

**Tsunami.** Because the Plan Area abuts Monterey Bay and the Pacific Ocean, inundation from tsunami is possible. Tsunamis are typically triggered by earthquakes, local or distant, and can also be triggered by larger underwater landslides. A submarine landslide in the Monterey Canyon offshore of the Plan Area is considered capable of producing a significant tsunami on Monterey Bay (Greene et al 2003). Large tsunamis can result in significant damage and loss of life.

Large portions of the Plan Area are shown as areas of potential tsunami wave movement (California Emergency Management Agency, et al 2009). Figure 39, Tsunami Inundation Areas, show the areas considered most likely to be inundated in the event of a major tsunami affecting the Monterey Bay area. The actual pattern of tsunami movement onto land is dependent on numerous factors, including the location and size of the event triggering the tsunami, tidal phase, etc. Tsunami movement and the extent of inundation could be significantly altered with sea level rise. Therefore, the tsunami planning maps provide only a rough guide. Several notable areas shown as likely being outside of the reach of a tsunami include much of The Heights, the power plant, and the refractory. Sea level rise would move the landward limit of the high hazard erosion zone farther inland. By 2100, with a 1.4-meter rise in sea level, this shift would significantly affect the southern end of the Island, and to a lesser degree, the northern part of the Island, Jetty Road, and the western end of Potrero Road, making these areas more susceptible to storm surges and tsunami (Pacific Institute et al 2009). Small amplitude seiches occur regularly within Monterey Bay, but do not result in damage (Breaker et al 2010).

The two most recent earthquakes that have caused recorded tsunami run-up heights that exceeded one meter in the Plan Area occurred in 1960 and 1964. The 1960 Chilean Earthquake of estimated magnitude 9.5 caused a 1.1-meter run-up and killed one person, while the slightly smaller but nearer 1964 Alaska earthquake of magnitude 9.2 caused a 1.4-meter run up and significant boat damage at harbors in the Monterey Bay area. According to the State of California Seismic Safety Commission Report released in December 2005, the maximum estimated run-up height in Monterey Bay is one to two meters (Monterey County 2008, page 4.4-4, URS 2007). However, tsunamis generated by large earthquakes in the Cascadia Fault

Zone that runs from northern California to British Columbia, have occurred at approximate 500 year intervals, and could potentially result in much larger waves along the northern California coast. The most recent of these very large Cascadia Fault-generated tsunamis was a magnitude 9.0 earthquake that occurred in January 1700 and caused a tsunami that struck as far away as Japan (Natural Resources Canada 2013, United States Department of Homeland Security et al 2013).

Table 28, Historic Tsunamis near Plan Area, lists tsunamis and recorded wave heights at locations within 100 miles of the Plan Area (roughly Pt. Reyes to San Simeon) from 1859 to present. Only tsunamis with wave height of one meter or greater are included.

**Table 28 Historic Tsunamis near Plan Area**

<b>Date</b>	<b>Source of Tsunami</b>	<b>Location Wave Recorded</b>	<b>Wave Height</b>
September 24, 1859	Northern California	Half Moon Bay	4.6 meters
October 21, 1868	San Francisco Bay Area	San Francisco Bay	4.5 meters
June 15, 1896	Japan	Santa Cruz	1.5 meters
April 1, 1946	Alaska	Half Moon Bay	2.6 meters
		Santa Cruz	1.5 meters
May 22, 1960	Chile	Monterey	1.1 meters
		Pacifica	1.2 meters
March 28, 1964	Alaska	Moss Landing	1.4 meters
		Monterey	1.4 meters
		Capitola	1.4 meters
		Santa Cruz	1.5 meters
October 18, 1989	Northern California	Moss Landing	1.0 meters
March 11, 2011	Japan	Pillar Point	1.5 meters

*Source:* California Department of Conservation 2013; California Coastal Commission 2011.

*Note:* Maximum wave height from March 11, 2011 Japanese tsunami at Monterey Harbor was 2.4 feet (0.72 meters).