FACT SHEET: CLIMATE CHANGE

Purpose and Requirements

State law requires general plans to include a Safety Element to identify and address natural and human-made hazards, as well as climate adaptation and resiliency.

As part of the City of Oakland's General Plan Update, the Safety Element presents a framework for minimizing risks posed by these hazards that may impact residents' health and welfare. This Element aims to protect residents, workers, and visitors from seismic and geologic hazards, fire hazards, hazardous materials, flooding, and other potential hazards that risk life and property. The Safety Element is supplemented by the Local Hazard Mitigation Plan, the Climate Change Vulnerability Assessment, and closely connected to the Environmental Justice and Housing Elements of the General Plan.

This fact sheet describes the unique threats that climate change poses to Oakland, areas and populations at greatest risk, and future adaptation priorities.

[1] Oakland Municipal Code Section 2.29.170.1

Safety and Racial Equity Goals

A guiding principle of Oakland's General Plan update is to advance the City's mission to "intentionally integrate, on a Citywide basis, the principle of 'fair and just' in all the City does in order to achieve equitable opportunities for all people and communities."[1]

The Safety Element's goals and policies prioritize "frontline communities", or vulnerable communities that will be affected 'first and worst' from climate change and environmental hazard impacts.

Social vulnerability indicators include:


Renters


Under 5 years old


Very low income


Non-U.S. Citizens


Without a vehicle


People with disabilities


Single parent families


Communities of color


65+ living alone


Limited English proficiency


Without a high school degree


Severely housing cost burdened

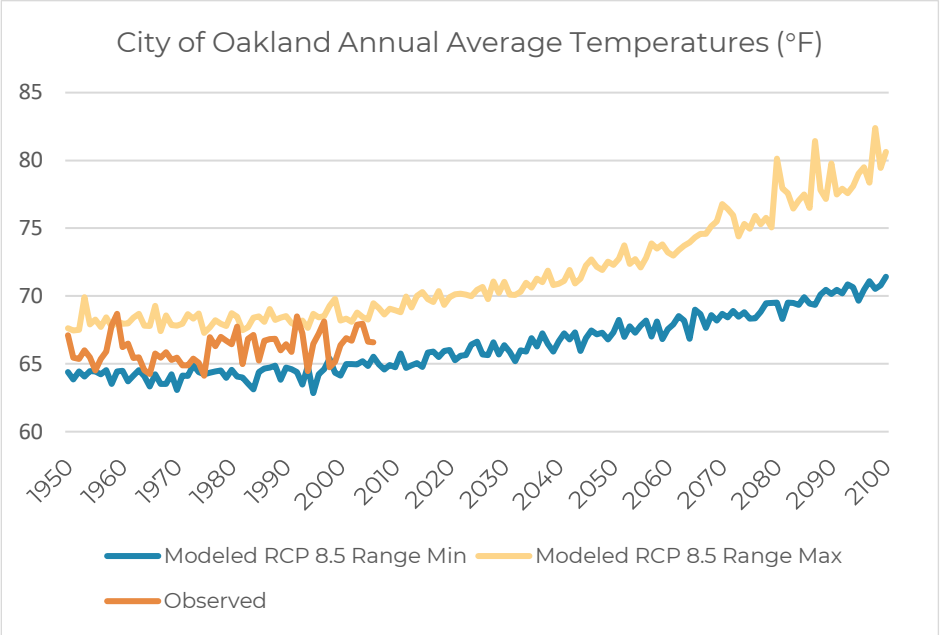
What Is Climate Change?

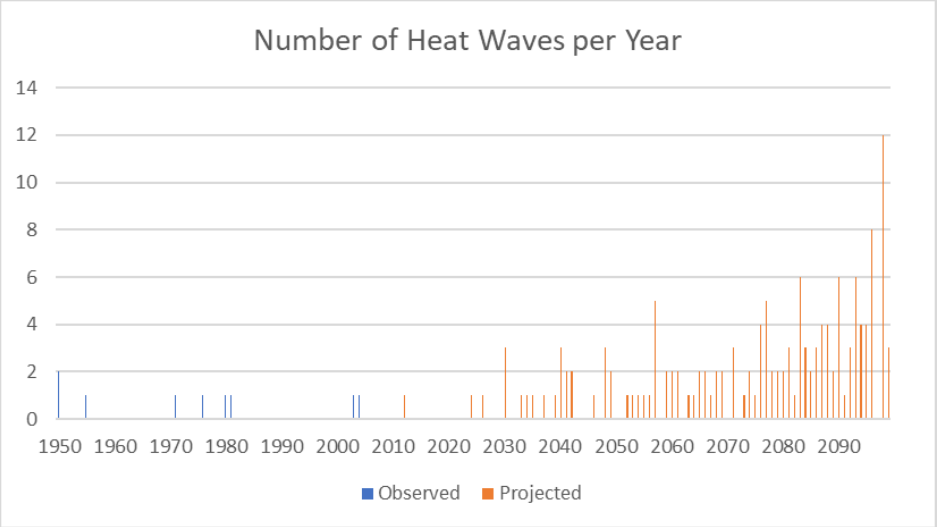
Climate change refers to long-term shifts in global temperature and weather patterns. The continued release of greenhouse gas emissions such as carbon dioxide (CO_2) and methane (CH_4) have contributed to rising average global temperatures, which have a host of downstream effects on the entire climate system. Climate change has resulted in increased impacts on natural hazards, including increased temperature, drought wildfire, flooding, and sea level rise. Each of these climate change impacts occur at different rates, in different ways, and may have more severe impacts on some communities and community members than others.

Climate Change Hazards

Urban heat

Oakland will experience increases in temperature and frequency of heat waves in the future throughout the 21st century. Increases in temperature may be felt most strongly by those living in urban heat islands – pockets of the urban environment, usually areas with large amounts of paved surfaces and limited tree canopy, where temperatures can dramatically exceed those in neighboring non-urban areas.





Increased average temperatures, heat waves, and heat islands can contribute to heat-related illness. Older adults, children, and those taking certain medication are more sensitive to the health impacts of heat, as well as those experiencing homelessness, outdoor workers, individuals that depend on medical equipment, individuals with impaired mobility, and those without access to adequate home insulation, air conditioning, or ventilation.[2, 3]

Infrastructure impacts include strains on the electrical grid sector via reduced efficiency and increased demand for air conditioning, increased hospital visits and demand for medical services resulting from heat-related illnesses, and potential damage to transportation infrastructure and increased discomfort with active and public transportation.

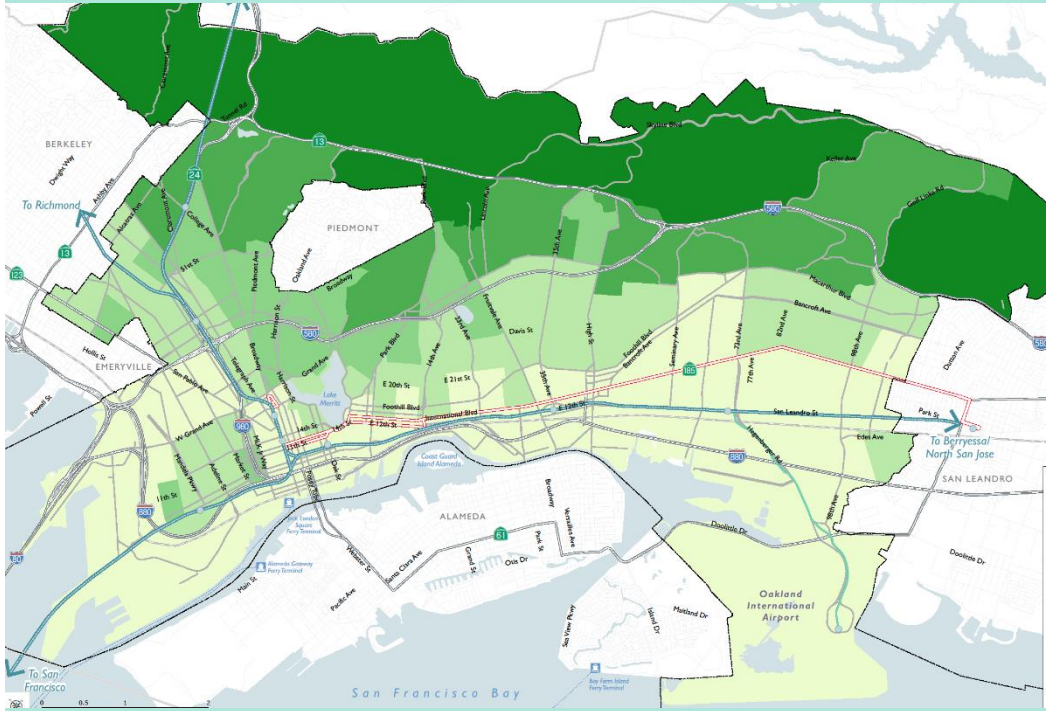
While the entire City of Oakland is likely to be impacted by temperature increases and its associated impacts, those in urban heat islands, including parts of Fruitvale/South Kennedy, the Coliseum Industrial Complex, Frick/Bancroft Business area, Castlemont, Oak Knolls-Golf Links/Chabot Park, Webster, and the Oakland International Airport area, are most likely to be impacted.

Adaptation priorities for temperature increases and extreme heat include establishing and identifying public air-conditioning equipped facilities, improving equitable tree canopy and green infrastructure distribution, and improving efficient air-conditioning and building electrification options.

[2] Maxwell, K., Julius S., Grambsch A., Kosmal A., Larson L., Sonti, N., Built Environment, Urban Systems, and Cities. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II (Washington D.C., 2018). Oct 28, 2019: https://nca2018.globalchange.gov/chapter/11/.

Tree Canopy

Trees and irrigation can help reduce urban heat effects. Currently, Oakland's tree canopy is disproportionately distributed as shown in the map below. Many of the more affluent/majority-white census tracts in North Oakland and the Oakland Hills contain significantly greater percentage of tree canopy cover compared to Downtown, West Oakland, and East Oakland neighborhoods.



[3] Gronlund CJ. "Racial and Socioeconomic Disparities in Heat-Related Health Effects and Their Mechanisms: s Review." Current Epidemiology Reports, 2014. May 3, 2020: https://link.springer.com/article/10.1007/s40471-014-0014-4.

Water Cycle Shifts

Climate change models will also affect the water cycle, which can cause drought, increased wildfire risk, flooding, reduction in winter snowpack, groundwater depletion, and strain to health, energy, and infrastructure systems.

Drought can affect production of crops, concentration of pollutants in the environment, water prices; availability cooling options like shady trees during extreme heat days. Flooding effects will be felt most strongly in coastal and low-lying areas, and areas with inadequate stormwater infrastructure, as described on the hydrology section of the hazards factsheet.

While drought varies year to year, water conservation tactics employed by the City and its residents can help to increase resilience. Stormwater flooding risks can be mitigated through improved stormwater management and infrastructure improvement.

Wildfire

Climate change is expected to increase wildfire risk and intensity by increasing temperatures, reducing snowpack, increasing fuel (e.g., more dead vegetation due to drought), and altering precipitation patterns.

Wildfires emit hazardous air contaminants, and wildfire smoke can cause health effects like restricted breathing; eye irritation; and aggravation of respiratory and heart diseases. Unhoused populations; young children; middle-aged and older adults; pregnant women; those with hypertension, diabetes, and COPD; and smokers are particularly sensitive to smoke.

Wildfires can also increase the risk of landslides and water contamination, and ash may contain high levels of heavy metals that can impact soil and water quality.[4],[5] Power lines or pipes in the direct path of a fire can be damaged, and wildfire in the Sierra Nevada may affect water and energy infrastructure that the Oakland region relies on.[6] Wildfire can also cause road and airport blockages, closures, power source disruption, and reduced road visibility.

Adaptation priorities for wildfire include expanding accessibility of wildfire preparedness, undertaking ecologically sensitive vegetation management, investing in Electric Vehicle (EV) emergency response vehicles, and establishing and identifying clean air facilities.

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[4] City of Oakland 2021 – 2026 Local Hazard Mitigation Plan
[5] Finlay SE., Moffat A., Gazzard R., Baker D., Murray, V. “Health Impacts of Wildfires.” PLos Currents, Nov 2, 2012. Oct 29 2019: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3492003/.

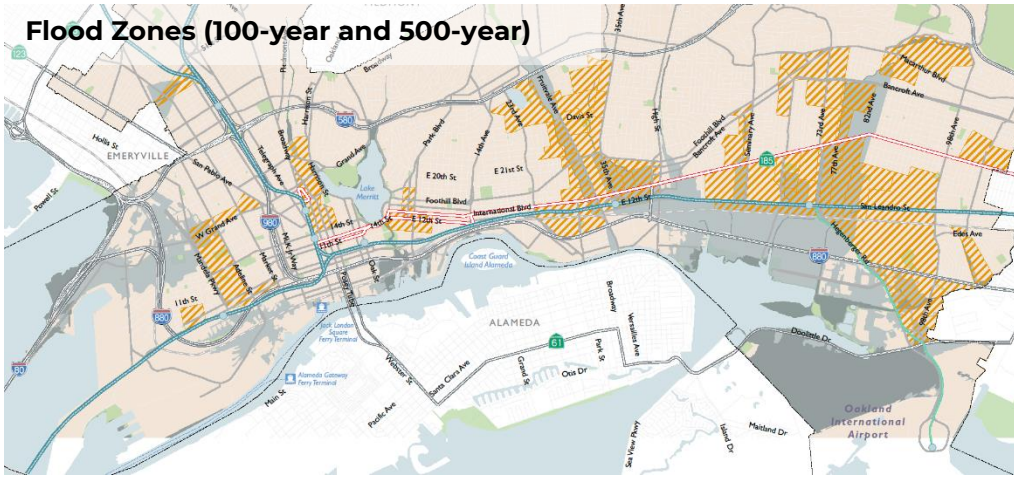
[6] East Bay Municipal Utility District Urban Water Management Plan 2020 file:///C:/Users/clare.DB/Downloads/UWMP-2020-FINAL-bookmarks%20(1).pdf

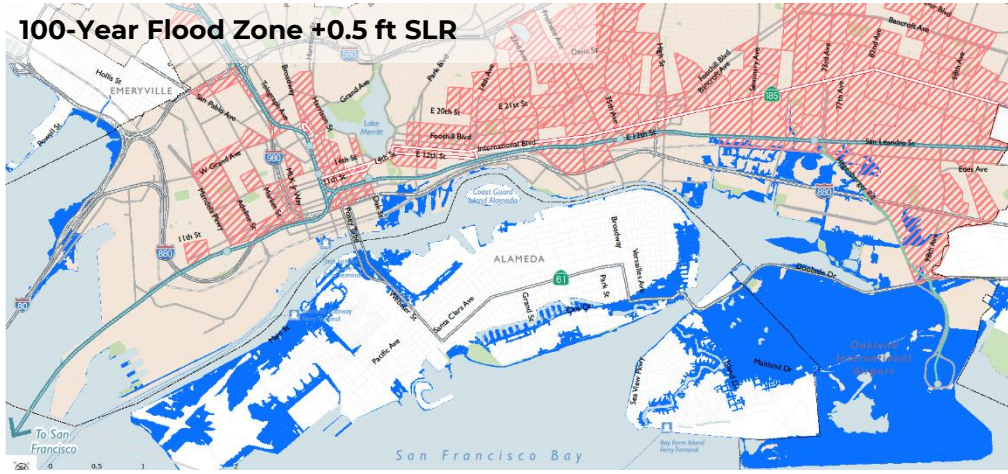
Sea Level Rise

Oakland is bordered to the west by more than 20 miles of San Francisco Bay coastline, which will be threatened in the future by sea level rise. Sea level rise (SLR) has already increased San Francisco Bay water levels by nearly eight inches in the last century. [7]

The main flooding threats in Oakland are shown at the top right. Dark gray shows the 100-year flood plain (where there is a 1 percent chance of a flood occurring) , and light gray shows the 500-year flood plain (where there is a 0.2 percent chance of a flood occurring). Most of the City's developed shoreline is not in the current 100-year Flood Zone, except the north part of the Oakland International Airport.[8]

Sea level rise will cause areas once considered to be at low risk to experience periodic coastal and/or urban flooding, especially places like the Port of Oakland and the Oakland International Airport. In the map on the bottom for 0.5 foot of SLR (shown in blue), the City's exposure to 100-year coastal flooding remains similar to present day, with Oakland International Airport and the Jack London District being most at risk. For 5.5 ft of SLR which is estimated to have a 1-in-200 chance of occurring by 2090, the city's entire shoreline is threatened by coastal flooding.





[7] National Oceanic and Atmospheric Administration (NOAA), 2018. Center for Operational Oceanographic Products and Services (CO-OPS), NOAA Sea-Level Trends 1987-2018, 2018. tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9414290.

The City of Oakland could also face flood risk from rising groundwater, which could also lead to groundwater contamination in areas where hazardous materials are stored underground.[8] With groundwater intrusion scenarios, flooding is predicted to extend farther inland than current sea level rise and 100-year coastal flood event projections. Groundwater intrusion occurs when sea water pushes the water table up or above the ground surface, potentially causing damage to underground pipes and water flow systems.

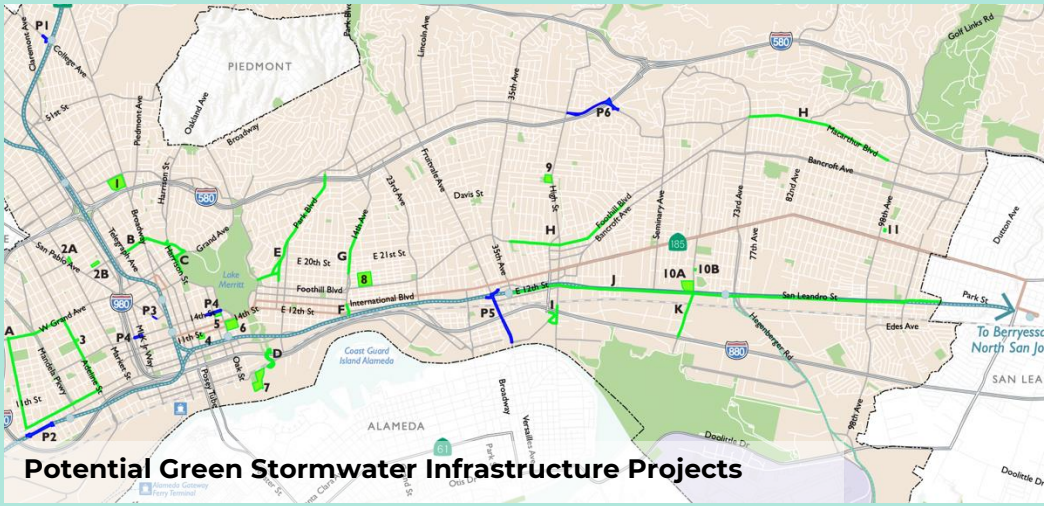
Adaptation priorities for sea level rise and flooding include expansion of green infrastructure to mitigate stormwater impacts, development of a Storm Drainage Master Plan, monitoring groundwater levels, and planning for/implementing standards for future sea-level rise and infrastructure building.

[8] "Shallow Groundwater Response to Sea Level Rise | San Francisco Estuary Institute." Www.sfei.org, www.sfei.org/projects/shallow-groundwater-response-sea-level-rise. Accessed 25 July 2022.

Green Infrastructure

"Green Stormwater Infrastructure" refers to a variety of practices and engineered facilities designed to detain and clean, capture and reuse, or infiltrate stormwater runoff to reduce the volume of runoff and improve water quality. In accordance with the City's Resilient Oakland Playbook, Oakland will use green stormwater infrastructure to manage stormwater and help reduce the risk of nuisance flooding, where feasible, from smaller storms.

The map below shows planned green stormwater infrastructure projects in blue and street improvement projects in green, many of which are planned for high flood hazard regions in Oakland with socially vulnerable populations. See the Green Stormwater Infrastructure Plan for more information.



Potential Green Stormwater Infrastructure Projects