



LAND DEVELOPMENT IN AREAS SUBJECT TO SEA LEVEL RISE

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HAYWARD AREA SHORELINE ADAPTATION MASTER PLAN

In 2021, the City of Hayward and the Hayward Area Shoreline Planning Agency (HASPA) has completed the development of a Shoreline Adaptation Master Plan to address anticipated sea level rise through the end of this century. The primary focus of the Shoreline Adaptation Master Plan is to mitigate the impacts of sea level rise through the construction of a perimeter levee intended to protect the shoreline and existing low-lying development from future inundation. A new levee would also protect any new development within these flood plain areas from coastal flooding. Any low-lying development, whether existing or new, would remain at risk of flooding from groundwater emergence and stormwater runoff after the construction of a perimeter levee.

The Shoreline Adaptation Master Plan aimed at reducing risk to critical assets from daily tidal inundation and future 100-year flood events in a up to 4' of sea level rise scenario. Based on a medium-risk aversion, it is estimated that the state will see approximately 4' of sea level rise in 50-60 years (California Coastal Commission recommendations, 2018). Due to complexities associated with estimating sea level rise and the evolving science, this estimate is subject to change. For planning purposes, the Shoreline Adaptation Master Plan used a target elevation of 14.3" (NAVD 88) to evaluate and assess adaptation strategies.

The Shoreline Adaptation Master Plan recommends that the City increase flood protection standards for new construction and renovations but does not identify or require a specific amount of sea level rise or minimum design elevations within the Master Plan. For more information about the Hayward Shoreline Adaptation Master Plan, please visit <https://www.hayward-ca.gov/shoreline-master-plan>

SEA LEVEL RISE MAPS

As part of the Shoreline Adaptation Master Plan, the City of Hayward and the Hayward Area Shoreline Planning Agency conducted a thorough analysis of future sea level rise scenarios based on guidance from the state and previous studies. Sea level rise scenarios of 2, 4, and 7 feet were used to prepare maps showing inundation from sea level rise, the 100-year flood event and groundwater emergence. These maps can be found here: [Sea Level Rise Mapping Report Story Map](#).

FLOOD PROTECTION AND SEA LEVEL RISE

The City of Hayward participates in the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA) and has adopted a [Flood Plain Management Ordinance](#). The intent of the ordinance is to protect development from existing flood hazards including coastal flooding and the threshold of protection is set at the 100-year event (1% chance of exceedance in any year). The primary purpose of the NFIP is to provide insurance protection for improved structures and does so by ensuring that structures are either located outside of the flood plain or elevated and protected where they may be located within a flood plain. As an example, the finish floor elevation of an industrial building near the shoreline may be elevated above and protected from the 100-year flood event while the surrounding grades including parking areas may be inundated during this same event.

Critically, FEMA flood plain maps do not account for sea level rise at this time. As sea levels rise in the coming century, the frequency of coastal flooding will increase as well. It is not known if, when, or how FEMA will incorporate sea level rise into the NFIP. Currently, the City has no ordinances or other

regulatory requirements for new development projects to account for future sea level rise; however, there are steps that applicants can take to mitigate these impacts on a project by project basis, as detailed below.

ELEVATIONS AND DATUMS

Tide charts are for sailors and fisherman, typically based on elevations relative to the average daily low tide within a 30-year epoch and not tied directly to any fixed elevations on land. For example, the current high tide is about 7 feet. After 3 feet of sea level rise, the high tide will still be 7 feet. Historically, elevation datums were also local, with cities often having varying datums or reference zero elevations; the zero elevation in San Francisco was different than the zero elevation in Hayward. The advent of Global Positioning Systems (GPS) in the 1980s lead to the establishment of the North American Vertical Datum, 1988 (NAVD88) which provides a consistent datum or zero elevation across the entire country. NAVD 88 is the datum used by most project surveyors when preparing a topographic site survey and by FEMA when preparing all flood maps. Therefore, when trying to understand tidal impacts to the shoreline, all elevations should be converted to the North American Vertical Datum 1988 (NAVD88).

CURRENT TIDAL EVENTS (ALL ELEVATIONS PER NAVD88)

The National Oceanic and Atmospheric Administration (NOAA) maintains several tide stations within San Francisco Bay including along the Hayward shoreline, however the closest tide station with an elevation tie to the NAVD88 datum is at San Leandro Marina. Using information from this tide station:

- Mean Higher High Water (average daily high tide) ~ 7.0 feet
- King Tide (annual highest tide or 1-year event) ~ 8.5 feet
- 100-Year Flood (tidal event and storm surge) ~ 10.3 feet (11 feet per FEMA maps)

A key takeaway is that the 100-year (1% change of exceedance) event is about 2 feet above the annual king tide event – an elevation difference that should remain consistent even with future sea level rise.

CONSIDERATIONS FOR NEW INDUSTRIAL PROJECTS NEAR THE SHORELINE

Much of the current development occurring near the Hayward shoreline is industrial with a tilt up concrete structure(s) surrounded by parking and/or truck loading docks. Due to the nature of loading docks, the surrounding parking areas and other site amenities are often a couple feet below the finish floor elevation of the structure.

Since the City's flood plain ordinance and FEMA already require that finish floor elevations be raised above the 100-year flood (1% chance of exceedance) elevation, much of the new development, including both structure and contents within those structures, are generally protected. Parking lots, loading docks, and other sitework are typically less expensive and usually able to withstand an occasional period of inundation. Therefore, protecting parking and site improvements by elevating above the annual king tide event may be deemed prudent and may result in potentially significant cost savings for a new development.

Buildings and site improvements constructed above the 100-year and king tide elevations, respectively, can be assumed to have some protection against sea level rise.

PROJECT SPECIFIC INFORMATION

The following information was taken from the site topography and grading plans for the U-Haul project with all elevations converted to the NAVD88 datum:

Finish Floor Elevation	13.2 feet
Parking areas, typical	10.7 feet
Loading dock	9.2 feet

As proposed, the U-Haul project meets the current City requirements for flood protection. Furthermore, it can be inferred that the U-Haul warehouse has 100-year (1% chance of exceedance) protection for approximately 3 foot of sea level rise and that the parking areas will begin to flood during king tide events with about 2 feet of sea level rise. The loading dock is at most risk, flooding annually with about 1 foot of sea level rise and daily with about 2 feet of sea level rise.

