CLIMATE CHANGE ADAPTATION AND RESILIENCE

Climate is the long-term behavior of the atmosphereweather—typically represented as averages—for a given time of year. This includes average annual temperature, snowpack, or rainfall. Human EEmissions of carbon dioxide and other greenhouse gases emissions (greenhouse gases) derived mainly from burning of fossil fuels for energy generation, heating, transportation, and industry and from methane emissions from leaking gas lines and factory farming are important drivers of global climate change, and recent detrimental changes across the climate system are increasing in intensity and damage. unprecedented. Greenhouse gases trap heat in the atmosphere, resulting in warming the planet over time. This atmospheric warming leads to other changes in the systems of the earth systems, including changing patterns of rainfall and snow, melting of glaciers and ice, and warming of oceans.

Human-induced climate change is already resulting in many weather and climate extremes in every region across the globe. Evidence of observed changes includes heatwaves, heavy precipitation, droughts, increased wildfires, and hurricanes, and more severe and frequent storms. Likewise, California and Portola Valley are already experiencing the effects of a changing climate. Both gradual climate change (e.g., sea level rise) and climate hazard events (e.g., extreme heat days) expose people, infrastructure, buildings and properties, and ecosystems, to a wide range of stress-inducing and hazardous situations. These hazards and their impacts disproportionately affect the most vulnerable populations, including children and elderly adults, low-income populations, renters, immigrants, and BIPOC residents (as well as insect, animal and plant populations). Many of the climate change projections are compared to the a historic time period from 1961-1990. This time period is considered a target for greenhouse gas reduction and provides a community with a target threshold for greenhouse gas emissions that can be established to determine which future climate mitigation and adaptation actions will contribute to reductions in climate-change-related impacts.

INCREASING TEMPERATURE

During the last century, average surface temperatures in California and the Bay Area rose steadily. Average minimum and maximum temperatures in San Mateo County rose faster than California. Between 1970 and 2006, the average minimum temperature rose by 1.2°F per decade and the average maximum temperature increased by 0.7°F per decade across the region.27 Several of the warmest years on record, in terms of annual average temperature, have all occurred since 2000, including 2020, 2018, 2015, 2014, and 2009. In Portola Valley, average January temperatures are currently a maximum of 60°F and a minimum of 37°F. Average July temperatures are a maximum of 88°F and a minimum of 51°F. They were x degrees in 1970. Climate change models indicate that temperatures will continue to rise in Portola Valley. Annual average maximum temperatures are projected to increase between 3.2°F and 4.0°F by mid-century (2035-2064) and between 4.2°F and 7.1°F by end of century (2070-2099). The lower temperature bound assumes that greenhouse gas emissions peak by 2040 and then decline (medium emissions scenario); the higher temperature bound assumes that global greenhouse gas emissions continue to rise through the 21st century (high emissions scenario).28

With climate change, extreme heat events in California and Portola Valley are becoming more frequent, more intense, and longer lasting. Historically (1961-1990), Portola Valley averaged five extreme heat days. The number of extreme heat days is anticipated to increase significantly across the Bay Area region during the next century, but more so for inland areas than coastal cities. In Portola Valley, an extreme heat day is considered a day ~~where~~ when the temperature exceeds 90.7°F. By mid-century (2035-2064), the town is expected to have~~,~~ on average~~,~~ between 10 to 12 extreme heat days per year, increasing to an average of 13 to 23 extreme heat days per year by the end of century (2070-2099).29

In addition to extreme heat days, warm nights are also a concern. Historically (from 1961-1990) Portola Valley has experienced approximately four warm nights where the temperature exceeds 55.1°F. According to Cal-Adapt, by mid-century Portola Valley is projected to experience 35-46 warm nights and 49-89 warm nights by the end of century. Increases in warm nights may exert greater strain on electrical infrastructure and older air conditioning units i~~o~~n homes.

Extreme heat days and heat waves can negatively impact human health. While the human body has cooling mechanisms that help auto-regulate body temperature within 1 or 2 degrees of 98.6 degrees, heat stress can cause fatigue, headaches, dizziness, nausea, and confusion. The combination of heat and high humidity is particularly lethal; it can result in heat stroke, which can lead to death, even among healthy people.30

CHANGING PRECIPITATION PATTERNS

Dry, mild summers and moist, cool winters characterize San Mateo County's overall climate. Temperatures are strongly influenced by large saltwater bodies on the east (San Francisco

Bay) and the west (Pacific Ocean) and by the Santa Cruz Mountains. This combination of features has resulted in a variety of microclimates throughout the cCounty with hill and ridgetop areas, valley floors and coastal areas each experiencing different temperatures and precipitation patterns.

The cCoastside area experiences a marine climate, characterized by cool, foggy summers and relatively wet winters. Fog, the result of condensation over the ocean near the coast, provides moisture and cool air for the coastal terraces, pulled over the area by the extreme hot air in California's Central Valley. These elements are largely responsible for the emergence of the cCoastside region as an agricultural area, featuring several specialty crops.

Bayside climates are follow a mild Mediterranean climate with warm, dry summers, and cool, wet winters. generally warm and sunny, particularly in the Ssummer months are generally warm and sunny, protected during the day from the cooler ocean breezes by coastal mountain ranges, with natural air conditioning in the evenings when the hot, dry air from in the Central Vvalleys moving to the east warmssucceeds in pulling the prevailing cool, fog-laden ocean breezes over the coastal ranges into the inland valleys.

The majority of annual precipitation in San Mateo County occurs from December November through March. During this wet season, precipitation levels average from 3.00 to 4.5 inches per month. One of the key influences upon precipitation is elevation. The bBayside generally receives less precipitation than the same elevation on the cCoastside, because the Santa Cruz Mountain Range acts as a rain shield causing moisture-laden air moving in from above the Coastside ocean to condense and deposit much of its moisture in the form of rain or fog as it reaches the higher, colder mountains.31

Weather in Portola Valley is usually mild during most of the year. Summers are dry and can be hot; winter temperatures rarely dip much below freezing. Based on Cal-Adapt, the average annual observed 30-year average precipitation is 32.9 inches.32 Based on the historic record from 1961-1990, Portola Valley experiences average annual precipitation between 30 and 32 inches. Based on Cal-Adapt, projections are anticipated to slightly increase to 33.0 to 33.7 inches by midcentury, and 33.8 to 34.9 inches by the end of the century due to more frequent and more extreme weather events.

Cal-Adapt provides maximum daily precipitation projections, which based on the observed historical 30-year average, Portola can expect rain events that produce up to 2.29 inches. By mid-century, this projection is anticipated to increase by 2.47 to 2.51 inches and 2.54 to 2.76 inches by the end of the century. This increase in the maximum daily precipitation amount may be due to more intense rainstorms resulting from climate change.33

DROUGHT

Drought is a normal part of the climate cycle. Droughts are generally considered a slow-moving hazard, which can cause significant damage, causing losses similar to those from hurricanes, tornadoes, and other faster-moving disasters. Droughts can significantly impact agricultural resources; affect water supplies, energy production, public health, and wildlife; and can exacerbate wildfire risks. Measuring drought typically involves the use of drought-oriented indexes like the multi-scalar Standardized Precipitation-Evapotranspiration Index (SPEI). ~~SPEI is a multi-scalar drought index that can be used to detect, monitor, and analyze droughts.~~ The tool measures drought severity according to its intensity and duration and can identify the onset and end of drought episodes. A value equaling (-1) implies the drought is at least moderate in intensity, with more negative values representing more severe droughts. The data is represented as days where this threshold of (-1) is met or surpassed and indicates ~~that there is~~ a water deficit. According to Cal Adapt, the observed historical 30-year average SPEI for Portola Valley is 0.2 months annually. This number is expected to increase to between 2.2 to 2.8 months by midcentury, and as high as 3.0 to 5.5 months by the end of the century. Longer durations of time with the SPEI below -1 can lead to drier soils and vegetation/fuels, which increases the potential for wildfires ~~hazards~~. For additional details regarding wildfire and drought relationships see the Wildfire Hazards section.

Policies and Implementation Actions

P-72 Prioritize the needs of vulnerable populations affected disproportionately by hazards and disasters.

P-73 Engage vulnerable populations in identifying potential hazards and program responses and priorities.

A-73-1 Use Community Emergency Response Team (CERT) resources (WPV-Ready.org) to assist with identification, outreach, and engagement of vulnerable populations.

P-74 Collaborate with local and regional agencies on hazard mitigation and emergency

Commented [RF1]: Do we need to identify who these vulnerable populations are in PV?

Commented [RF2]: Move to Emergency Preparedness.

Commented [RF3]: What does this sentence mean? Are we saying we need to help vulnerable populations in Town identify available programs or that the Town needs to identify missing programs and priorities?

management projects and programs.

P-75 Ensure infrastructure can accommodate changing conditions and effects associated with climate changes.

A-75-1 Look to Best Practices to develop and maintain resilient infrastructure standards.

P-76 Require capital projects in high hazard areas to adhere to higher standards (for building requirements?) to reduce future potential hazard vulnerability.

Commented [RF4]: Not specific enough to Climate Change. It seems like capital projects should be included in every section.

A-76-1 Develop risk assessment guidance and resilience strategies.

A-76-2 As part of the capital planning and budgeting process evaluate and determine if capital projects located within high hazard areas need to adhere to risk assessment guidance and identify appropriate resilience strategies.

P-77 Strengthen emergency management capacity and coordination with the San Mateo County Department of Emergency Management and the Woodside Fire Protection District (WFPD).

Commented [RF5]: P77 is too broad for Climate Change but the Actions 2, 3, 4, are relevant for Climate Change.

A-77-1 Regularly assess emergency management needs and identify resources to prepare for current and future hazard events.

A-77-2 Incorporate the likelihood of climate change impacts into Town emergency response planning and training.

A-77-3 Incorporate locations and operations responsibility for establishing cooling centers for extreme heat events as part of the next update of the Town's Emergency Operations Plan.

A-77-4 Incorporate the projected impacts of climate change, including extreme heat, drought, flooding, wildfire, and storm events, in the Multijurisdictional Local Hazard Mitigation Plan, the Housing Element, Sustainability Element, Emergency Operations Plan, and other comprehensive planning efforts.

P-78 Continue to promote the Community Emergency Response Team (CERT) program to strengthen community cohesion and emergency preparedness through community engagement efforts.

A-78-1 Coordinate with Town sponsored advisory bodies/committees and neighboring communities to ensure effective coordination with the Safety Element.

P-79 Prepare the Town for post-disaster recovery through proactive planning.

A-79-1 Develop a post disaster recovery framework.

P-80 Require floodproofing for new development in flood hazard zones.

A-80-1 Identify areas of a parcel subject to flooding by type of flooding, including inundation, creek, and groundwater and by the potential depth of flooding.

A-80-2 Encourage increased freeboard above current 100-year base flood elevation requirements.

A-80-3 Locate mechanical equipment, such as boilers, chillers, and air handlers for ventilation in appropriate locations to ensure operation during flooding.

P-81 Monitor drought conditions and enact appropriate measures to reduce water demand in coordination with local and regional water providers.

A-81-1 Continue to collaborate with Town advisory bodies/-committees, in conjunction with Town's water service provider, to identify opportunities for water conservation and efficiencies.

A-81-2 Collaborate with SMC Environmental Health on new graywater regulations and composting toilets modeled on those in Arizona and New Mexico.

A-81-3 Collaborate with Westbay Sanitary District on sewer reclamation projects.

A-81-4 Continue to encourage drought-tolerant native landscapes.

P-82 Continue to work with San Mateo County Flood and Sea Level Rise Resiliency District on developing and implementing adaptation options for San Francisquito Creek.

A-82-1 Restore creek ecologies and create transitional habitat zones to build resilience and ecosystem services.

A-82-2 Continue to identify opportunities to reduce down-stream flooding from town stormwater ~~wastewater.~~

P-83 Identify the major sources of greenhouse gas emissions in the Town and opportunities to reduce them.

A-83-1 Develop a climate action plan that identifies the most impactful measures for

Commented [RF6]: Move to Emergency preparedness

Commented [RF7]: What is freeboard?

Commented [RF8]: What wastewater is going into the SF Creek?

Commented [RF9R8]: stormwater

Commented [RF10]: We already know the major sources of GHG emissions in Town: transportation, energy, heating and airconditioning, and gas leaks (and consumerism). Why not be more specific and mention these in the SE?

reducing greenhouse gas emissions in the Town.

A-83-2 Work with Town advisory bodies/committees, utility providers, and regional partners to identify and develop programs and incentives that support these measures.

P-84 Address climate change impacts and develop adaptation strategies that focus on fire prevention and protection, flooding and severe storms, extreme heat events, public health, and the health and adaptability of natural systems.

A-84-1 Develop a climate adaptation plan for the Town.

P-85 Ensure that the community can respond to future extreme heat events.

A-85-1 Explore upgrades to electrical and HVAC equipment within Town facilities to ensure greater resilience during extreme heat, wildfire smoke events, and public safety power shutoff events.