

**Topic:** Sea Level Rise Adaptation  
**Resource Type:** Regulations  
**State:** California  
**Jurisdiction Type:** Municipal  
**Municipality:** City of San Francisco  
**Year (adopted, written, etc.):** 2008  
**Community Type - applicable to:** Urban; Suburban  
**Title:** San Francisco Bay Conservation & Development Commission  
**Document Last Updated in Database:** April 15, 2017

### ***Abstract***

The San Francisco Bay Conservation and Development Commission's 2008 Bay Plan incorporates policy considerations that are responsive to sea level rise. Because the Commission found that water levels in the Bay are likely to increase due in part to rising global sea levels, the Bay Plan establishes policies that structures on fill or near the shoreline have adequate flood protection and that all proposed development projects be "sufficiently high above the highest estimated tide level" for the expected life of the project. Furthermore, the Plan calls on local governments and special districts to assure that their land use planning requirements reflect future relative sea level rise and assure that new structures and uses attracting people are not approved in flood prone areas.

### ***Resource***

*Editor's Note:* The text below contains relevant provisions excerpted from Parts III and IV of the Plan. The remaining provisions of these sections have been omitted due to length.

#### **Part III - The Bay as a Resource: Findings and Policies Tidal Marshes and Tidal Flats**

##### **Findings**

k. Sedimentation is an essential factor in the creation, maintenance and growth of tidal marsh and tidal flat habitat. However, scientists studying the Bay estimate that sedimentation will not be able to keep pace with accelerating sea level rise, due largely to declines in sediment entering the Bay from the Sacramento and San Joaquin Delta, thus potentially exacerbating shoreline erosion and adversely affecting the sustainability of future wetland restoration projects.

#### **Part IV - Development of the Bay and Shoreline: Findings and Policies Safety of Fills**

## Findings

c. Safety of a fill also depends on the manner in which the filling is done, and the materials used for the fill. Similarly, safety of a structure on fill depends on the manner in which it is built and the materials used in its construction. Construction of a fill or building that will be safe enough for the intended use requires:

- (1) recognition and investigation of all potential hazards—including
  - (a) settling of a fill or building over a long period of time,
  - (b) ground failure caused by the manner of constructing the fill or by shaking during a major earthquake, and
  - (c) height above high water level—and
- (2) construction of the filling or building in a manner specifically designed to minimize these hazards.

While the construction of buildings on fills overlying Bay deposits involves a greater number of potential hazards than construction on rock or on dense hard soil deposits, adequate design measures can be taken to reduce the hazards to acceptable levels. Similarly, while the construction of a building on fill over the Bay or on the shoreline can involve tidal flooding risk because of extreme high water levels, storms, and rise in sea level, adequate project design measures can be taken to minimize the hazards to an acceptable risk.

g. Bay water levels are likely to increase in the future because of a relative rise in sea level. Relative rise in sea level is the sum of: (1) a rise in global sea level and (2) land elevation change (lifting or subsidence) around the Bay. If historic trends continue, global sea level should increase between four and five inches in the Bay in the next 50 years and could increase approximately one and one-half to five feet by the year 2100 depending on the rate of accelerated rise in sea level caused by the "greenhouse effect," the long-term warming of the earth's surface from heat radiated off the earth and trapped in the earth's atmosphere by gases released into the atmosphere. The warming would bring about an accelerated rise in sea level worldwide through thermal expansion of the upper layers of the oceans and melting of some of the earth's glaciers and polar ice packs. Land elevation change caused by tectonic (geologic including seismic) activity, consolidation or compaction of soft soils such as Bay muds, and extraction of subsurface groundwater or natural gas extraction, is variable around the Bay. Consequently, some parts of the Bay will experience a greater relative rise in sea level than other areas. For example, in Sausalito, the land area has been gradually lifting while in the South Bay excessive pumping from underground fresh water reservoirs has caused extensive subsidence of the ground surface in the San Jose area and as far north as Dumbarton Bridge (map of Generalized Subsidence and Fault Zones shows subsidence from 1934 to 1967). Indications are that if heavy ground-water pumping is continued indefinitely in the South Bay area, land in the Alviso area (which has already subsided about seven feet since 1912) could subside up to seven feet more; if this occurs, extensive levees may be needed to prevent inundation of low-lying areas by the extreme high water levels.

## Policies

4. To prevent damage from flooding, structures on fill or near the shoreline should have adequate flood protection including consideration of future relative sea level rise as determined by competent engineers. As a general rule, structures on fill or near the shoreline should be above the wave runup level or sufficiently set back from the edge of the shore so that the structure is not subject to dynamic wave energy. In all cases, the bottom floor level of structures should be above the highest estimated tide elevation. Exceptions to the general height rule may be made for developments specifically designed to tolerate periodic flooding.

5. To minimize the potential hazard to Bay fill projects and bayside development from subsidence, all proposed developments should be sufficiently high above the highest estimated tide level for the expected life of the project or sufficiently protected by levees to allow for the effects of additional subsidence for the expected life of the project, utilizing the latest information available from the U.S. Geological Survey and the National Ocean Service. Rights-of-way for levees protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.

6. Local governments and special districts with responsibilities for flood protection should assure that their requirements and criteria reflect future relative sea level rise and should assure that new structures and uses attracting people are not approved in flood prone areas