



Date: May 31 2018

To: Patrick H. West, City Manager *T.H.W.*

From: Linda F. Tatum, Director of Development Services *LT*

For: Mayor and Members of the City Council

Subject: **Climate Action and Adaptation Plan (CAAP) Data Released  
Prior to Public Open House**

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On May 11, 2018, a memorandum was provided to the Mayor and City Council detailing the status of the Climate Action and Adaptation Plan (CAAP). The memorandum also included an invitation to the CAAP public open house taking place on June 2, 2018, from 10 a.m. to 1:00 p.m., at Martin Luther King, Jr. Park, located at 1950 Lemon Avenue. This memorandum provides you with summary preview of the data that will be presented in detail at the open house. Technical staff will be available at the open house to help explain the information.

A CAAP addresses two related issues: climate action and climate adaptation. Each component requires distinct data analyses to serve as the factual basis for developing a plan to reduce the city's carbon footprint while preparing for the impacts of climate change. First, there must be an estimate of current and future polluting emissions, known as greenhouse gases (GHGs), to develop a plan for reducing future emissions of pollutants. The forecast completed for Long Beach shows GHGs produced in Long Beach come from two main sources -- transportation (54 percent) and energy used in the buildings where we live and work (40 percent). The remaining 5 percent of emissions come from waste (Attachment A: GHG Emissions Chart).

Second, the adaptation planning portion of the CAAP requires a vulnerability assessment to estimate how and when critical community assets and infrastructure are likely to be impacted by climate change or extreme weather events such as flooding, sea level rise, drought, extreme heat, and worsening air quality. The vulnerability assessment for Long Beach shows that physical and community assets including roads, bridges, parks and community centers are likely to be impacted by the year 2030 (Attachment B: Vulnerability Assessment Maps).

This assessment is based on the best available data, but as noted on each of the attached vulnerability assessment maps, results are estimated potential scenarios and are not intended to be precisely predictive. Additionally, the maps show vulnerabilities under a "no action" scenario, which means these assets are likely to be vulnerable if the City and community do nothing to prepare for and protect assets from sea level rise, precipitation and extreme heat. Therefore, developing and implementing an actionable CAAP will be critical to ensuring enhanced protection of physical and community resources. There is considerable uncertainty in the amount and timing of future sea level rise, extreme heat and precipitation events. However, maps such as these provide a better understanding of which areas the City should focus its efforts on to reduce vulnerabilities now and in the future.

CAAP Public Workshop  
May 31, 2018  
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If you have questions regarding this matter, please contact Linda F. Tatum, Director of Development Services, at (562) 570-6261 or [Linda.Tatum@longbeach.gov](mailto:Linda.Tatum@longbeach.gov).

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P:\PLANNING\TFF COUNCIL CAAP DATA RELEASE V2.DOCX

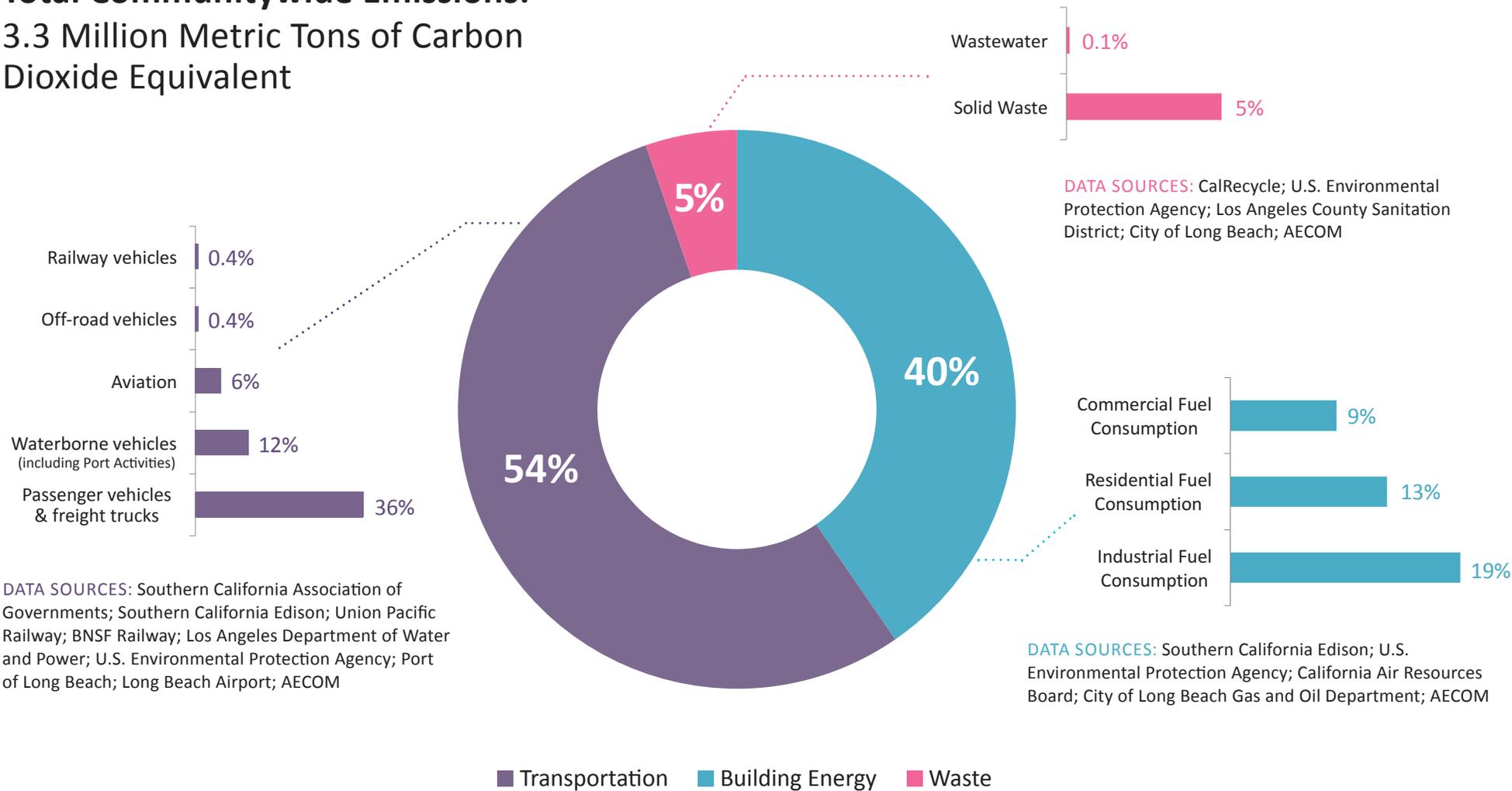
ATTACHMENTS

- A. GHG EMISSIONS CHART
- B. VULNERABILITY ASSESSMENT MAPS

CC: CHARLES PARKIN, CITY ATTORNEY  
LAURA L. DOUD, CITY AUDITOR  
TOM MODICA, ASSISTANT CITY MANAGER  
KEVIN JACKSON, DEPUTY CITY MANAGER  
REBECCA GARNER, ASSISTANT TO THE CITY MANAGER  
MONIQUE DE LA GARZA, CITY CLERK

# Communitywide Greenhouse Gas (GHG) Emissions Profile (2015)

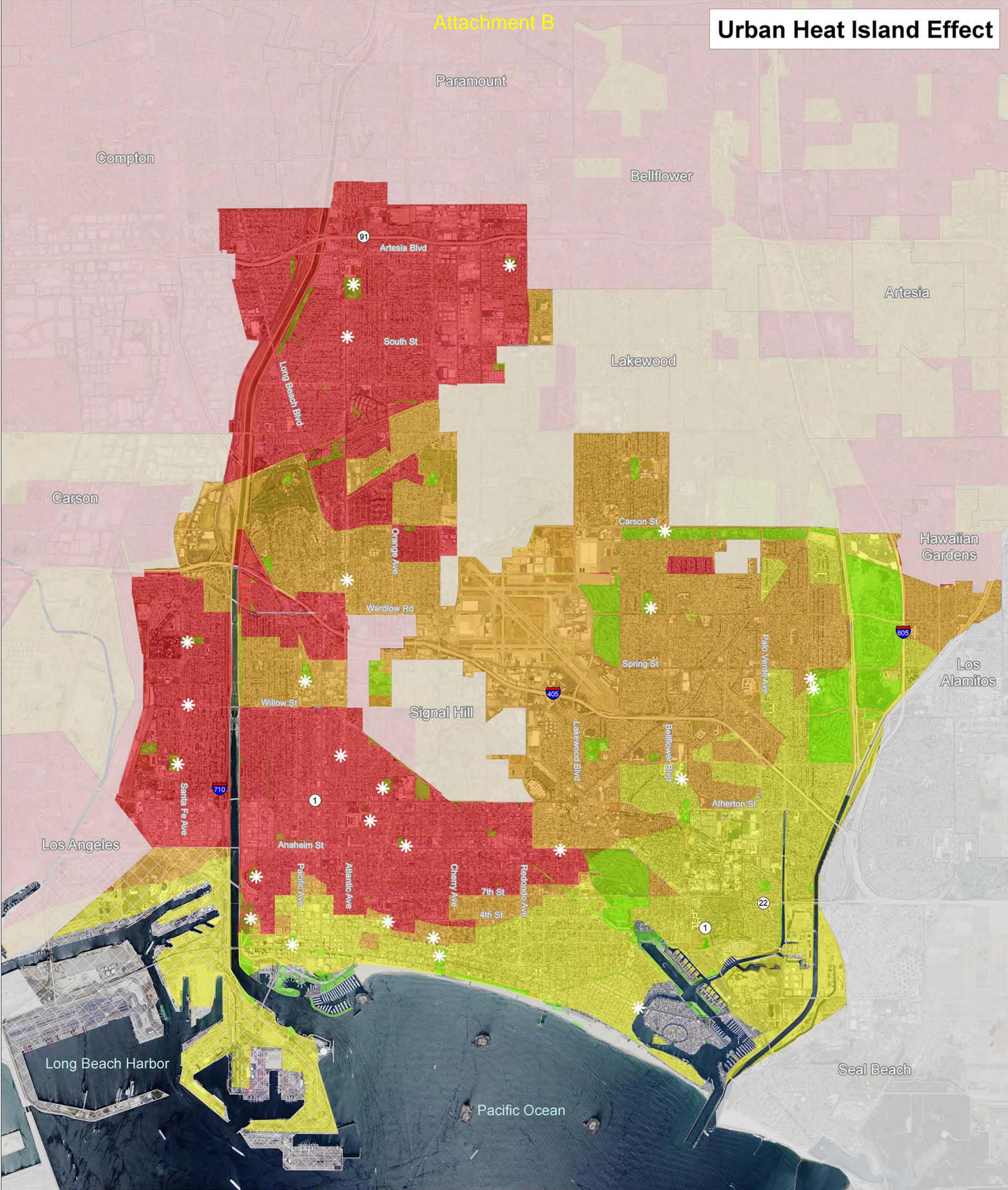
**Total Communitywide Emissions:**  
3.3 Million Metric Tons of Carbon Dioxide Equivalent



DATA SOURCES: Southern California Association of Governments; Southern California Edison; Union Pacific Railway; BNSF Railway; Los Angeles Department of Water and Power; U.S. Environmental Protection Agency; Port of Long Beach; Long Beach Airport; AECOM

DATA SOURCES: CalRecycle; U.S. Environmental Protection Agency; Los Angeles County Sanitation District; City of Long Beach; AECOM

DATA SOURCES: Southern California Edison; U.S. Environmental Protection Agency; California Air Resources Board; City of Long Beach Gas and Oil Department; AECOM



City of Long Beach: Urban Heat Island Effect

- Vulnerability to Extreme Heat**
- Low
  - Medium
  - High
  - None

- Parks & Cooling Centers**
- Cooling Center
  - Park

- Port of Long Beach**
- POLB Harbor District

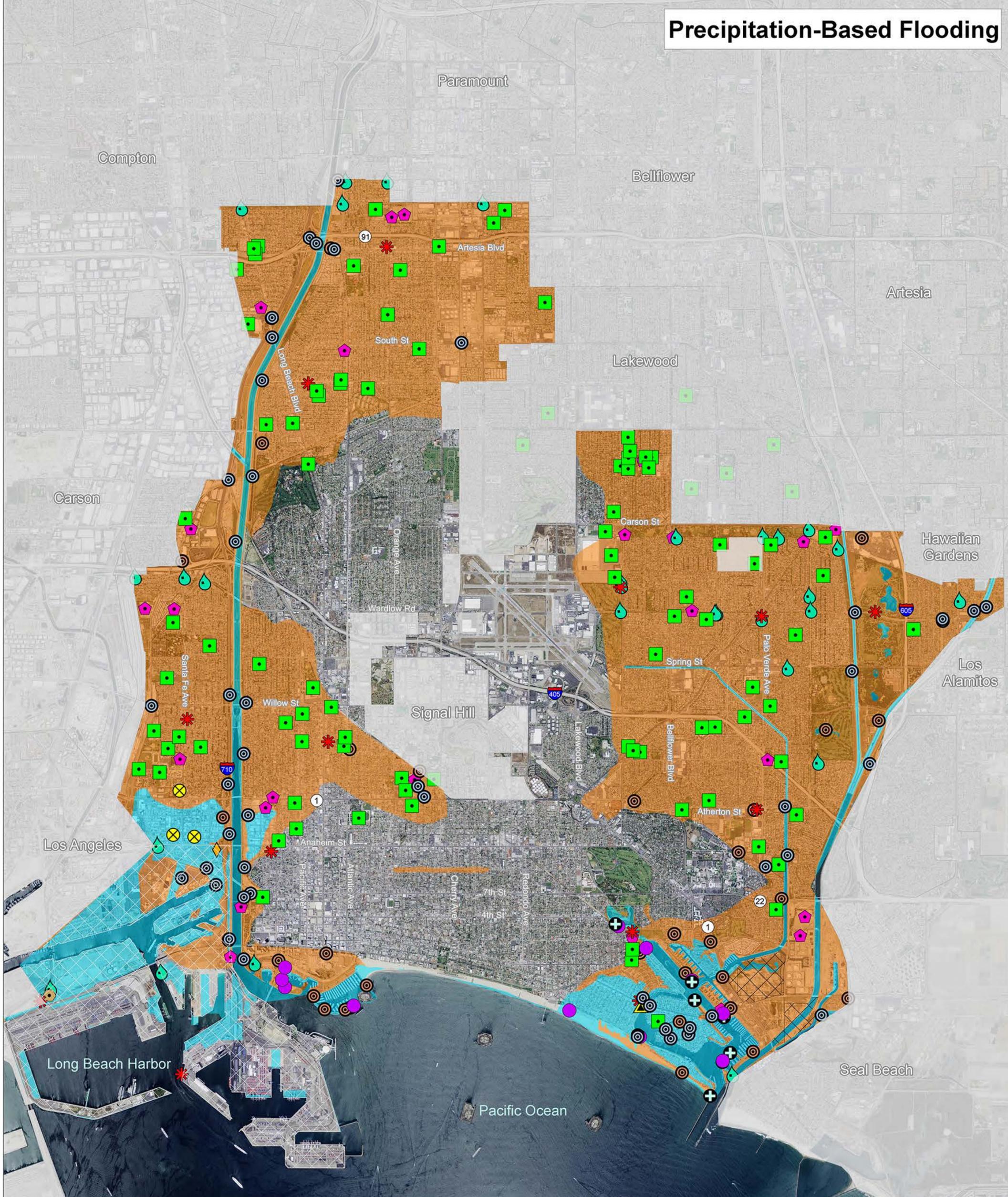
This map shows hot spots in Long Beach that are susceptible to temperatures higher than the mean daily temperature during summer months under current conditions. The map shows areas that are likely to experience more frequent and intense heat waves in the future as a result of climate change.

Urban Heat Island: An area that is significantly warmer than its surrounding areas due to the built environment and human activities.

\*Source: Climate Smart Cities Los Angeles Results; City of Long Beach; AECOM, 2018.



# Precipitation-Based Flooding



## City of Long Beach: Precipitation-Based Flooding

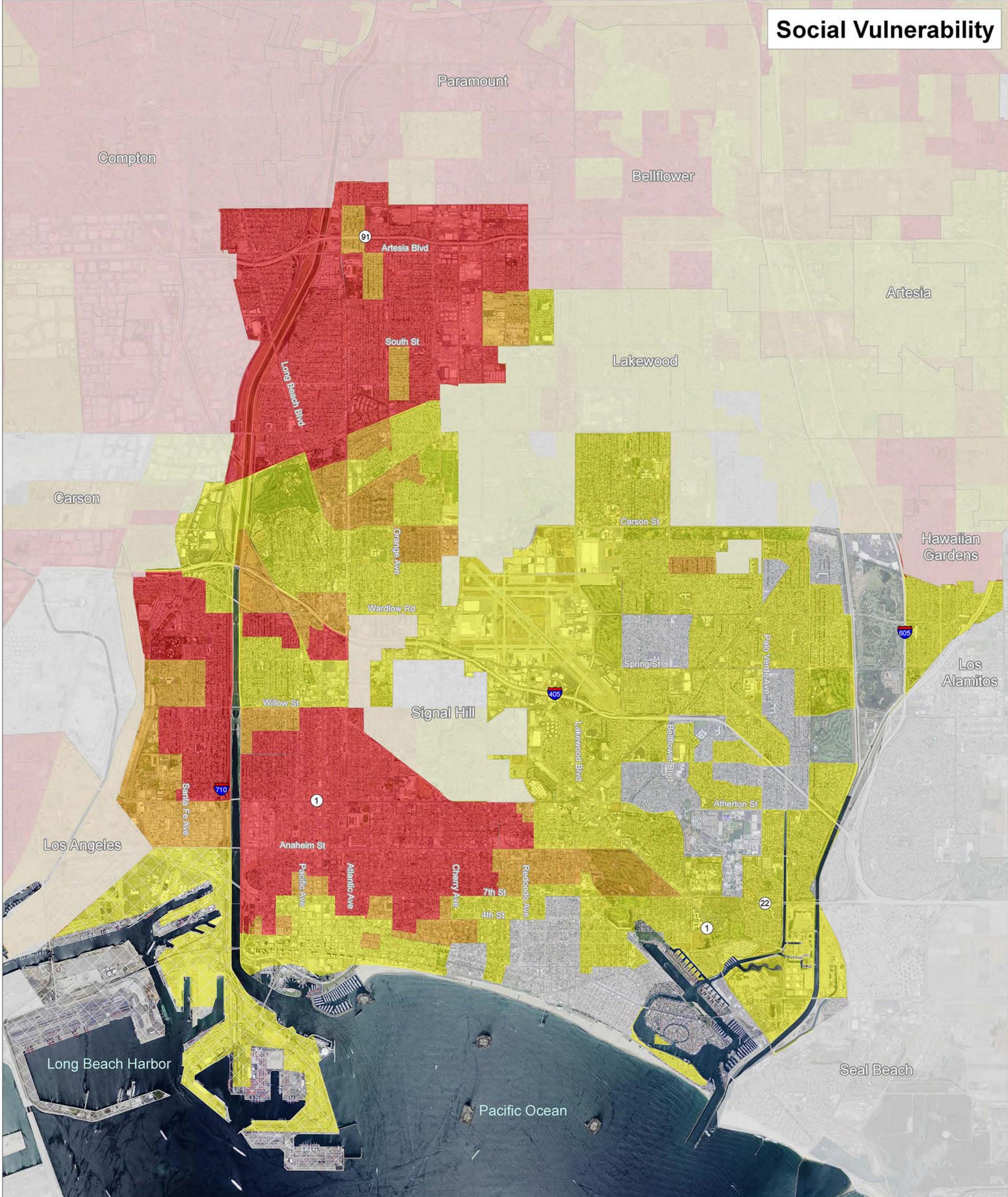
- |   |   |  |  |
|---|---|--|--|
| <b>Precipitation Event</b><br><span style="color: cyan;">■</span> 100-Year Storm<br><span style="color: orange;">■</span> 500-Year Storm      | <b>Energy Infrastructure</b><br><span style="color: magenta;">◆</span> Substation   | <b>Water &amp; Waste Infrastructure</b><br><span style="color: cyan;">●</span> Potable Facility<br><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">●</span> Stormwater Pump Station<br><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">●</span> Sewer Pump Station<br><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">●</span> Solid Waste Facility | <b>Community Building/Facility</b><br><span style="color: green;">■</span> School<br><span style="color: red;">★</span> Fire Station<br><span style="color: purple;">●</span> Park, Rec, & Marine<br><span style="color: yellow;">◆</span> Health Resource Center<br><span style="color: yellow;">▲</span> Library<br><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">●</span> Police Facility<br><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">+</span> Marine Safety |
| <b>Ecological Resource</b><br><span style="border: 1px dashed black; border-radius: 50%; padding: 2px;">■</span> Los Cerritos Wetland Complex | <b>Port of Long Beach</b><br><span style="border: 1px solid black; border-radius: 50%; padding: 2px;">■</span> POLB Harbor District |  |  |

Source: City of Long Beach, Federal Emergency Management Agency, AECOM, 2018



This map depicts low-lying areas that fall within riverine floodplains designated by the Federal Emergency Management Agency (FEMA). The floodplains indicate the extent of potential flooding under a 100-year and 500-year storm event. With precipitation events projected to increase in intensity as a result of climate change, riverine and storm-water flooding may increase. These FEMA floodplains are indicative of areas that may be at risk to increased exposure to precipitation-based flooding in the future.

# Social Vulnerability



## City of Long Beach: Indicators of Social Vulnerability

- Social Vulnerability\***
- Low
  - Medium
  - High
  - No Data

- Port of Long Beach**
- POLB Harbor District

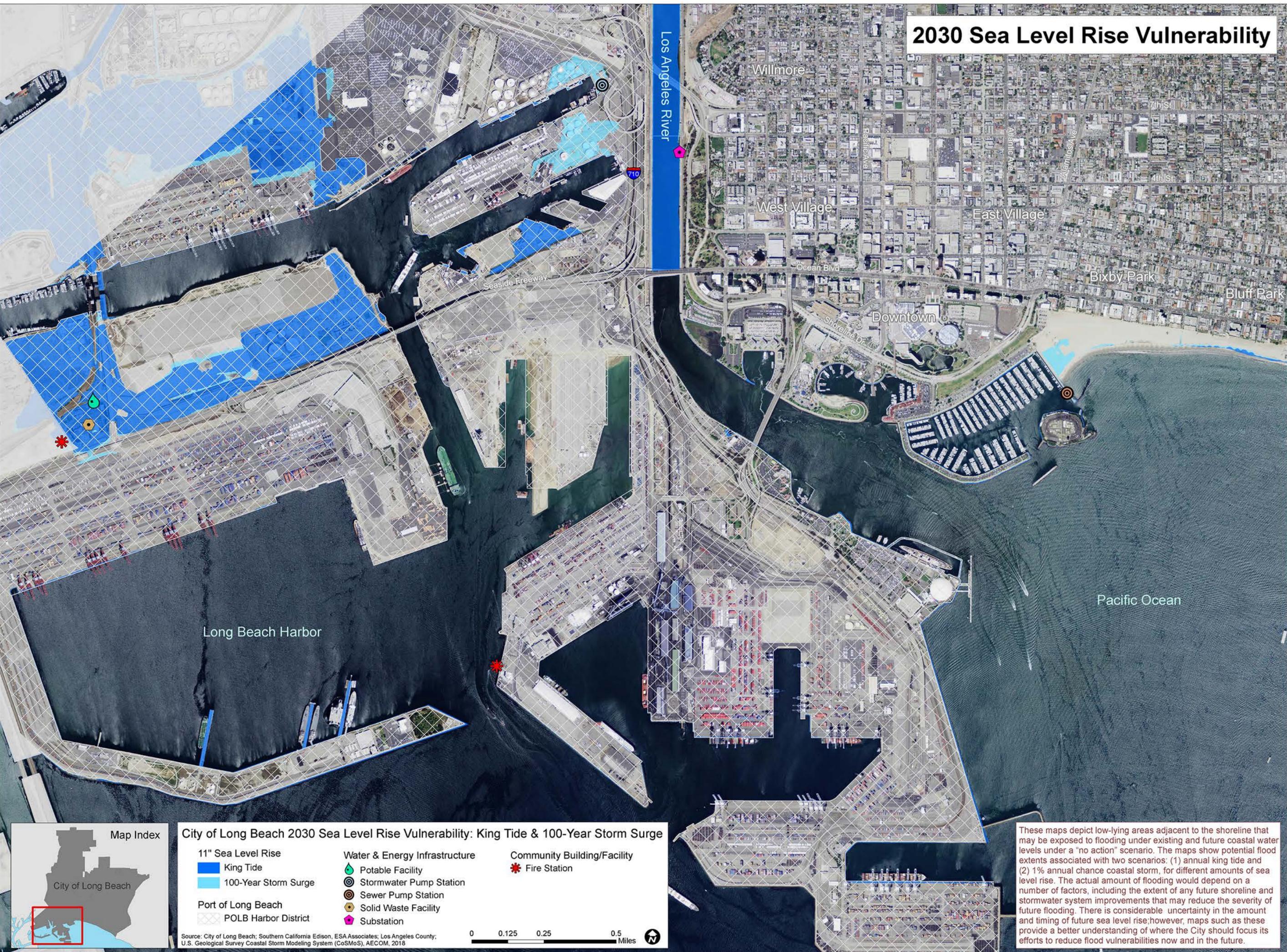
**What do we mean by Social Vulnerability?**

Social Vulnerability is based on demographic, social, and economic factors that indicate a community's potential susceptibility to environmental stressors; these factors include race, economic and educational achievement, language, age, and other health indicators. These factors affect community resilience in the face of climate change and natural disasters, and planning for marginalized populations is integral to climate adaptation and disaster preparedness.

\*Source: Climate Smart Cities Los Angeles Results, AECOM, 2018.



# 2030 Sea Level Rise Vulnerability



## City of Long Beach 2030 Sea Level Rise Vulnerability: King Tide & 100-Year Storm Surge

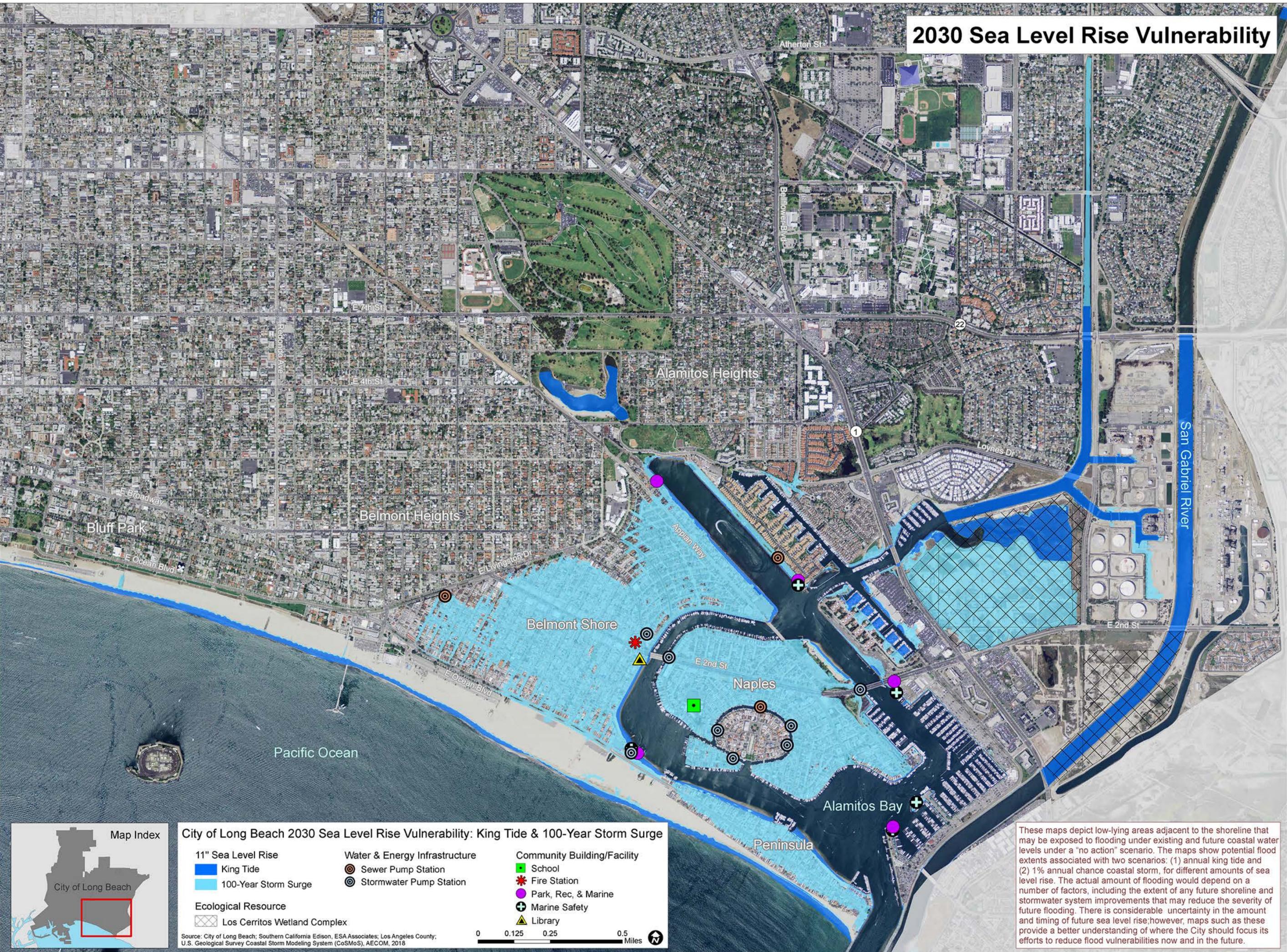
- |                           |  |                                    |
|---------------------------|--|------------------------------------|
| <b>11" Sea Level Rise</b> | <b>Water &amp; Energy Infrastructure</b> | <b>Community Building/Facility</b> |
| King Tide                 | Potable Facility                         | Fire Station                       |
| 100-Year Storm Surge      | Stormwater Pump Station                  | Sewer Pump Station                 |
| Port of Long Beach        | Solid Waste Facility                     | Substation                         |
| POLB Harbor District      |  |                                    |

Source: City of Long Beach; Southern California Edison, ESA Associates; Los Angeles County; U.S. Geological Survey Coastal Storm Modeling System (CoSMoS), AECOM, 2018



These maps depict low-lying areas adjacent to the shoreline that may be exposed to flooding under existing and future coastal water levels under a "no action" scenario. The maps show potential flood extents associated with two scenarios: (1) annual king tide and (2) 1% annual chance coastal storm, for different amounts of sea level rise. The actual amount of flooding would depend on a number of factors, including the extent of any future shoreline and stormwater system improvements that may reduce the severity of future flooding. There is considerable uncertainty in the amount and timing of future sea level rise; however, maps such as these provide a better understanding of where the City should focus its efforts to reduce flood vulnerabilities now and in the future.

# 2030 Sea Level Rise Vulnerability



## City of Long Beach 2030 Sea Level Rise Vulnerability: King Tide & 100-Year Storm Surge

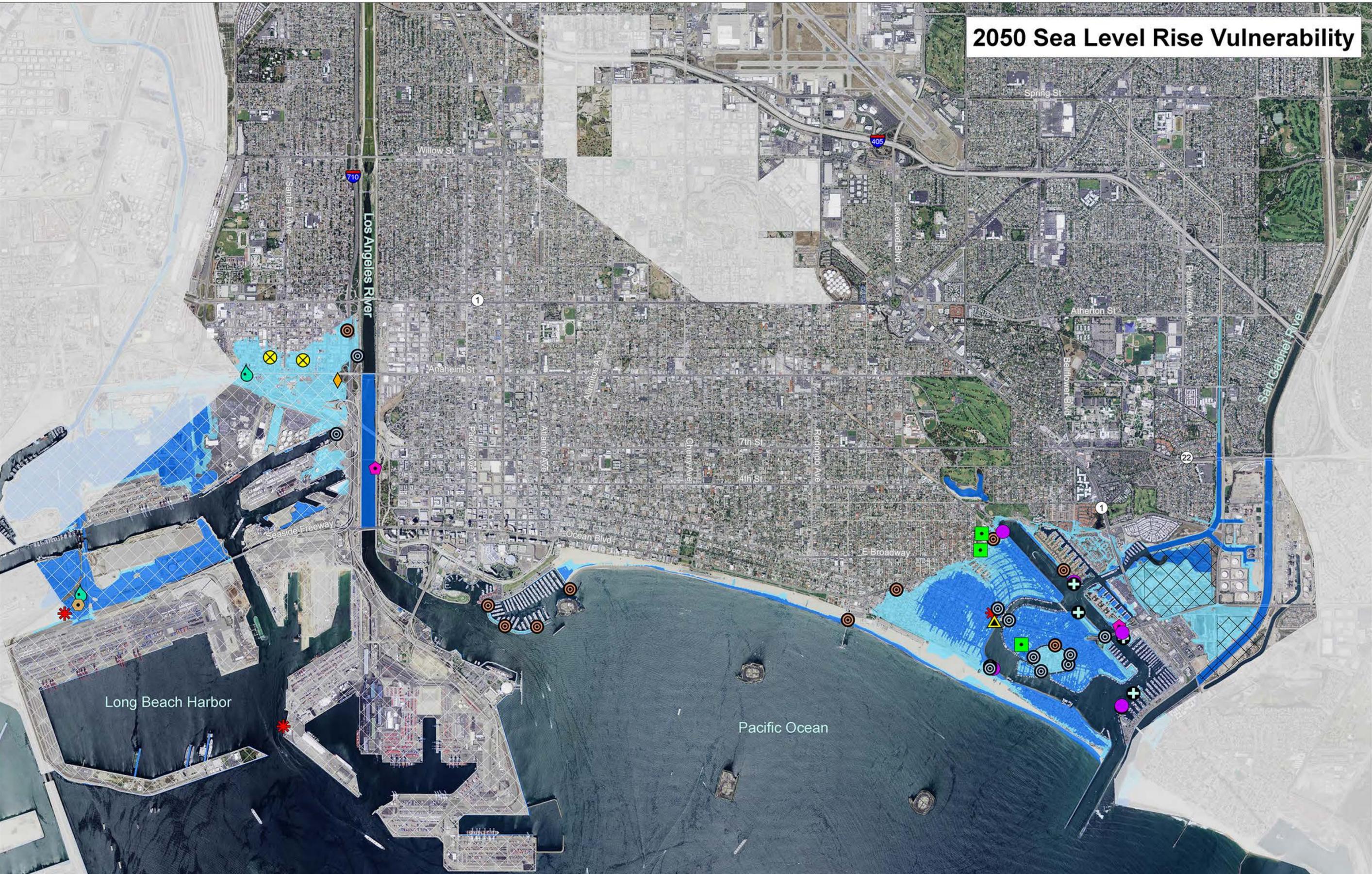
- |                              |  |                                    |
|------------------------------|--|------------------------------------|
| <b>11" Sea Level Rise</b>    | <b>Water &amp; Energy Infrastructure</b> | <b>Community Building/Facility</b> |
| King Tide                    | Sewer Pump Station                       | School                             |
| 100-Year Storm Surge         | Stormwater Pump Station                  | Fire Station                       |
| <b>Ecological Resource</b>   |  | Park, Rec, & Marine                |
| Los Cerritos Wetland Complex |  | Marine Safety                      |
|                              |  | Library                            |

Source: City of Long Beach; Southern California Edison, ESA Associates; Los Angeles County; U.S. Geological Survey Coastal Storm Modeling System (CoSMoS), AECOM, 2018



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# 2050 Sea Level Rise Vulnerability



**City of Long Beach 2050 Sea Level Rise Vulnerability: King Tide & 100-Year Storm Surge**

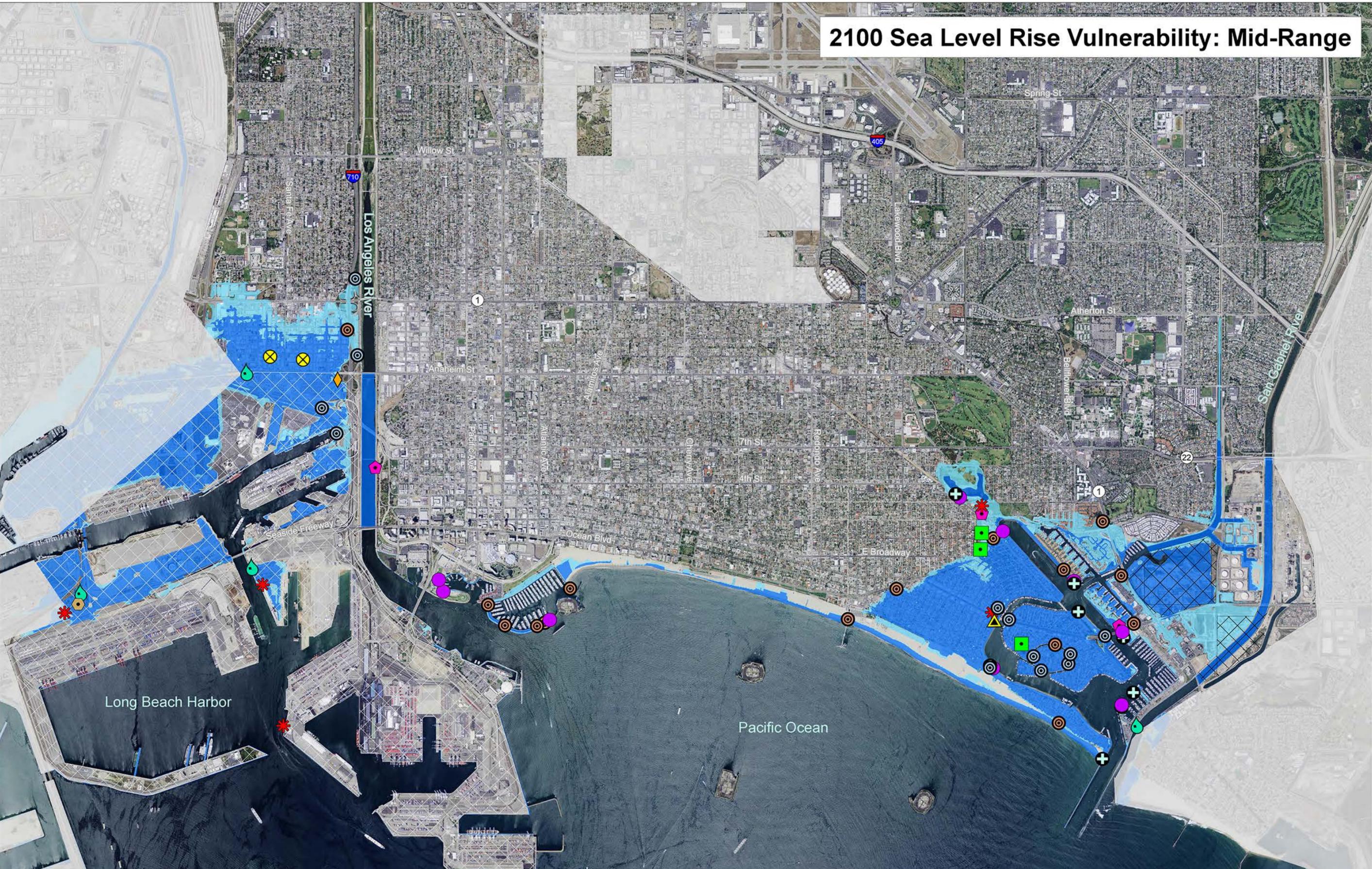
<p><b>11" Sea Level Rise</b></p> <ul style="list-style-type: none"> <li><span style="color: blue;">■</span> King Tide</li> <li><span style="color: lightblue;">■</span> 100-Year Storm Surge</li> </ul> <p><b>Ecological Resource</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px dashed gray; display: inline-block; width: 15px; height: 10px;"></span> Los Cerritos Wetland Complex</li> </ul>	<p><b>Energy Infrastructure</b></p> <ul style="list-style-type: none"> <li><span style="color: magenta;">◆</span> Substation</li> </ul> <p><b>Port of Long Beach</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid gray; display: inline-block; width: 15px; height: 10px;"></span> POLB Harbor District</li> </ul>	<p><b>Water &amp; Waste Infrastructure</b></p> <ul style="list-style-type: none"> <li><span style="color: teal;">◆</span> Potable Facility</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Stormwater Pump Station</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Sewer Pump Station</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Solid Waste Facility</li> </ul>	<p><b>Community Building/Facility</b></p> <ul style="list-style-type: none"> <li><span style="color: green;">■</span> School</li> <li><span style="color: red;">★</span> Fire Station</li> <li><span style="color: purple;">◆</span> Park, Rec, &amp; Marine</li> <li><span style="color: orange;">◆</span> Health Resource Center</li> <li><span style="color: yellow;">▲</span> Library</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Police Facility</li> <li><span style="color: blue;">+</span> Marine Safety</li> </ul>
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Source: City of Long Beach; Southern California Edison, ESA Associates; Los Angeles County; U.S. Geological Survey Coastal Storm Modeling System (CoSMoS), AECOM, 2018



These maps depict low-lying areas adjacent to the shoreline that may be exposed to flooding under existing and future coastal water levels under a "no action" scenario. The maps show potential flood extents associated with two scenarios: (1) annual king tide and (2) 1% annual chance coastal storm, for different amounts of sea level rise. The actual amount of flooding would depend on a number of factors, including the extent of any future shoreline and stormwater system improvements that may reduce the severity of future flooding. There is considerable uncertainty in the amount and timing of future sea level rise; however, maps such as these provide a better understanding of where the City should focus its efforts to reduce flood vulnerabilities now and in the future.

# 2100 Sea Level Rise Vulnerability: Mid-Range



**City of Long Beach 2100 Sea Level Rise Vulnerability: King Tide & 100-Year Storm Surge**

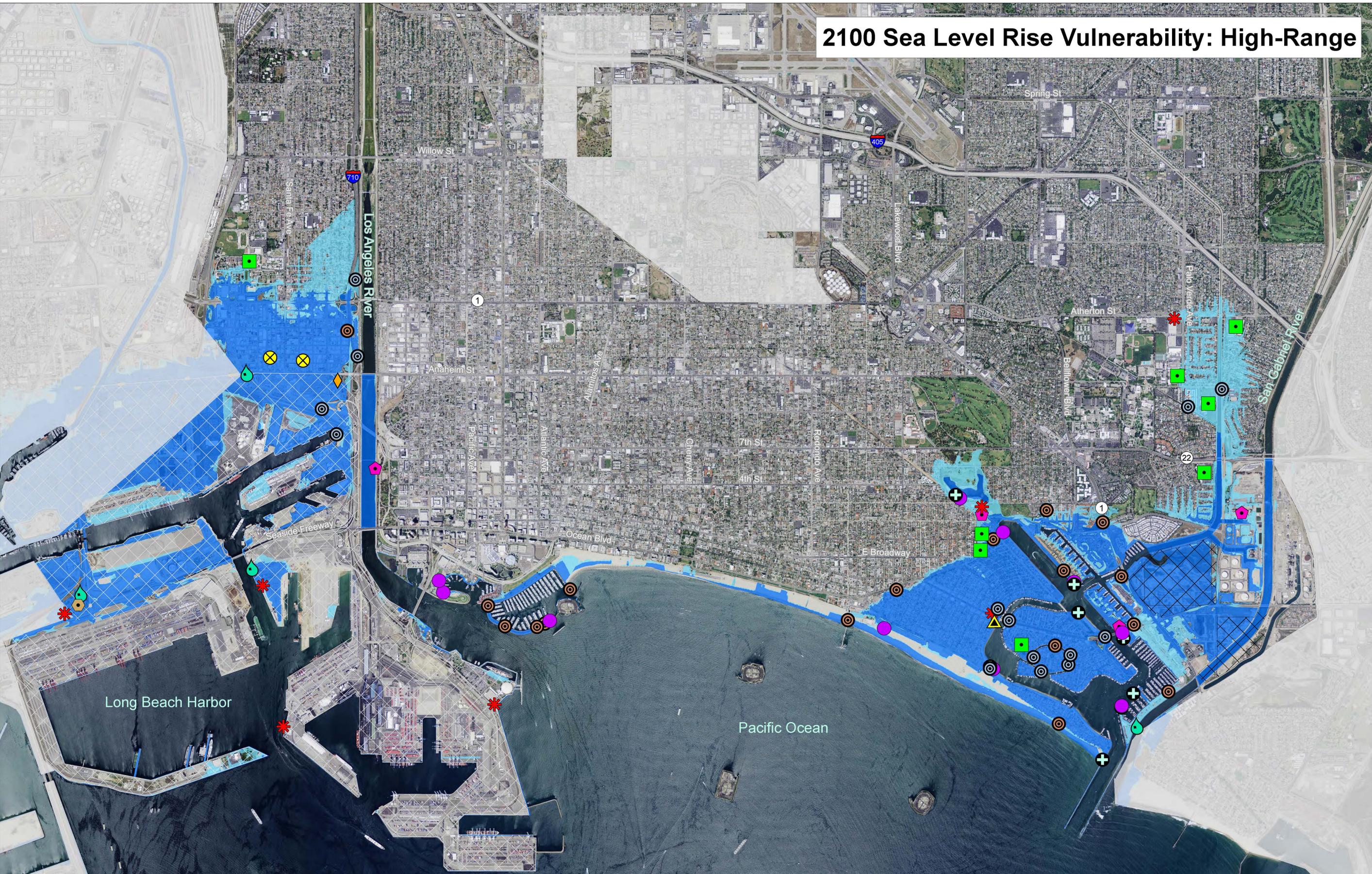
<p><b>37" Sea Level Rise</b></p> <ul style="list-style-type: none"> <li><span style="color: blue;">■</span> King Tide</li> <li><span style="color: lightblue;">■</span> 100-Year Storm Surge</li> </ul> <p><b>Ecological Resource</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px dashed gray; display: inline-block; width: 10px; height: 10px;"></span> Los Cerritos Wetland Complex</li> </ul>	<p><b>Energy Infrastructure</b></p> <ul style="list-style-type: none"> <li><span style="color: magenta;">◆</span> Substation</li> </ul> <p><b>Port of Long Beach</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid gray; display: inline-block; width: 10px; height: 10px;"></span> POLB Harbor District</li> </ul>	<p><b>Water &amp; Waste Infrastructure</b></p> <ul style="list-style-type: none"> <li><span style="color: teal;">●</span> Potable Facility</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Stormwater Pump Station</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Sewer Pump Station</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Solid Waste Facility</li> </ul>	<p><b>Community Building/Facility</b></p> <ul style="list-style-type: none"> <li><span style="color: green;">■</span> School</li> <li><span style="color: red;">★</span> Fire Station</li> <li><span style="color: purple;">◆</span> Park, Rec, &amp; Marine</li> <li><span style="color: orange;">◆</span> Health Resource Center</li> <li><span style="color: yellow;">▲</span> Library</li> <li><span style="color: yellow;">⊗</span> Police Facility</li> <li><span style="color: green;">+</span> Marine Safety</li> </ul>
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Source: City of Long Beach; Southern California Edison, ESA Associates; Los Angeles County; U.S. Geological Survey Coastal Storm Modeling System (CoSMoS), AECOM, 2018



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# 2100 Sea Level Rise Vulnerability: High-Range



**City of Long Beach 2100 Sea Level Rise Vulnerability: King Tide & 100-Year Storm Surge**

<p><b>66" Sea Level Rise</b></p> <ul style="list-style-type: none"> <li><span style="color: blue;">■</span> King Tide</li> <li><span style="color: lightblue;">■</span> 100-Year Storm Surge</li> </ul> <p><b>Ecological Resource</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px dashed gray; display: inline-block; width: 15px; height: 10px;"></span> Los Cerritos Wetland Complex</li> </ul>	<p><b>Energy Infrastructure</b></p> <ul style="list-style-type: none"> <li><span style="color: magenta;">◆</span> Substation</li> </ul> <p><b>Port of Long Beach</b></p> <ul style="list-style-type: none"> <li><span style="border: 1px solid gray; display: inline-block; width: 15px; height: 10px;"></span> POLB Harbor District</li> </ul>	<p><b>Water &amp; Waste Infrastructure</b></p> <ul style="list-style-type: none"> <li><span style="color: teal;">◆</span> Potable Facility</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block;"></span> Stormwater Pump Station</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block; background-color: #ccc;"></span> Sewer Pump Station</li> <li><span style="color: brown;">◆</span> Solid Waste Facility</li> </ul>	<p><b>Community Building/Facility</b></p> <ul style="list-style-type: none"> <li><span style="color: green;">■</span> School</li> <li><span style="color: red;">★</span> Fire Station</li> <li><span style="color: purple;">◆</span> Park, Rec, &amp; Marine</li> <li><span style="color: orange;">◆</span> Health Resource Center</li> <li><span style="color: yellow;">▲</span> Library</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block; background-color: #ccc;"></span> Police Facility</li> <li><span style="color: blue;">+</span> Marine Safety</li> </ul>
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