

STORMS







DEFINITIONS

Base Flood Elevation (BFE)

A 1% chance flood in a given year ("100 Year Flood"), accounts for tides, storm surge, wind waves & precipitation

King Tide

A very high tide when Earth, Moon and Sun align, several times annually

Mean Higher High Water (MHHW)

Average of higher high tides over 19 years (there are 2 high tides/day in SF Bay)

Mean Lower Low Water (MLLW)

Average of lower low tides over 19 years (there are 2 low tides/day in SF Bay)

North American Vertical Datum (NAVD 88)

NAVD 88 is the official vertical datum for the Conterminous United States and Alaska and is used as **a reference point to measure elevations.** Base Flood Elevation and projections of sea level rise are based on NAVD 88.

WATER LEVELS



PIER ELEVATION VS. BASE FLOOD ELEVATION (BFE)



SAN FRANCISCO SLR PROJECTIONS

Year	Most Likely Projection	Upper Range (Long-range Planning*)
2030	6 in	12 in
2050	11 in	24 in
2100	36 in	66 in

Reference: Sea level rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future (NRC 2012) *Note: the City uses the National Research Council's (NRC) most likely SLR projection of 36" for ongoing planning and development purposes related to environmental review and project approvals. This Action Plan considers adaptive strategies to address the NRC's upper end estimate of 66" of SLR by 2100 in the event that future GHG emissions and land ice melting accelerates beyond current predictions.

*With Storm Surge + King Tides: add ~ 40" (106" in 2100)

SEA LEVEL RISE – YEAR 2100 36" SLR + BFE



Combined Storm/ Sewer Outfall

HYDE S

Transit Infrastructure

BRANNAN STREET WHARF (2009)

ATTANTANTALITATION AND AN AN

Adapted to 16" of SLR

DOWNTOWN FERRY TERMINAL PHASE 2 EXPANSION



SLR DESIGN TO 2065, ADAPTIVE THROUGH 2100



PASSENGER PLAZA +4 FEET ABOVE THE





BAYFRONT SHORELINE RESTORATION (2012)



CRANE COVE PARK (Proposed)





PIER 70 FOREST CITY (Proposed)

- 25 acre waterfront site
- 4 feet elevation
- Managed retreat shoreline design
- Plan for future adaptation
- Avoid over-engineered



Stepped terracing can transition from recreation features today to protective adaptive management interventions in the future.



SWL 337 MISSION ROCK (Proposed)



New Flood Protection



SEA LEVEL RISE ADAPTATIONS

Interim Pier Flood Management

- Relocate utilities to topside
- Solid edge railings around piers
 - <u>fermenary flood</u> barriers o

aoorways

Long Term Shoreline Adaptation

- Citywide Adaptation Plan
- Funding needed
- Regional policy and funding collaboration



Seismic engineering study in progress

Historic Shoreline Seawall

Project

Boundary

SUMMARY

 FEMA indicates current flood risk for some Port piers, Agriculture Building, Mission Creek and Islais Creek for limited durations that can be managed during the next few decades

 MUNI tunnels, wastewater outfalls and infrastructure may be affected by Sea Level Rise after approximately 11-inches of SLR rise from today – expected in 2050, but could occur in worst case scenarios by 2030.

 The Port has incorporated projected sea level rise into planning and projects since 2007

SUMMARY

• A Citywide Sea Level Rise Adaptation Plan is underway by the City's Sea Level Rise Committee

• The Seawall Resilience Project is led by the Port, a major City safety and resilience effort for the Embarcadero Waterfront

• Port will continue regional coordination, including BCDC: monitor storm events, water levels and evolving SLR projections and solutions

 Port's Waterfront Plan Update provides the public forum to educate, solicit ideas and direction to guide solutions & policies

QUESTIONS & THANK YOU!

