City of Brentwood – Climate Vulnerability Assessment

Climate change is a global phenomenon that may affect each community differently. In recognition of this, Senate Bill 379, Land Use: General Plan: Safety Element (Jackson, 2015) requires "a city or county to adopt a comprehensive, long-term general plan that includes various elements, including, among others, a safety element for the protection of the community from unreasonable risks associated with the effects of various geologic hazards, flooding, and wildland and urban fires."[1] Thus, a city or county's safety element is to be reviewed and updated as necessary to address applicable climate adaptation and resiliency strategies, including a set of goals, policies, and objectives based on a vulnerability assessment. A Climate Vulnerability Assessment (CVA) serves as the foundation for the Safety Element's Update and Climate Change section, as described in the State's General Plan Guidelines (2023).[2] This CVA is also designed to meet the requirements set forth in the Board of Forestry and Fire Protection's June 2020 General Plan Safety Element Assessment.[3]

This document discusses the climate change effects a community will experience, otherwise known as exposures, based on guidance from the California Governor's Office of Emergency Services (Cal OES) California Adaptation Planning Guide (APG)[4]. In addition to reviewing the City of Brentwood (City)'s exposures to climate change, this document supports Contra Costa County's 2024 Hazard Mitigation Plan (HMP). The County's HMP discusses sensitivity, potential impacts, adaptive capacity, and vulnerability scoring to assess the vulnerability of the City to the effects of climate change.

Data for this CVA was collected from sources including the following:

- CalAdapt
- California's Fourth Climate Change Assessment, 2018[5]
- California's Fourth Climate Change Assessment, San Francisco Bay Area Regional Report, 2018
- Contra Costa County Local Hazard Mitigation Plan, 2024
- Association of Bay Area Governments, Regional Resilience Toolkit, 2019
- California Adaptation Planning Guide

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[1] Senate Bill No. 379, Approved by Governor October 8, 2015. Available at https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB379. Accessed January 23, 2024.

[2] Governor's Office of Planning and Research (OPR), General Plan 2023 Guidelines. Available at https://opr.ca.gov/planning/general-plan/guidelines.html. Accessed January 23, 2024.

[3] California Board of Forestry and Fire Protection, General Plan Safety Element Assessment, June 2020. Available at https://bof.fire.ca.gov/media/o4ajs021/rpc-2-a-san-diego-county-safety-element-assessment-2021-final.pdf. Accessed January 23, 2024.

[4] Governor's Office of Emergency Services, California Adaptation Planning Guide, June 2020 Final Draft. Available at https://www.caloes.ca.gov/wp-content/uploads/Hazard-Mitigation/Documents/CA-Adaptation-Planning-Guide-FINAL-June-2020-Accessible.pdf. Accessed January 23, 2024.

[5] OPR, State of California Energy Commission, and California Natural Resources Agency, California's Fourth Climate Change Assessment, 2018. Available at https://www.climateassessment.ca.gov/. Accessed January 29, 2024.

1. Potential Climate-Related Effects

Climate change affects communities all around the world regardless of their contribution to this phenomenon. Jurisdictions across California are expected to experience different climate change effects to varying degrees based on geography, density of urban development, and environmental factors. **Table 1: Climate-Related Effects and Hazards Potentially Applicable to Brentwood** below, based on guidance from the California Adaptation Planning guide, identifies the direct effects of climate change and the associated secondary effects potentially applicable to Brentwood. Each of the six is discussed in detail below. The goal of the exposure step is to characterize the community's exposure to current and projected climate hazards.

Table 1: Climate-Related Effects and Hazards Potentially Applicable to Brentwood

Primary Hazard	Secondary Hazard
Air quality	Public health effects
Changed temperature and/or precipitation patterns	Drought, wildfire
Flooding	Flooding, erosion, mud or landslides; Dam and levee failure
Severe storms and extreme weather	Intense rainstorms, severe wind, flooding, lightning, hail
Temperature changes – warming	Extreme heat/heat waves
Wildfire	Erosion, landslide

The projection of the likelihood, timing, and severity of these primary and secondary hazards to impact the City is based on the trajectory of greenhouse gas (GHG) concentrations in the Earth's atmosphere, commonly referred to as Representative Concentration Pathways (RCPs). RCPs represent a combination of the historical data and estimates of concentrations through 2100, based on a set of formulated human behaviors. The pathways describe different climate futures, all of which are considered possible depending on the volume of GHGs emitted in the years to come. The Intergovernmental Panel on Climate Change (IPCC) adopted a number of RCPs in its latest assessment in its recent guidance and chose to focus on three RCPs representing a reasonable range of outcomes, as follows:

1. A low emissions scenario (RCP2.6) – this represents an aggressive emissions reduction scenario that assumes global greenhouse gas emissions will be significantly curtailed. RCP 2.6 most closely corresponds to the aspirational goals of the United Nations Framework Convention on Climate Change 2015 Paris Agreement.
2. A medium emissions scenario (RCP4.5) – this represents a mitigation scenario where global greenhouse gas emissions peak by 2040 and then decrease for the rest of the century.
3. A high emissions scenario (RCP8.5) – this represents a "business-as-usual" scenario where global greenhouse gas emissions continue to rise throughout the 21st century.

Because the RCP2.6 scenario depends on substantive changes in the current set of world-wide policies, regulations, and behaviors, it is considered unlikely, and therefore not especially helpful in a climate vulnerability assessment. This CVA will rely primarily on RCP8.5, the high emissions scenario, in alignment with OPR's recommendation that agencies use RCP8.5 when considering impacts through 2050 because

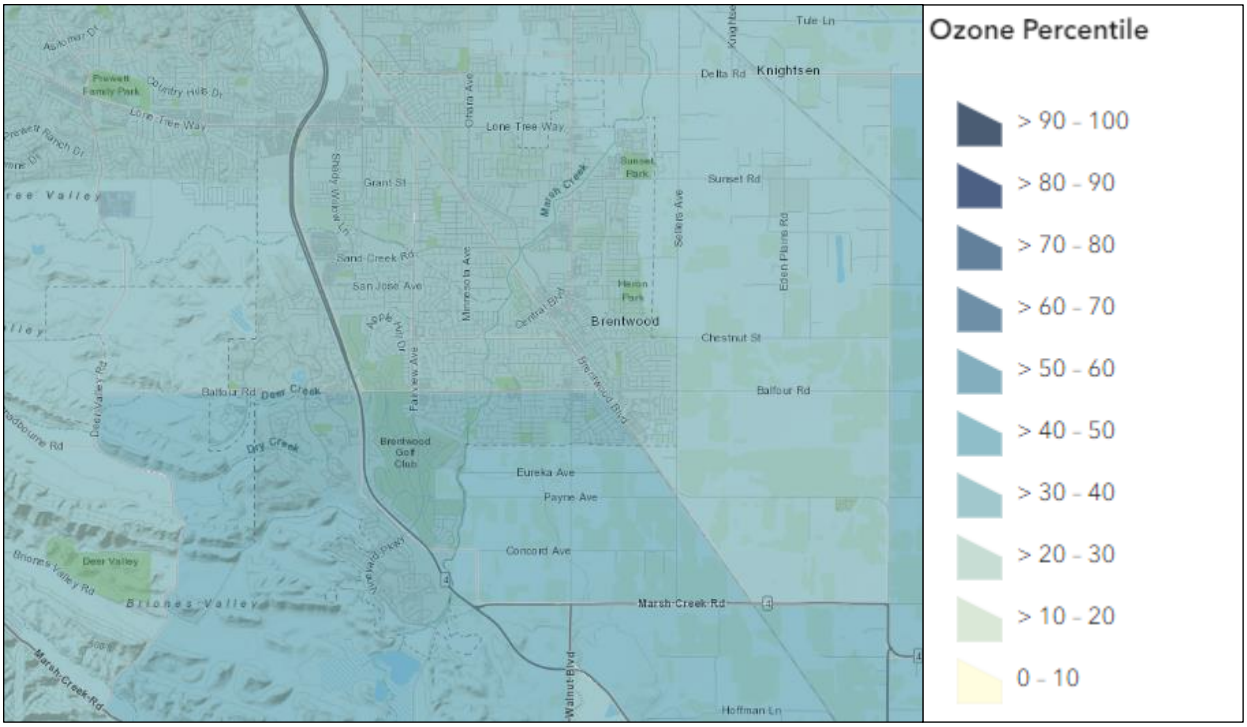
there are minimal differences between the low and high emissions scenarios through the first half of the century. When available and illustrative, the RCP4.5 scenario may be shown for additional context.

1.1. Air Quality

The City is located in Contra Costa County, which lies in the central portion of the San Francisco Bay Air Basin (Basin). As such, the Bay Area Air Quality Management District (BAAQMD) is tasked with monitoring ambient levels of air pollutants and setting regulations to ensure that the Basin obtain and maintain the National Ambient Air Quality Standards (NAAQS) and continue progress towards meeting more stringent California Ambient Air Quality Standards (CAAQS).

According to CalEnvironScreen 4.0, as shown in **Figure 1**, based on exposure to ozone levels, census tracts in Brentwood rank in the 38th to 43rd percentile, which means that 62 to 57 percent of census tracts in the State experience higher concentrations of ozone. The southern portion of the City, south of Balfour Road, experiences slightly higher ozone concentrations than the rest of the City. Brentwood's ozone concentrations are relatively high in comparison to the entire County, but low in comparison to the State.

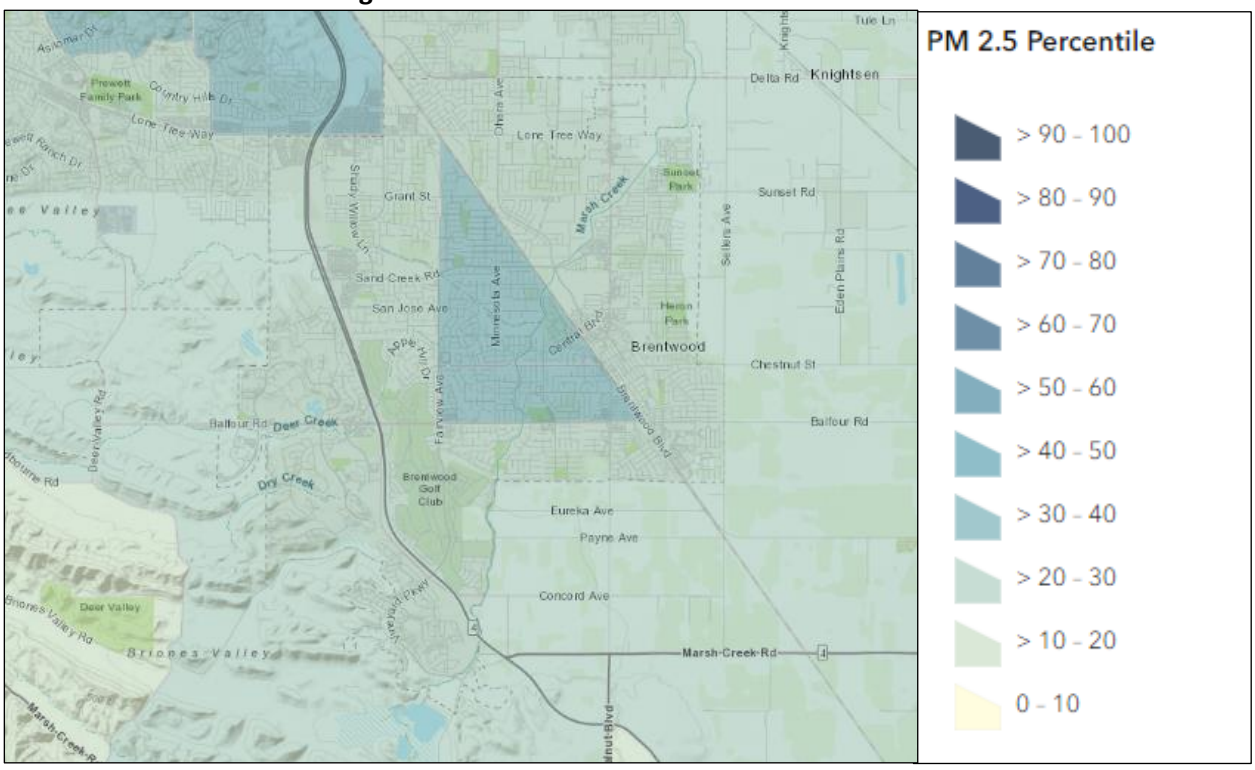
Figure 1: CalEnviroScreen 4.0 - Ozone



Source: CalEnviroScreen 4.0, Ozone Pollution Burden.

According to CalEnvironScreen 4.0, as shown in **Figure 2**, based on PM2.5 exposure, census tracts in Brentwood rank in the 22nd to 30th percentile. The central portion of the City, west of Brentwood Boulevard and north of Balfour Road, experiences higher PM2.5 concentrations than the rest of the City. Brentwood's PM2.5 concentrations are average in comparison to the entire County, and low in comparison to the State.

Figure 2: CalEnviroScreen 4.0 – PM2.5



Source: CalEnviroScreen 4.0, PM2.5 Pollution Burden

Changes in climate can result in impacts to local air quality. Ozone is not emitted directly, rather it is formed when emissions of oxides of nitrogen (primarily from the combustion of fossil fuels) and reactive organic gases (from evaporative sources such as gasoline, solvents, paints, and other consumer and industrial products and processes) react in the presence of sunlight. Thus, it is widely recognized that atmospheric warming associated with climate change has the potential to increase ground-level ozone formation. Locally, this threatens the ability of the Basin to obtain the applicable ozone NAAQS and CAAQS under the business-as-usual (BAU) (RCP8.5) scenario.

PM is caused both by natural and anthropomorphic activities; it is emitted directly from sources (such as earth moving, smokestacks, and fires) and also forms secondarily in the atmosphere when gases and aerosols combine (from sources such as power plants, industries and automobiles). According to the United States Environmental Protection Agency (USEPA), the impact of climate change on PM is less certain, but research is underway to address these uncertainties. Climate change, such as decreasing precipitation and increasing wildfires, can result in higher emission of PM into the atmosphere.

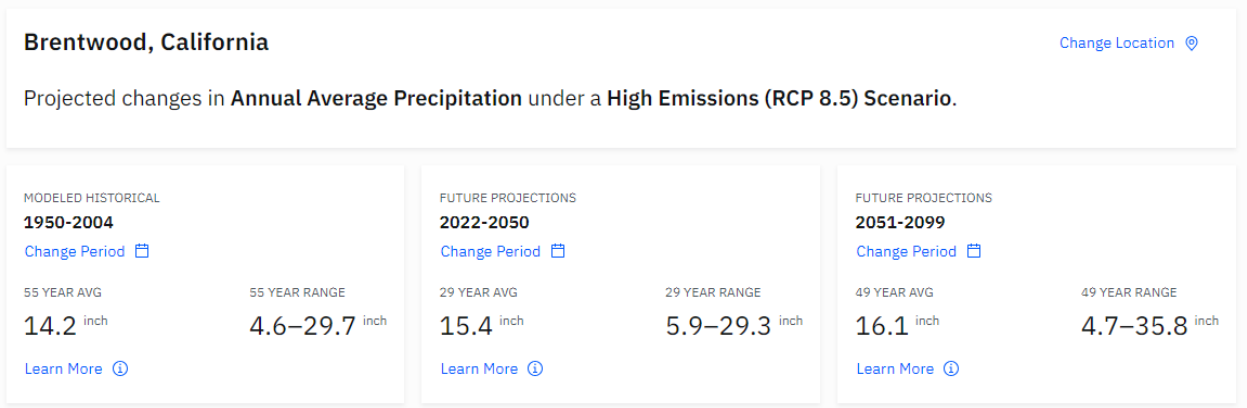
1.2. Precipitation Changes

Brentwood, like most of the Contra Costa region, is characterized by wet winters. The average precipitation observed in Brentwood between 1950 and 2004 was 14.1 inches with a high of 29.7 inches and a low of 4.6 inches.[6]

[6] Cal-Adapt, Annual Averages. Available at https://cal-adapt.org/tools/annual-averages/. Accessed January 31, 2023.

As presented in **Figure 3**, local annual levels of precipitation are not anticipated to change drastically for the City in the medium- and long-term. It is projected that the average precipitation in Brentwood in the mid-century range (2022 to 2050) will increase to 15.4 inches and would increase slightly to 16.1 inches in the end-century range (2051 to 2099) under the RCP8.5 scenario.[7] Changes in annual precipitation of these minimal ranges alone are not expected to pose much risk to the built or human environment. The role of changing precipitation amounts and patterns in expanding the extent or geographic distribution of vector-borne disease is not clearly understood at this time.[8]

Figure 3: Annual Average Precipitation



Source: Cal-Adapt, Annual Average Precipitation.

However, much of the subregion's potable water supply is provided by several sources, including both surface water from the Delta and groundwater from existing wells located in the East Contra Costa Subbasin. The City also purchases water from the Randall-Bold Water Treatment Plant at a permanent capacity share of 6 million gallons a day (MGD) and may use additional capacity in future years. In addition, the City's water conservation program will continue to reduce water inefficiencies and reduce the City's overall demands. According to Cal-Adapt, a climate change induced decline in the northern Sierra Nevada of 32 percent in snow water equivalence by 2050 and 77 percent by 2099 is anticipated, and declines in the southern Sierra Nevada of up to 10 percent and up to 40 percent by 2050 and 2099, respectively. Precipitation levels are not expected to change significantly for the Colorado River Basin. However, as temperatures rise and precipitation levels decrease on a larger geographic scale, the snowpack volume is expected to drop, potentially resulting in a 9 percent decline in the total flow of the Colorado River. According to *California's Fourth Climate Change Assessment*, the changes in Sierra Nevada snowpack will "undeniably pressure California to preemptively invest in climate adaptation measures, such as alternative water storage, water-use efficiency, and updated reservoir storage operations."[9]

Droughts are common in California, and it is widely recognized that dry conditions may be experienced more regularly in the future given the impact of climate change on California's snowpack. Currently, the

[7] Cal-Adapt, Annual Averages. Available at https://cal-adapt.org/tools/annual-averages/. Accessed January 31, 2023.
[8] Vicki Kramer, PhD, Impact of Climate Change on Vector-Borne Diseases. Available at https://oehha.ca.gov/media/downloads/climate-change/document-presentation/13humankramer.pdf. Accessed January 31, 2023.
[9] California's Fourth Climate Change Assessment – San Francisco Bay Area Region Report. Available at https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-005_SanFranciscoBayArea_ADA.pdf. Accessed January 31, 2024.

Brentwood and Bay Area region are classified within the -2 to 4 range of the Palmer Drought Severity Index (PDSI), where a value of -6 represents "extreme drought."[10] Drought can lead to reductions in the quality and quantity of water, degradation of air quality, increase in agricultural vectors and disease, and decreases in crop yield.[11] According to the California Department of Public Health, health consequences of drought may impact the following vulnerable/sensitive populations most: "the elderly, children, individuals of low socioeconomic status, rural communities, populations living in nursing homes, hospitalized patients, those who rely on electrical equipment to survive, farmers, and agricultural workers."[12]

1.3. Flooding

The accumulation of excess water due to increase precipitation or natural water flows has the potential to result in the flooding of nearby floodplains or low-lying valleys. Floodplains, or areas adjacent to water bodies, are especially susceptible to flooding hazards. The severity of flooding within a floodplain is directly related to the capacity and volume of the neighboring body of water or waterway. Flooding within larger, flatter floodplains occurs more predictably for longer durations.

Although CalAdapt does not provide emissions-based flooding projections, the County has produced a Local Hazard Mitigation Plan (LHMP), which outlines the existing flooding risks present in the City.[13] According to the County's LHMP, historically, areas within the City that are vulnerable to flooding include central areas of the City, including areas near tributaries of the Marsh Creek Watershed, Dry Creek, Sand Creek, and Deer Creek. Major roads that pass through the 100-year floodplain and thus are exposed to flooding include Brentwood Boulevard and State Highway 4. However, in the region, some roads are built above the flood level, and others function as levees to prevent flooding.[14] Since precipitation is expected to remain fairly consistent, increased flood hazards due to annual average precipitation is unlikely. However, the increase in the frequency and intensity of severe rainstorms in the future may result in increased risk of localized flooding events.

1.4. Severe Storms and Extreme Weather

California's Fourth Climate Change Assessment explains that, despite model predictions of only small changes in average precipitation in the Bay Area region, overall, precipitation in the Bay Area will continue to exhibit high year-to-year variability with very wet and very dry years. Please refer to the discussion of precipitation changes and droughts in Section 1.2 above. This section also addresses land and mudslides that may result from severe rain events.

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[10] WestWideDroughtTracker, California – PDSI. Available at https://wrcc.dri.edu/wwdt/index.php?region=ca. Accessed January 31, 2024.

[11] California Department of Public Health (CDPH), California Building Resilience Against Climate Effects (CalBRACE) Project. Available at https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CHVIs/Drought_802_Narrative_11-8-2016.pdf. Accessed January 31, 2024.

[12] CDPH, CalBRACE Project, page 1.

[13] Contra Costa County Local Hazard Mitigation Plan, 2018. Available at https://www.contracosta.ca.gov/DocumentCenter/View/48893/Contra-Costa-County-Draft-Local-Hazard-Mitigation-Plan-Volume-1-January-31-2018?bidId=. Accessed January 31, 2024.

[14] Contra Costa County Local Hazard Mitigation Plan, 2018, page 9-34.

1.4.1. Severe Rainstorms

In the Bay Area, extreme precipitation often arrives via so called "atmospheric rivers," which the National Oceanic and Atmospheric Administration (NOAA) defines as "a flowing column of condensed water vapor in the atmosphere responsible for producing significant levels of rain and snow, especially in the Western United States."[15] Further, the NOAA recognizes that atmospheric rivers "that contain the largest amounts of water vapor and the strongest winds can create extreme rainfall and floods."[16] Data presented in *California's Fourth Climate Change Assessment* suggests that little change is projected for summer and fall precipitation, but larger changes may occur in winter and spring. In general, precipitation in northern regions of California is projected to increase. The data also suggests that the frequency of atmospheric river events may increase in the future. Please refer to Section 1.3 for discussion of the change in potential flooding impacts that could affect the City.

1.4.2. Extreme Weather

In addition to extreme rain events, other severe weather phenomena, including strong winds, hail, and lightning, may occur with increased frequency. Severe weather can pose direct hazards resulting in injury or death, damage to buildings, structures, infrastructure, and trees, fires, and diminished or blocked transportation access. Extreme weather can lead to secondary effects, such as wildfires, and can lead to increased fire spread and intensity. According to the County's LHMP, changes in climate pattern "may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires."[17]

1.4.3. Diablo Winds

During the spring and fall, hot and dry winds, known as the Diablo winds, from the northeast occur in the Bay Area. Diablo winds occur below canyons in the East Bay Hills (Diablo range) and in extreme cases can exceed 60 miles per hour (mph). The winds blow into the inner Bay Area from the direction of Mount Diablo and are created by a combination of strong inland high pressure at the surface, strongly sinking air aloft, and lower pressure off the California coast. Brentwood and Contra Costa County is subject to high winds from thunderstorms and other severe weather events. Contra Costa County is located in Federal Emergency Management Agency (FEMA)'s Wind Zone I, where wind speeds can reach up to 130 mph. *California's Fourth Climate Change Assessment* recognizes the uncertainty in predicted changes to the patterns of winds due to global climate change. Hot and dry conditions, combined with offshore winds (Diablo winds) in autumn create high risk conditions that spread fires.

The Bay Area electrical grid is vulnerable to power outages during wind and wildfire events. Under scenarios of climate change, extreme storm events with stronger winds may become more frequent. The electrical grid may face more frequent and severe threats in the coming decades.[18] To prevent wildfires, PG&E may need to turn off power during high winds. This is called a Public Safety Power Shutoff (PSPS). A future PSPS is more likely to occur where it has happened before. This may be in or near high fire-risk areas. To learn more, visit the PSPS webpage.

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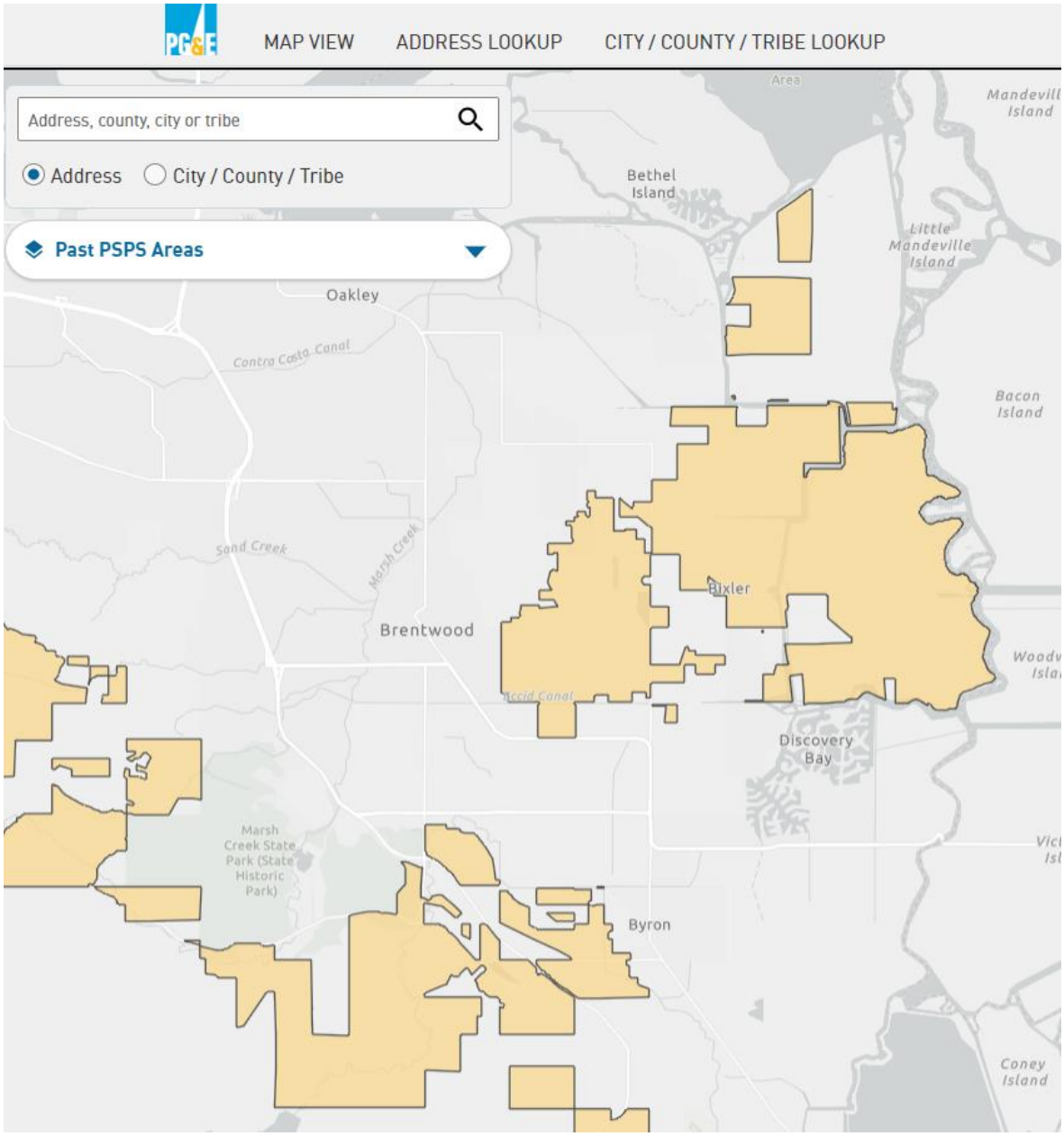
[15] National Oceanic and Atmospheric Administration (NOAA), What are atmospheric rivers?. Available at https://www.noaa.gov/stories/what-are-atmospheric-rivers. Accessed February 1, 2024.

[16] NOAA, What are atmospheric rivers?

[17] Contra Costa Local Hazard Mitigation Plan, page 14-14.

[18] California's Fourth Climate Change Assessment, San Francisco Bay Area Region, page 46.

Figure 4: PG&E Public Safety Power Shutoff Map



Source: PG&E

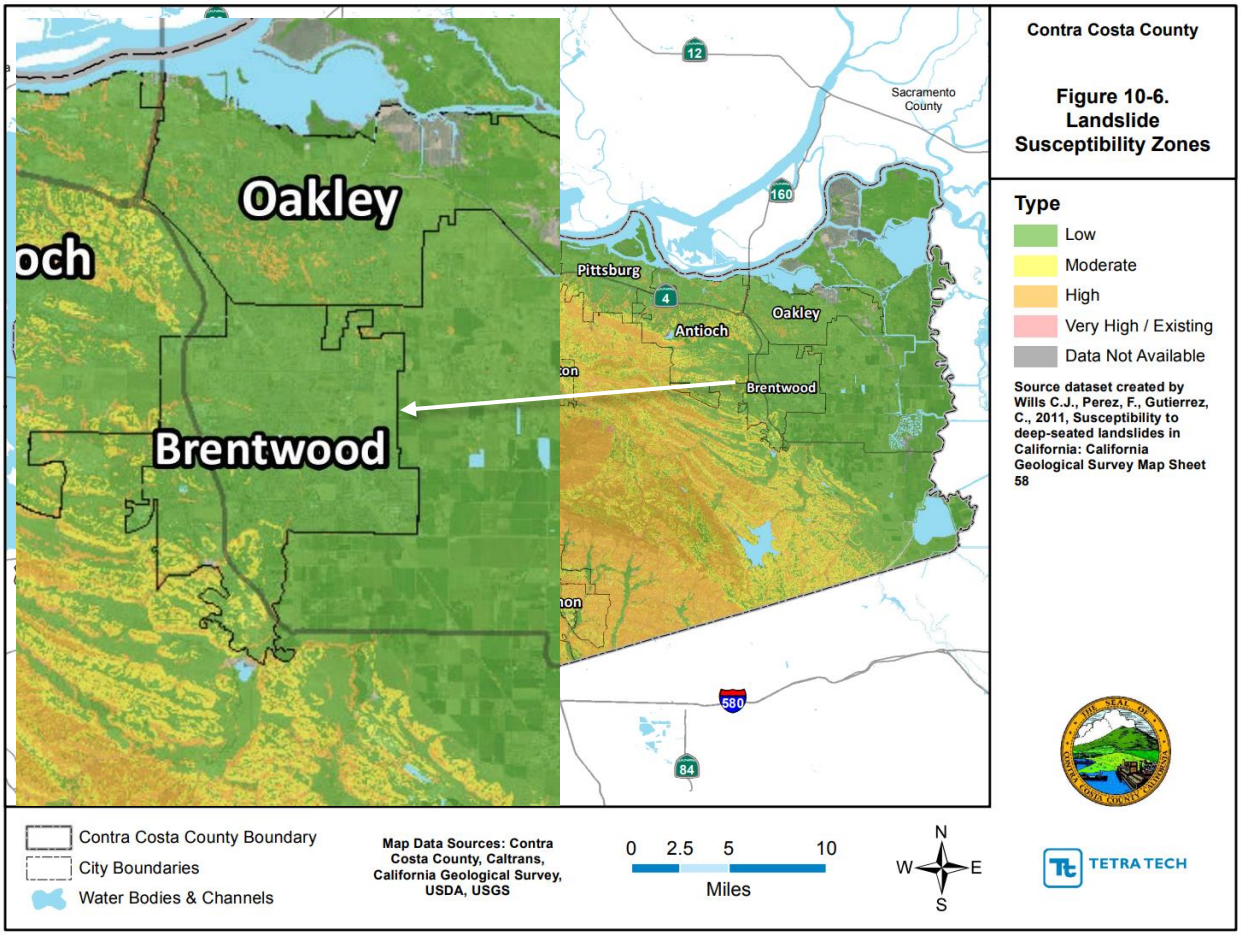
1.4.4. Landslides

Weather-induced landslides occur when a hillside becomes unstable, caused by severe or persistent rain events, causing soil and rocks to slide downslope. In some cases, the hillsides can become so saturated that slope failures result in a mudslide, a mixture of soil and water moving downslope. Unstable hillsides, such as those denuded of vegetation by wildfires or drought, are at greater risk of land- and mudslides. The climate change-induced increase in rainfall, especially severe rain events, may result in an increase in landslides and mudslides.

As discussed in the LHMP, "climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature is likely to affect the

snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for landslide occurrences."[19] The LHMP ranks landslides with a high hazard risk ranking for Contra Costa County; however, most of Brentwood is rated as low to moderate landslide susceptibility with a few pockets of high to very high/existing susceptibility, as shown in **Figure 5.** The majority of landslide zones are located in areas of higher topography, such as Marsh Creek State Park. Given the relatively level slopes throughout the majority of the City, the landslide potential is low. The landslide potential increases in hilly terrain towards the west and south. The LHMP details historical landslide events in the City, including the event in 2017 in which a slow moving mudslide closed the 3100 block of Morgan Territory Road, causing Contra Costa Water District's waterline to break.[20]

Figure 5: Landslide Zones



Source: Contra Costa County, Local Hazard Mitigation Plan.

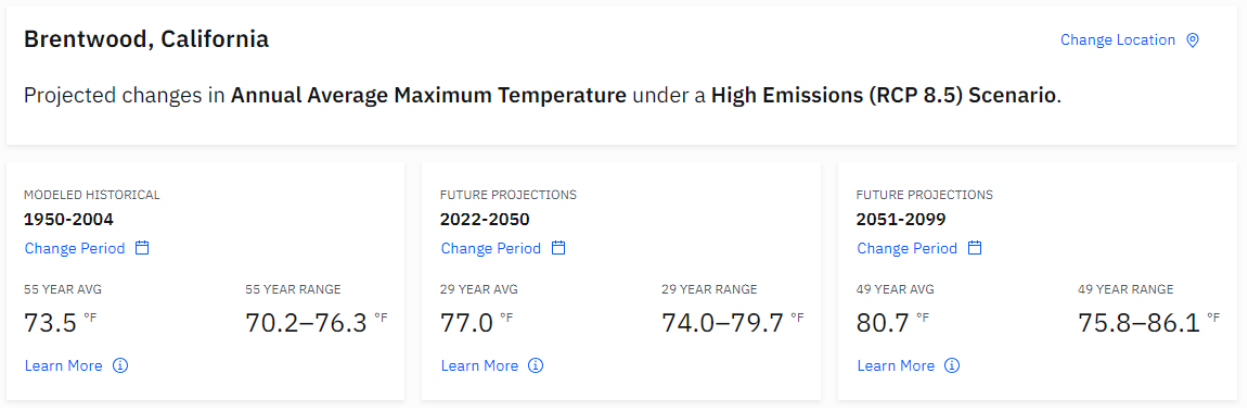
[19] Contra Costa Local Hazard Mitigation Plan, page 14-12.
[20] Ibid.

1.5. Temperature Changes

A rise in temperature has been observed in many California communities, including those in Contra Costa County. According to the long-term historical data (1950 to 2005) presented in the LHMP, trends in annual average, maximum, and minimum temperatures show an increase of 0.7-degree Fahrenheit when comparing 1950 to 1990 and 1990 to 2005 records. Average temperatures are expected to continue to rise. Overall, the Bay Area average annual temperature increased by 1.7°F from 1950 to 2005. Warming is expected to increase across the region in the coming decades, with the "average hottest day of year is projected to increase a minimum of 6.3°F near the coast and up to 10°F further inland under RCP8.5. According to CalAdapt, the average maximum temperature observed for the City in the years 1950 to 2004 was 73.5°F.

In the projections based on the RCP8.5 scenario, Brentwood could experience an average maximum temperature of 77.0°F during the years 2022 to 2050. Through 2099, the projections for Brentwood include an average maximum temperature of 80.7°F. **Figure 6** provides the estimated annual average maximum temperatures for Brentwood in an RCP8.5 scenario. According to the California Office of Environmental Health Hazard Assessment (OEHHA) and California Department of Public Health (CDPH), disruptions in weather patterns due to global climate change, such as warmer spring temperatures and overall increases in temperatures will "likely alter the distribution and occurrence of West Nile virus, Lyme disease, hantavirus, and other insect or animal transmitted diseases in California."[21]

Figure 6: Annual Average Maximum Temperature



Source: Cal-Adapt, Annual Average Maximum Temperature.

1.5.1. Extreme Heat Days

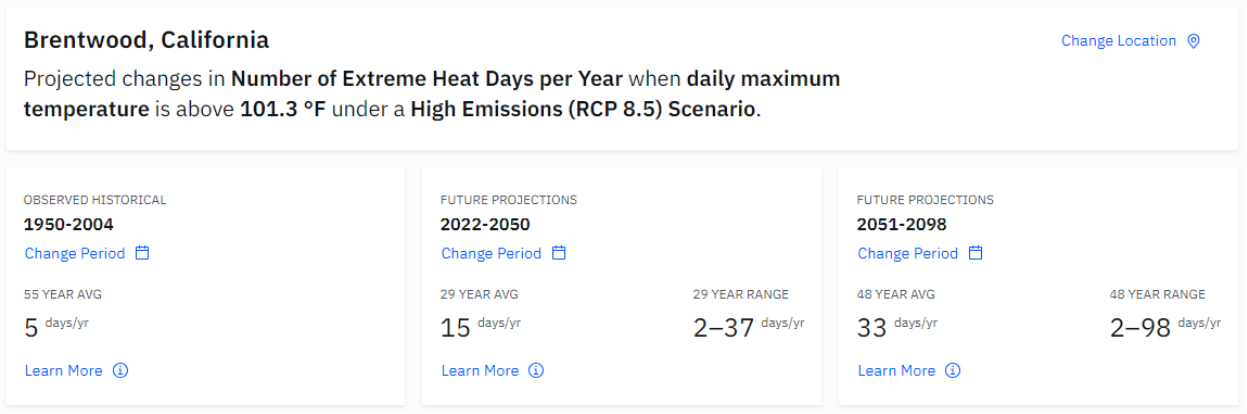
According to California's Fourth Climate Change Assessment, "while all parts of the Bay Area are projected to get warmer, inland areas will heat up more than coastal areas." Extreme heat days are defined as a day in a year when the daily maximum temperature on any day in April through October exceeds the 98th historical percentile of maximum temperatures between 1961 and 1990. According to CalAdapt, the extreme heat temperature threshold is 101.3°F for Brentwood. The average number of extreme heat days observed for the City in the years 1950 to 2004 was 5 days per year. In the RCP8.5 high emissions scenario, Brentwood is projected to experience 15 extreme heat days per year between the years 2022 and 2050. **Figure 7** provides an estimated number of extreme heat days for the City in an RCP8.5 scenario. This is a 10-day increase from the annual extreme heat days observed during the years 1950 and 2004. Models

[21] Vicki Kramer, PhD, Impact of Climate Change on Vector-Borne Diseases.

predict the number of extreme heat days in Brentwood may rise to 33 days per year in the second half of this century.

An increase in extreme heat days can correlate with an overall increase in temperature. Further, the heightened frequency of extreme heat days can pose a risk to sensitive communities such as persons with homelessness, senior citizens, and persons with disabilities. This would create a greater reliance on high energy demand electrical equipment, such as air conditioning. The increased use of equipment may impact the demands in the State's power grid and could increase the risk of blackout events. Heat waves pose increased health risks due to urban heat islands and lack of local experience and cooling infrastructure (air conditioning) in bayside cities. These risks are compounded for low-income communities.[22]

Figure 7: Number of Extreme Heat Days by Year



Source: Cal-Adapt, Extreme Heat Days.

1.6. Wildfire

Across California, wildfire season typically runs between late summer to early spring, but the California Department of Forestry and Fire Protection (CalFire) reports that fires are starting earlier and ending later with each passing year. Intense dry seasons, warmer spring and summer temperatures, reduced snowpack, and earlier snowmelt make forests and vegetation more susceptible to wildfires. CalFire estimates the length of the fire season has increased by 75 days in 2020. Natural events, such as warm and dry Diablo winds, which typically occur in the spring and fall, further increase the growth of fires and threat to the region. According to the LHMP, the geography, weather patterns, and vegetation in the East Bay area provide ideal conditions for recurring wildfires.

The Contra Costa County Fire Protection District (CCCFPD) is a professional, full-service fire department and is among the 13 largest metropolitan fire agencies in the State of California. It provides fire prevention, suppression and emergency medical services (EMS) to 12 cities and the unincorporated areas of Contra Costa County with 34 fire stations.

Its telecommunications center provides dispatch services via contract to three (3) other fire agencies in the County. Staffing includes 420 uniformed personnel and 87 civilian personnel. All responding engines and trucks include a minimum of one (1) paramedic. Additional capabilities and resources include training, certification/personnel development, vehicle rescue, trench rescue, water rescue, hazardous material, high and low-angle rescue, building collapse, confined space rescue, fire/rescue boats, fire and arson

[22] California's Fourth Climate Change Assessment, San Francisco Bay Area Region Report, page 8.

investigations, code enforcement, building plan review, and public education, as well as Community Emergency Response Training (CERT).

As of 2023, CCCFPD experienced a 33% increase in call volume since 2021 and this trend is expected to continue (49,929 in 2021, 61,133 in 2022, and 66,406 in 2023). Approximately 30,561 (46%) were for rescue and EMS. According to the Association of Bay Area Governments (ABAG), which conducted long-term forecasts of population growth in the region, the population will grow by 9% each decade between 2010 and 2040, or approximately 716,120 new residents per decade. Between 2010 and 2040, the ABAG anticipates that the region will grow 25% to a population of over 9.5 million people.

In 2022, CCCFPD responded to 2,080 exterior fires throughout the county. Of those responses, 56 were located in the City of Brentwood (last 6 months of the year). In 2023, CCCFPD responded to 2,072 exterior fires throughout the county. Of those responses, 82 were located in the City of Brentwood (12 months).

According to the National Fire Protection Association (NFPA), during 2011-2015, fire departments throughout the United States responded to an estimated average of 306,000 brush, grass, and forest fires per year.[23] State and County codes provide building and landscaping standards to mitigate wildfire hazard risk:

- California Building Code Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure): provides standards intended to prevent the ignition of structures from wildland fire exposure, including building standards related to roof assemblies and materials, windows, siding, decks, and eave vents.
- Contra Costa County Ordinance 2016-23, Chapter 3 (General Precautions Against Fires): provides for landscaping/vegetation management requirements to reduce and/or prevent the spread of wildland fires.
- Contra Costa County Ordinance 2019-37, Chapter 6 (Building Services and Systems): provides for use of spark arresters on chimneys when utilizing solid or liquid fuel in a fireplace or heating appliances.

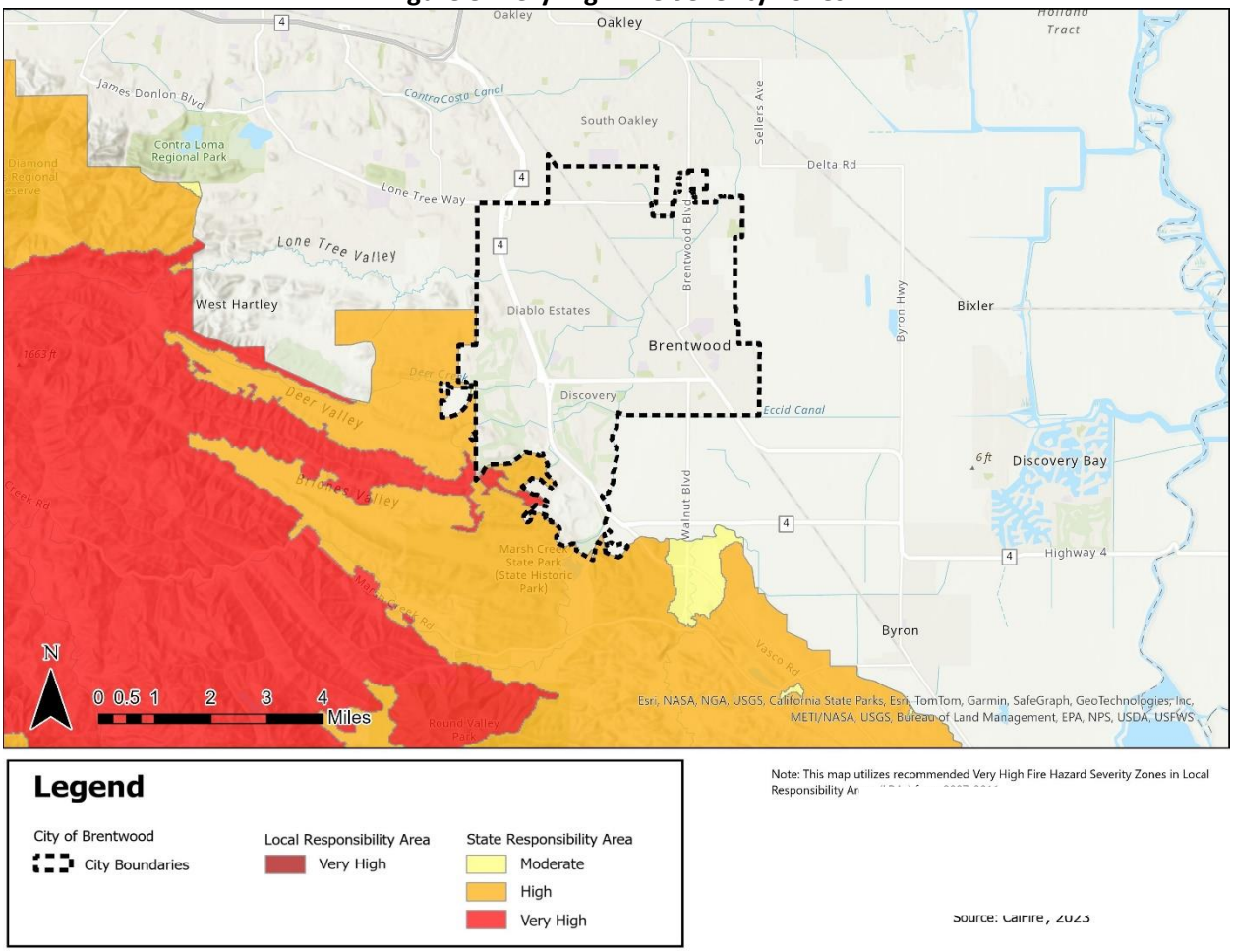
According to the Global Institute of Sustainable Forestry at Yale University, taxpayers spent more than $1.6 billion to combat more than 88,400 fires nationwide.[24] Many of these fires burned in wildland urban interface (WUI) areas and exceeded the fire suppression capabilities of those areas. According to CalFire's Very High Fire Hazard Severity Zone (VHFHSZ) Map, there are no parcels within the City that are located in a VHFHSZ. However, areas to the west of Brentwood have Moderate, High, or Very High designations. Areas such as Deer Valley, Black Diamond Mines Regional Park, and Mt Diablo are regions in proximity to the City that feature vegetation, slopes, and terrain that could lead to potential fire hazards for Brentwood residents. Even though the City does not have any VHFHSZs, the General Plan includes goals, policies, and actions related to fire hazards and protection. An example of a policy is the Fuel Modification Ordinance in which the City would work with the Fire Protection District to prepare a Fuel Modification Ordinance

[23] National Fire Protection Assocation (NFPA), Brush, Grass, and Forest Fires, September 2018. Available at https://www.nfpa.org//-/media/Files/News-and-Research/Fire-statistics-and-reports/WUI/osbrushgrassforest.pdf. Accessed December 27, 2021.

[24] Morton et al, Assessing the Environmental, Social, and Economic Impacts of Wildfire, May 2003. Available at https://yff.yale.edu/sites/default/files/files/wildfire_report(1).pdf. Accessed December 27, 2021.

and require fire-resistant, native vegetation as buffers for developments in hillside, open space, and rural areas with moderate to high fire risk.

Figure 8: Very High Fire Severity Zones



Source: City of Brentwood Safety Element, CAL FIRE Very High Fire Hazard Severity Zones.

2. Conclusion

The long-term climate effects predicted to be experienced by Brentwood include changes in precipitation amounts and patterns, increase in flooding, increased temperature, and wildfires. Local annual levels of precipitation in Brentwood are not anticipated to change drastically with slight increases in the latter decades of this century. The City's flood risk due to annual average precipitation is not projected to be substantially impacted by climate change as precipitation is expected to remain fairly consistent. However, the increase in the frequency and intensity of severe rainstorms in the future may result in increased risk of localized flooding events. In general, precipitation in northern regions of California is projected to increase. Temperature changes in Brentwood are projected to change in terms of extreme heat days, with a resultant increase on the reliance of climate modifying appliances such as air conditioning. An increase of extreme heat days poses a greater risk to sensitive communities such as homeless residents, senior citizens, and people with disabilities. In terms of wildfire, no areas within the City were identified in a VHFHSZ, and the City's vulnerability to wildfire is likely to remain the same even with a changing climate. The Safety Element will be updated in accordance with recently adopted changes in state law.