Scenario One: Sea Level Rise

Core Problem

Your school is located in an area within San Mateo County that is vulnerable and susceptible to sea-level rise and flooding. American researchers project sea levels in San Mateo County to rise 6 inches by 2030, and 1-2 feet by 2050. The area your school is located in will experience nearly half an inch of sea level rise each year for the next 30 years. This will not only affect the school environment but the routes to and from school.

Background Information

The Bay shoreline, from Brisbane to East Palo Alto, is a typical San Francisco Bay low-lying shoreline which provides vital ecological, industrial, and residential functions yet is already vulnerable to inundation from both tidal and fluvial (river) sources. Both the San Francisco International Airport and the Port of Redwood City are at risk, as are segments of critical transportation infrastructure including sections of Highway 101, approaches to the Dumbarton and San Mateo Bridges, and the Caltrain rail lines.

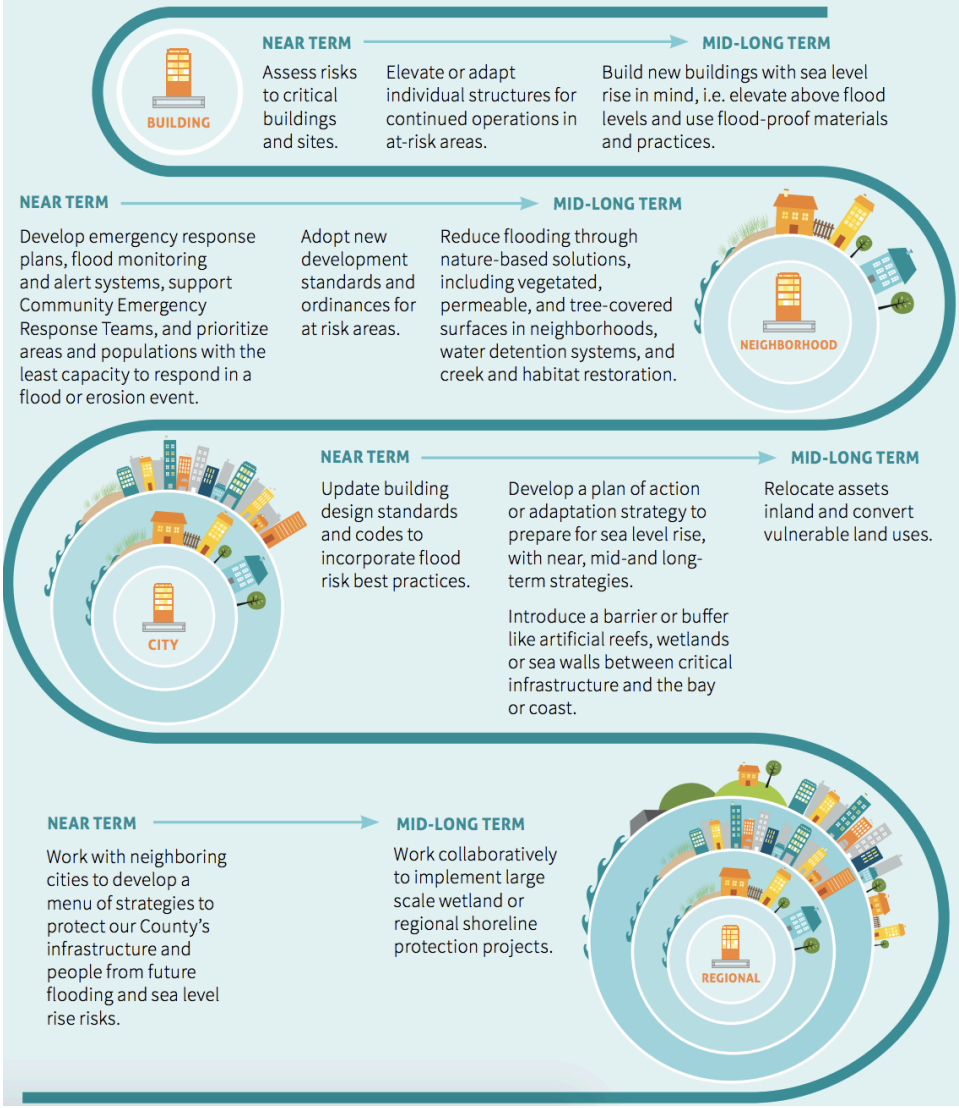
According to a 2009 study by the California Energy Commission (CEC), the Pacific Institute, and others, 110,000 people (14%) live in areas of San Mateo County that are vulnerable to a 100-year flood event with a 1.4 meter rise in sea level. City and County infrastructure and facilities at risk from the same event include:

- $24 billion worth of buildings and contents, mostly along the Bay (replacement value)
- 530 miles of roadways
- 10 miles of railroads
- San Francisco International Airport (SFO), including the 31 MW United Cogen power plant located there
- Wastewater treatment plants operated by the Cities of South San Francisco/San Bruno, City of Millbrae, City of San Mateo, South Bayside System Authority, Mid-Coastside Sewer Authority, and SFO (total treatment capacity of approximately 44 MGD)
- 78 EPA-regulated hazardous materials sites
- 34 square miles of coastal wetlands

Design Challenge: Adaptation Solutions
Your team has been asked by city engineers to design an infrastructure solution to deal with this increase in water from sea level rise (only focusing on salt water). Examples of infrastructure solutions for sea level rise include: levees, seawalls, wetlands restoration, asset elevation, etc. The solution should be focused on your school community, but could scale up to other parts of the city or residential neighborhoods if applicable.

This will be your first brainstorming session, and you have been asked to brainstorm ideas and then rapid prototype one of the ideas. It is recommended you use your time in the following way:

- Brainstorm Ideas: 5 minutes
- Make 2-3 ideas visible with a drawing: 10 minutes
- Create a 3D prototype: 15 minutes



Resources: Sea Level Rise Vulnerability Assessment, San Mateo County Climate Action Plan; SMC Sheriff's Office Resources, NOAA - Coastal Flooding in California, Sea Level Rise.org, Foster City Flood Risk

https://sealevelrise.org/

Sea level rise is caused primarily by two factors related to global warming: the added water from melting ice sheets and glaciers and the expansion of seawater as it warms

Although the sea level has risen by 6.5 inches since 1950, nearly half of it (3 inches) has occurred in just the last 20 years. This small increase in sea level has caused on average a 233% increase in tidal flooding across the United States. Minor increases of even an inch in the sea level are causing real problems everywhere—from Texas to Florida to New York. Higher seas mean more water and more flooding during high tides, hurricanes, and rainstorms.

The sea level around San Francisco, California, has risen by 6 inches since 1950. Its speed of rise has accelerated over the last ten years and it's now rising by about 1 inch every 10 years.[1]

King tides, as they're colloquially known, are naturally occurring sea-level-rise events that happen twice a year, when the sun and the moon's gravitational pulls are in alignment—sort of like a lopsided cosmic tug-of-war game, resulting in performance-enhanced tides.