAA Tide Stations

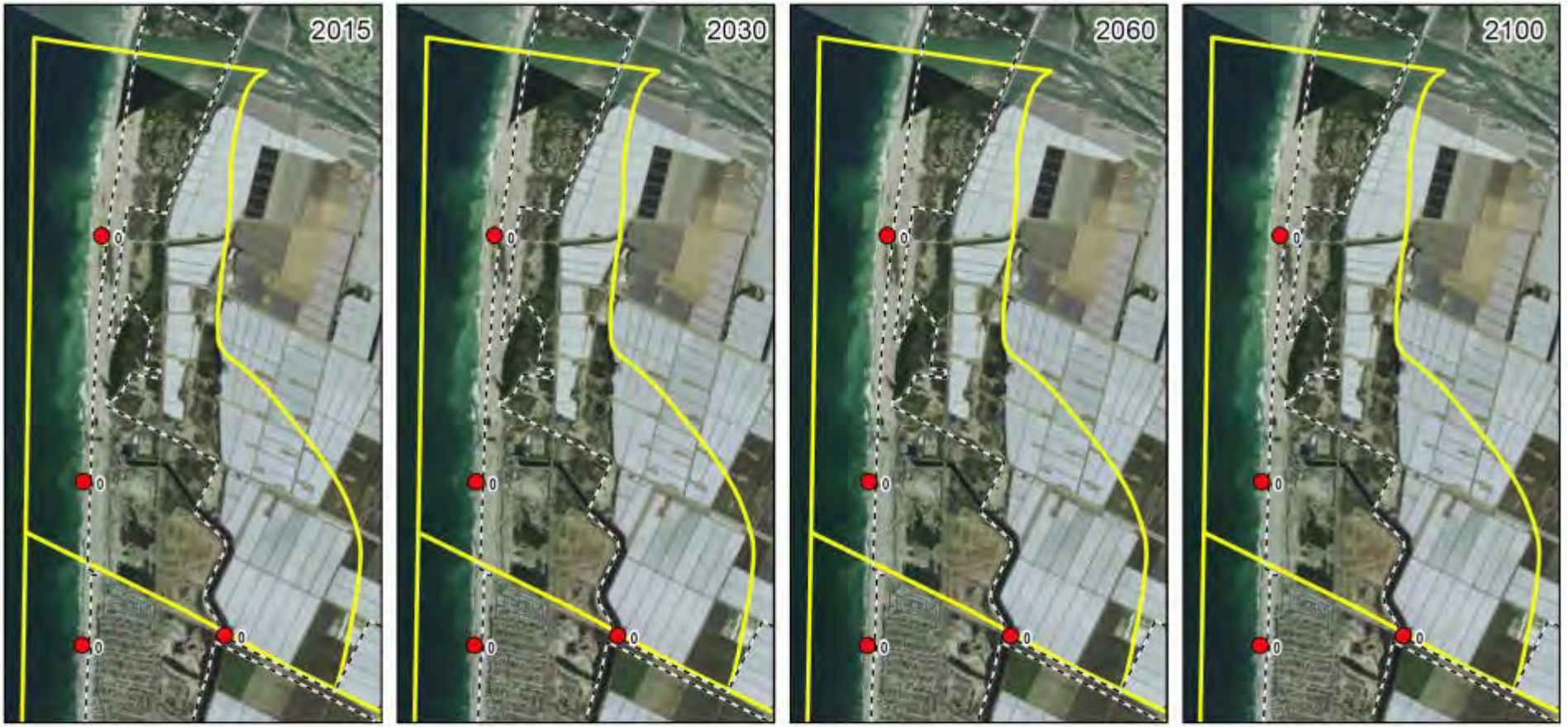
Extreme Ocean Water Level	Elevation (Feet, NAVD88)		
	Santa Barbara (Station 9411340)	Santa Monica (Station 9410840)	Average
Highest Observed Water Level (11/26/2015)	7.34	7.52	7.43

Extreme Ocean Water Levels With and Without Sea Level Rise

Year	Extreme Ocean Water Level (ft, NAVD88)	SLR (ft)	Extreme Ocean Water Level + SLR (ft, NAVD88)
2015	7.43	0.00	7.4
2030	7.43	0.67	8.1
2060	7.43	2.11	9.5
2100	7.43	4.84	12.3

Storm Drain SLR Vulnerability Mapping

PA 1: McGrath/Mandalay Beach



2015 King Tide + El Nino
Water Level = 7.4' NAVD

- Stormwater Outfall Above 7.4' NAVD
- Stormwater Outfall Below 7.4' NAVD
- -2.50 Invert Elevation (ft, NAVD)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions

2030 King Tide + El Nino + SLR
Water Level = 8.1' NAVD

- Stormwater Outfall Above 8.1' NAVD
- Stormwater Outfall Below 8.1' NAVD

2060 King Tide + El Nino + SLR
Water Level = 9.5' NAVD

- Stormwater Outfall Above 9.5' NAVD
- Stormwater Outfall Below 9.5' NAVD

2100 King Tide + El Nino + SLR
Water Level = 12.3' NAVD

- Stormwater Outfall Above 12.3' NAVD
- Stormwater Outfall Below 12.3' NAVD

N

0 0.5 1 Miles

Storm Drain SLR Vulnerability Mapping

PA 2: Oxnard Shores

2015 King Tide + El Nino
Water Level = 7.4' NAVD

- Stormwater Outfall Above 7.4' NAVD
- Stormwater Outfall Below 7.4' NAVD
- -2.50 Invert Elevation (ft, NAVD)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions

2030 King Tide + El Nino + SLR
Water Level = 8.1' NAVD

- Stormwater Outfall Above 8.1' NAVD
- Stormwater Outfall Below 8.1' NAVD

2060 King Tide + El Nino + SLR
Water Level = 9.5' NAVD

- Stormwater Outfall Above 9.5' NAVD
- Stormwater Outfall Below 9.5' NAVD

2100 King Tide + El Nino + SLR
Water Level = 12.3' NAVD

- Stormwater Outfall Above 12.3' NAVD
- Stormwater Outfall Below 12.3' NAVD

Storm Drain SLR Vulnerability Mapping

PA 3: Channel Islands

2015 King Tide + El Nino
Water Level = 7.4' NAVD

- Stormwater Outfall Above 7.4' NAVD
- Stormwater Outfall Below 7.4' NAVD
- -2.50 Invert Elevation (ft. NAVD)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions

2030 King Tide + El Nino + SLR
Water Level = 8.1' NAVD

- Stormwater Outfall Above 8.1' NAVD
- Stormwater Outfall Below 8.1' NAVD

2060 King Tide + El Nino + SLR
Water Level = 9.5' NAVD

- Stormwater Outfall Above 9.5' NAVD
- Stormwater Outfall Below 9.5' NAVD

2100 King Tide + El Nino + SLR
Water Level = 12.3' NAVD

- Stormwater Outfall Above 12.3' NAVD
- Stormwater Outfall Below 12.3' NAVD

0 0.5 1 Miles

Storm Drain SLR Vulnerability Mapping

PA 4: Ormond Beach

2015 King Tide + El Nino
Water Level = 7.4' NAVD

- Stormwater Outfall Above 7.4' NAVD
- Stormwater Outfall Below 7.4' NAVD
- -2.50 Invert Elevation (ft. NAVD)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions

2030 King Tide + El Nino + SLR
Water Level = 8.1' NAVD

- Stormwater Outfall Above 8.1' NAVD
- Stormwater Outfall Below 8.1' NAVD

2060 King Tide + El Nino + SLR
Water Level = 9.5' NAVD

- Stormwater Outfall Above 9.5' NAVD
- Stormwater Outfall Below 9.5' NAVD

2100 King Tide + El Nino + SLR
Water Level = 12.3' NAVD

- Stormwater Outfall Above 12.3' NAVD
- Stormwater Outfall Below 12.3' NAVD

0 0.5 1 Miles

Storm Drain SLR Vulnerability Mapping

PA 5: Port Hueneme

2015 King Tide + El Nino
Water Level = 7.4' NAVD

- Stormwater Outfall Above 7.4' NAVD
- Stormwater Outfall Below 7.4' NAVD
- -2.50 Invert Elevation (ft. NAVD)
- City Boundary
- City of Oxnard LCP Planning Area
- Adjacent Jurisdictions

2030 King Tide + El Nino + SLR
Water Level = 8.1' NAVD

- Stormwater Outfall Above 8.1' NAVD
- Stormwater Outfall Below 8.1' NAVD

0 0.5 1 Miles

2060 King Tide + El Nino + SLR
Water Level = 9.5' NAVD

- Stormwater Outfall Above 9.5' NAVD
- Stormwater Outfall Below 9.5' NAVD

2100 King Tide + El Nino + SLR
Water Level = 12.3' NAVD

- Stormwater Outfall Above 12.3' NAVD
- Stormwater Outfall Below 12.3' NAVD