## Appendix A Climate Action Plan

# Appendix B Climate Vulnerability Assessment



### City of Carmel-by-the-Sea CLIMATE CHANGE VULNERABILITY ASSESSMENT

### **FINAL REPORT**



**July 2021** 

### Acknowledgments

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### I. Introduction

The purpose of this Vulnerability Assessment is to characterize climate hazards that will impact the community and City assets in Carmel-by-the-Sea, determine our community's major climate vulnerabilities, and identify work that has already been done to improve community resilience. The Vulnerability Assessment will help provide focus to the City's adaptation planning efforts.

### II. Historical Hazards

Historical hazards provide information about hazards that may be exacerbated by climate change, as well as potential vulnerabilities of City assets to those hazards. A table of historical hazards assembled from the Monterey County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database, and historic records at the Carmel Library, is included in Appendix A. Additionally, a map of historic wildland fires in Monterey County from the MJHMP is also included in Appendix A.

### III. Changing Hazards with Climate Change

This Vulnerability Assessment uses information and modeling projections provided by the State of California to support climate adaptation efforts, including the <u>Cal-Adapt</u> modeling tool and the <u>Fourth California Climate</u> <u>Assessment</u>. The Cal-Adapt modeling tool provides climate change projections based on two different future greenhouse emissions gas scenarios: a high-emissions scenario, Representative Concentration Pathway (RCP) 8.5, in which greenhouse gas emissions continue to rise over the 21st century, and a low-emissions scenario, RCP 4.5, in which greenhouse gas emissions level off around the middle of the 21st century, and, by the end of the century, are lower than 1990 levels.

### **Increased Temperatures**

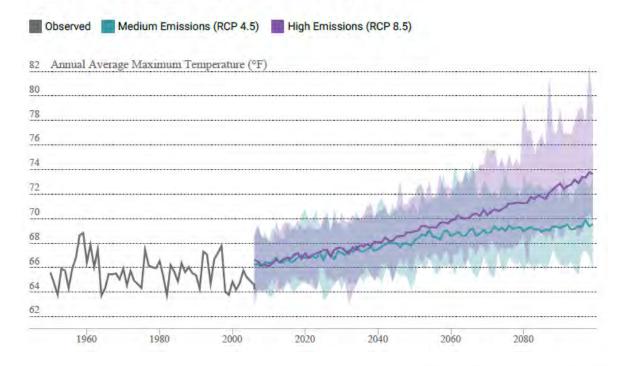
According to the State's Cal-Adapt modeling tool, overall temperatures are projected to rise in California during the 21st century. However, coastal areas will be less impacted due to the moderating effect of the Pacific Ocean. The current average annual maximum temperature (the average of all the hottest daily temperatures in a year) in Carmel-by-the-Sea is 65.6 degrees Fahrenheit (°F). According to the RCP 8.5 model, annual average maximum temperatures in Carmel-by-the-Sea could increase by 3.3°F by mid-century to 68.9°F, and by 6.3°F to 71.9°F by the end of the century.

The number of extreme heat days, defined as days with daily maximum temperature above 87.9 °F, is also projected to increase from 3 days to an average of 6 days per year by mid-century, and to an average of 7 to 13 days per year by the end of the century, depending on the emissions scenario. It is important to note that these are modeled averages and that some years will have more extreme heat days, and others fewer.

While the community and essential facilities of Carmel-by-the-Sea may be able to adapt to these temperature changes, local ecosystems are likely to be adversely impacted by the increased heat.

### Annual Average Maximum Temperature

Average of all the hottest daily temperatures in a year.



		30yr Average	30yr Range
Baseline (1961-1990)			
MODELED HISTORICAL	-	65.6 °F	65.3 - 65.8 °F
Mid-Century (2035-2064)			
MEDIUM EMISSIONS (RCP 4.5)	+2.6 °F	68.2 °F	66.7 - 69.6 °F
HIGH EMISSIONS (RCP 8.5)	+3.3 °F	68.9 °F	67.3 - 70.6 °F
End-Century (2070-2099)			
MEDIUM EMISSIONS (RCP 4.5)	+3.6 °F	69.2 °F	67.3 - 71.5 °F
HIGH EMISSIONS (RCP 8.5)	+6.3 °F	71.9 °F	69.2 - 76.0 °F

Source: Cal-Adapt Local Climate Change Snapshot for Carmel-by-the-Sea

### Drought

In 2014, the State of California, including Monterey County, faced one of the most severe droughts on record. Governor Brown declared a drought State of Emergency in January 2014, and directed State officials to take all necessary actions to prepare for water shortages during what was considered an "unprecedented" drought.

Prior to the 2014 drought, the National Climatic Data Center has recorded no instances of severe drought conditions in the Monterey County forecast zone for the period of 1/1/1996 through 12/31/2013.

According to the Fourth California Climate Assessment, even minor fluctuations in rainfall patterns will increase pressure on Monterey County's water resources, which are already over-stretched by the demands of a growing agriculture economy and population. Decreasing spring stream flows, coupled with increasing demand for water resulting from both a growing population and hotter climate, could lead to increasing water shortages.

According to the State's Cal-Adapt modeling tool, research suggests that for much of the state, wet years will become wetter and dry years will become drier. Dry years are also likely to be followed by dry years, increasing the risk of drought. While California does not see the average annual precipitation changing significantly in the next 50-75 years, precipitation will likely be delivered in more intense storms and within a shorter wet season. We are already seeing some of the impacts from a shift towards larger year to year fluctuations.

### Fog Changes

According to California's Fourth Climate Assessment, the formation of coastal fog is very complex and involves highly dynamic ocean, air, and land processes. Ocean upwelling, once thought to drive the formation of coastal fog, is secondary to the global atmospheric circulation pattern that situates a North Pacific zone of atmospheric high-pressure. This air mass generates inversions under which coastal fog forms. The frequency and thickness of summertime fog depends on the location of the high-pressure zone, the strength of the inversion, and sea surface temperatures.

The future of coastal fog under climate change remains uncertain. Long term fog trends over the coastal ocean from ship observations since 1951 show an increase, while fog trends over land show a decrease. The effect of other land surface changes such as forest fires on fog is unknown.

Changes in coastal fog could have a significant impact on coastal ecosystems. Fog provides an important source of water for many coastal plant communities through fog drip, and it also acts to keep moisture in the ecosystem, preventing evaporation and maintaining cooler temperatures during the summer months. Ecosystems such as the coastal redwoods and maritime chaparral are dependent on fog for their survival. A decline in coastal fog could also lead to increased water use and an increased demand for water in the Central Coast Region due to warmer temperatures and increased evaporation during the summer months. This in turn could lead to increased agricultural and landscape water use.

### **Ocean Warming**

According to information provided by the National Oceanic and Atmospheric Administration (NOAA), Office of National Marine Sanctuaries, water temperatures in the Monterey Bay Sanctuary have risen slightly over the past century and offshore waters could warm by 7 degrees Fahrenheit by 2100. In addition to rising average temperatures, marine heatwaves are expected to increase in frequency, duration, and intensity.

Monterey Bay is at an ecological transition zone that is the northern range edge of many warm-water species. Thus, warming of ocean waters may have a significant impact on marine communities by shifting warm-water species northward. Warming waters also hold less oxygen and may increase the mortality of a variety of local organisms, including mussels, oysters, sea stars, rockfish, kelp, and deep-water corals.

Many impacts of warming waters were observed during the 2014-2016 marine heatwave known as "The Blob", during which water temperatures in the Sanctuary reached 7.2 degrees Fahrenheit above normal. That marine heatwave caused significant impacts in the Bay, including a large Harmful Algal Bloom, reduced numbers of zooplankton, and migration of southern species. These changes in turn caused mass mortalities of seabirds and marine mammals, and early closure and delayed opening of the Dungeness crab fishery. Effects of the heatwave also led to significant declines in kelp forests in the region.

The varied impacts of The Blob on the marine ecosystems of the Monterey Bay and the fisheries that rely on them demonstrated the potential significant impacts of climate change on local marine communities; however, marine systems are complex, impacted by not only water temperature, but also upwelling, sea level rise, storm patterns, and ocean acidification. Thus, the long-term effects of climate change on local marine ecosystems are still under study and are difficult to predict.

### Wildfires

Wildfires occur frequently in the Central Coast region. In recent years, much of California, including the Central Coast, has seen an increased risk of wildfire, with a wildfire season that starts earlier, runs longer, and features more extreme fire events.

According to California's Fourth Climate Assessment, annual climatic water deficit, which measures water availability relative to water demand, is generally a strong predictor of fire occurrence in semi-arid regions, largely due to the correlation between annual water deficit and fuel moisture. Warmer temperatures will increase water demand and climate water deficit, and thus fire risks.

A key factor affecting wildfires on the Central Coast will be precipitation patterns. Northern Central Coast areas typically have higher precipitation and may see fewer, more severe, wildfires; while areas to the south may see more frequent, less severe, wildfires as warming temperatures increase climatic water deficit there but also could reduce vegetation growth rates and fuel loads. Another important factor in wildfire severity will be wind; at this time, climate models have not determined yet how climate change will affect major wind patterns in the Central Coast.

Given the uncertainties in climate predictions of precipitation and wind for the Central Coast region and the sensitivity to precipitation and climatic water deficits of our local ecosystems, it is difficult to accurately predict the change in wildfire frequency and severity; however, there is little doubt that large, severe wildfires will continue to occur in this region. Thus, growing populations and expansion into the Wildland Urban Interface (WUI) will increase vulnerability to fires. Projected increases in precipitation intensity during storms may also increase post-fire impacts such as sediment flows, nutrient pulses in nearshore waters, and the spread of invasive grasses.

### **Stronger Storms**

Projections of changes in precipitation in California are more nuanced than projected changes in temperature and have less separation between RCP4.5 and 8.5 scenarios. There is a projected increase of year-to-year variability with wetter days during periods of precipitation, but with fewer total days with precipitation. This means that storms will intensify and rainfall will come in more intense bursts; however, drought years may also be more common and the wet season will become shorter. When combined with higher temperatures, these changes will create significant challenges for the state's water supplies, potentially creating more serious flooding events as well as more frequent drought conditions.

According to California's Fourth Climate Assessment, extreme atmospheric river events, which are associated with strong winds and severe flooding, are expected to increase under projected climate change in California. Atmospheric rivers are the dominant drivers of locally-extreme rainfall events along the Central Coast. During the winter of 2016-2017, a large number of atmospheric rivers that struck the Central Coast caused tremendous flooding and damage throughout the Monterey Bay region. During the winter of 2018-19, a series of atmospheric rivers struck the Monterey Peninsula with significant wind and rainfall that caused widespread power outages and road closures due to fallen trees and broken branches (Appendix A).

Periodic El Niño events also can significantly impact the intensity of storm events on the Central Coast. El Niño events are associated with seasonally-elevated ocean water levels as high as 1 foot above normal, and, on average, 30 percent larger winter wave energy in California. Extreme El Niño events of 1982-83 and 1997-98 caused significant coastal erosion due to strong winter waves. The magnitude and frequency of El Niño events, which may increase with climate change, will have significant impacts on coastal resources and will exacerbate the impacts of sea level rise.

### Sea Level Rise

Global sea level rise is driven primarily by thermal expansion caused by the warming of the oceans and the loss of land-based ice such as glaciers and polar ice caps due to increased melting. The Monterey County MJHMP (September 2014) estimates that Monterey County may experience an approximate 5-foot (150 cm) rise in sea level by the year 2100. Figure 1 below is a chart from the Coast and Ocean Summary Report of California's Fourth Climate Assessment (August 2018). The chart indicates potentially more extreme sea level rise than previously anticipated, particularly if greenhouse gas emissions are not controlled. The chart also illustrates the rapid and drastic sea level rise between 2050 and 2100, especially under an unmitigated greenhouse gas emission scenario.

Figure 2 is from the USGS Coastal Storm Modeling System and shows a range of inundation zones, starting with 1) current conditions, 2) 1.6 feet (50 cm) of Sea Level Rise (SLR) by mid-century under normal conditions, 3) 1.6 feet of SLR during a 1-year storm, and 4) 5 feet of sea level rise by 2100 (no storm).

The figures indicate that the Carmel bluffs provide an important barrier against sea level rise impacts to property, which will be increasingly impacted by the rising tides. Particularly during storms, as the beach continues to narrow, the bluffs and seawalls will endure an increasing amount of the erosive force of ocean waves. Carmel Beach will continue to become narrower, particularly at the southern end of the bay, as well as the northern end, near Pescadero Canyon, and, by mid-century, will be inaccessible during and after storms. This phenomenon of beach loss is already happening after large winter storms in Carmel. With 5 feet of sea level rise

(near the end of the century under an RCP 4.5 scenario), the southern end of the beach will be gone, as well as the northern portions, even under normal conditions.

The loss of Carmel Beach will impact not only the recreational, environmental, and economic resources it provides but it also will amplify the impacts of hazard events such as storms, as well as coastal erosion. Coastal erosion analysis indicates that retreat rates for the Carmel bluffs average 2-4 inches per year. It is important to note that there are wide variations in coastal erosion from year to year and that, during El Nino years, which are characterized by stronger storms, the bluffs experience significantly more erosion. For example, during the winter of 1982-83, as much as 40 feet of bluff were lost in some areas of Carmel (Appendix A). Sea level rise, combined with amplified coastal erosion could cause considerable damage to the City's coastal facilities, including sea walls, revetments, access stairs, the Scenic pathway, bathrooms, Scenic Road, and utilities including the sanitary sewer, water supply, and stormwater systems.

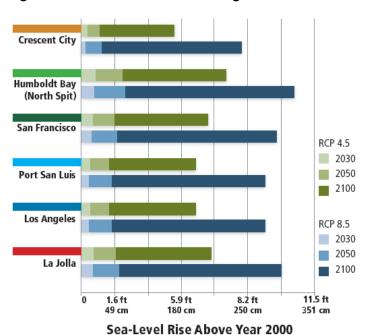
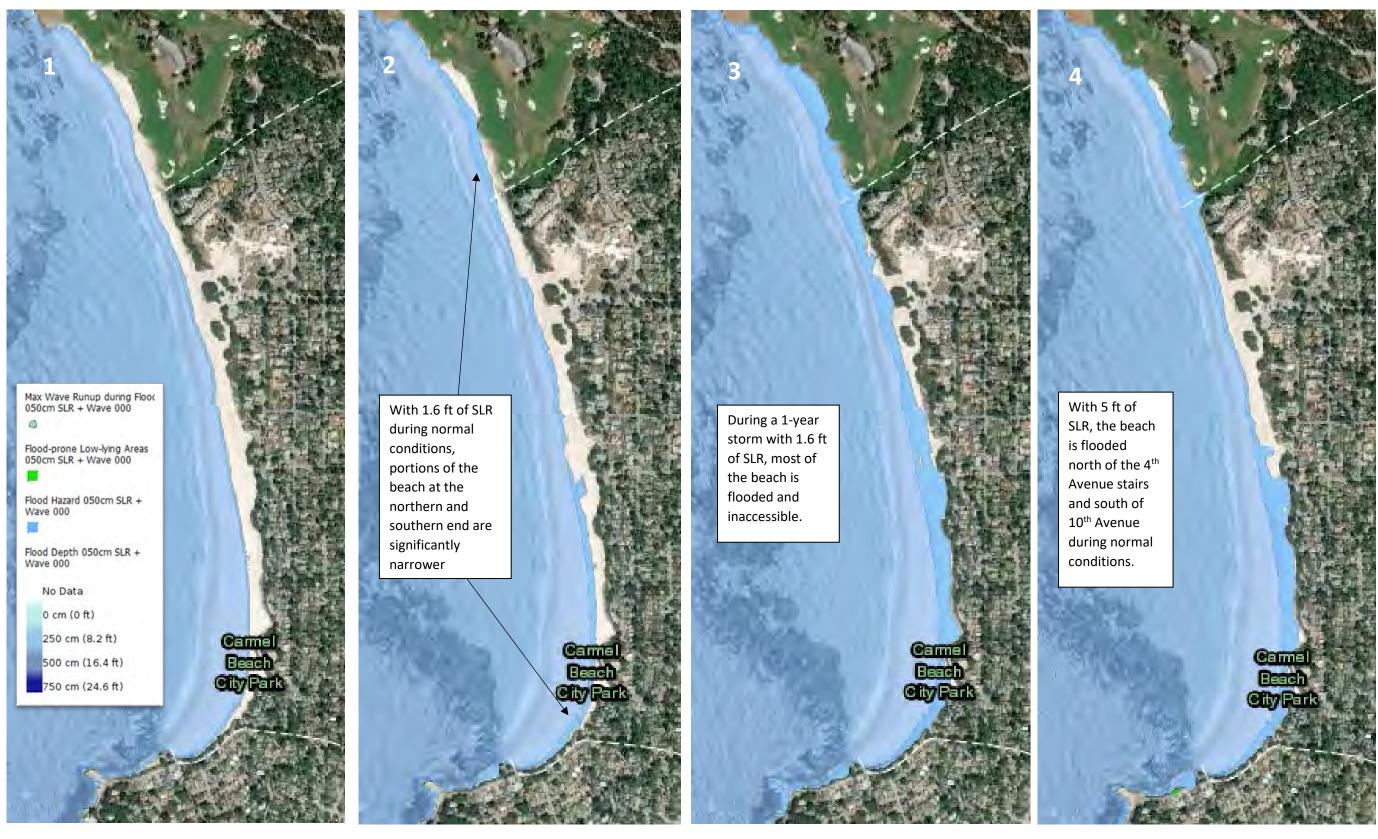


Figure 1: Chart of Sea Level Rise along the California Coast

Source: California's Coast and Ocean Summary Report, California's Fourth Climate Change Assessment

Figure 2: Comparison of Carmel Beach maximum wave run-up during: 1) current conditions, 2) with 1.6 ft of sea level rise (SLR) and no storm, 3) 1.6 ft of SLR and 1-year storm, and 4) 5 ft of SLR and no storm.



Source: Our Coast Our Future, <a href="https://data.pointblue.org/apps/ocof/cms/">https://data.pointblue.org/apps/ocof/cms/</a>

### IV. Hazard Ranking

Based on the information provided by historical hazards (Appendix A), as well as projected changes from climate change, several climate effects will significantly impact Carmel over the coming years. Climate hazards are ranked in the table below by the timeframe of their impacts, with hazards that are already causing observable impacts or representing a significant near-term risk in orange and those with potentially significant impacts into the future in yellow. Hazards in yellow have a longer planning time horizon. Hazards for which we do not have enough data yet are shown in grey.

- Orange: already causing observable impacts or a near-term significant risk
- Yellow: significant mid- to long-range impacts
- Grey: not enough data

Stronger Storms
Wildfires
Sea Level Rise
Drought
Increased Temperature
Fog Changes
Ocean Warming

### V. Vulnerable City Assets and Populations

Climate change does not have the same effects in all parts of the community. Some people and physical assets will be affected more severely than others, and adaptation planning efforts should evaluate the full range of potential effects of climate change. Priority assets and populations at risk are organized in Table 1 below under the following main categories:

- Natural Assets
- Community
- Utilities
- Regional Infrastructure
- Local Infrastructure

Virtually all people and assets in our community will be affected by climate change in some way over the planning horizon; however, it is not feasible to assess the vulnerability of every group or every asset in our community. Thus, we have focused on those assets that face greater harm, require special consideration, or are critical to the community's well-being. They are listed below with potential hazards that may affect them.

**Table 1: Vulnerable City Assets and Populations** 

	Priority Hazards						
Priority Assets at Risk	Stronger Storms	Wildfires	Sea Level Rise	More Droughts	Increased Temperature	Fog Changes	Ocean Warming
Natural Assets							
Mission Trail Nature							
Preserve	Х	Х	Χ	Х	X	Χ	
North Dunes			Х	Х	X	Χ	
Urban forest	Х	Х		Х	Х	Χ	
Marine Sanctuary	Х			Х	Х	Χ	Х
Carmel Beach			Х			Х	Х
Community							
Elderly population and							
people with disabilities	Х	Х		Х	x		
Residents	X	X		X	X		
Visitors	X	Х	Х				Х
Local businesses	X	X	X	Х	Х		X
Service industry	Λ	,		X	, A		Λ
workers	Х	Х	Χ		X		
Second homes	Х	Х	Х		X		
Utilities							
Water supply		Х	Х	Х	Х		
Sanitary sewer system	Х		Х				
Power grid	X	Х			Х		
Overhead							
communication lines	Х	Х			X		
PG&E/communication							
underground lines (gas,							
cable)		Х	Х				
Regional Infrastructure							
Wastewater treatment							
facility	X		Χ		X		
Transportation							
infrastructure (Caltrans)	Х	Х	X				
Hospital and							
emergency medical							
care facilities	X	Х			X		
Landfill & waste	.,						
management	Х						

	Priority Hazards						
Priority Assets at Risk	Stronger Storms	Wildfires	Sea Level Rise	More Droughts	Increased Temperature	Fog Changes	Ocean Warming
Local Infrastructure							
Shoreline access infrastructure: Scenic trail, public restrooms, beach stairs, coastal							
roadways, and parking	Х	Х	Х		X (visitors)	Х	
Seawalls and revetments	Х		Х				
Storm drainage system	Х		Х				
Other city streets	Х						
Emergency response facilities (Fire station, EOC, PD, PW, City Hall, etc.)	x	×			X		

### VI. Existing Strategies and Policies for Adaptation

The City has several existing documents that provide guiding policies and strategies that will help address elements of climate change adaptation. A summary of recommended projects in those documents that will help reduce the City's vulnerability to climate change is presented below, by asset category.

### **Natural Assets**

### a. Mission Trail Nature Preserve

### Mission Trail Nature Preserve Master Plan

Adopted by the City Council: 1996

The Mission Trail Nature Preserve Master Plan has policies that will be beneficial to the short- and long-term health of the Preserve's ecosystems in the face of climate change. These policies can make the Preserve more resilient to increased heat, drought, and wildfires:

- O5-25: Preserve and enhance the vegetative diversity in Mission Trail Nature Preserve consisting of Monterey pine forest, central coast willow riparian forest, wet meadow, coast live oak woodland, redwood, box elder, cottonwood, coastal terrace prairie.
- O5-31: Maintain natural drainage patterns except where erosion or human safety problems may be created. Encourage/allow the channelized ditch to revert to a more natural channel in order to enhance the park's wetlands (riparian forest, wet meadow) and natural character.

• Prepare annual maintenance plans for habitats within the Preserve. Encourage native vegetation to reestablish on sites previously mowed, cut, or invaded by exotic species.

**Implementation Status:** *Initiated.* Many elements of the Mission Trail Nature Preserve Master Plan, including enhancing native habitats and site hydrology, have been initiated and are currently in progress. The City has been working with its private non-profit partners on invasive species and fire fuel removal throughout the Preserve for several years.

### Mission Trail Nature Preserve Baseline Biological Assessment

Prepared by Nicole Nedeff: January 2016

The Mission Trail Nature Preserve Baseline Biological Assessment was completed in 2016 and includes an implementation plan for maintenance and enhancement of the various habitats of the Preserve. This is the primary guiding document for habitat restoration projects in the Preserve.

**Implementation Status:** *Initiated.* Many elements of the Mission Trail Nature Preserve Baseline Biological Assessment, including weed removal and improving the site's hydrology, have been initiated and are currently in progress. The City has been working with the Friends of Mission Trail Nature Preserve on invasive species and fire fuel removal throughout the Preserve.

### Mission Trail Stream Stability Study

Prepared by Dudek and Waterways Consulting: February 2019

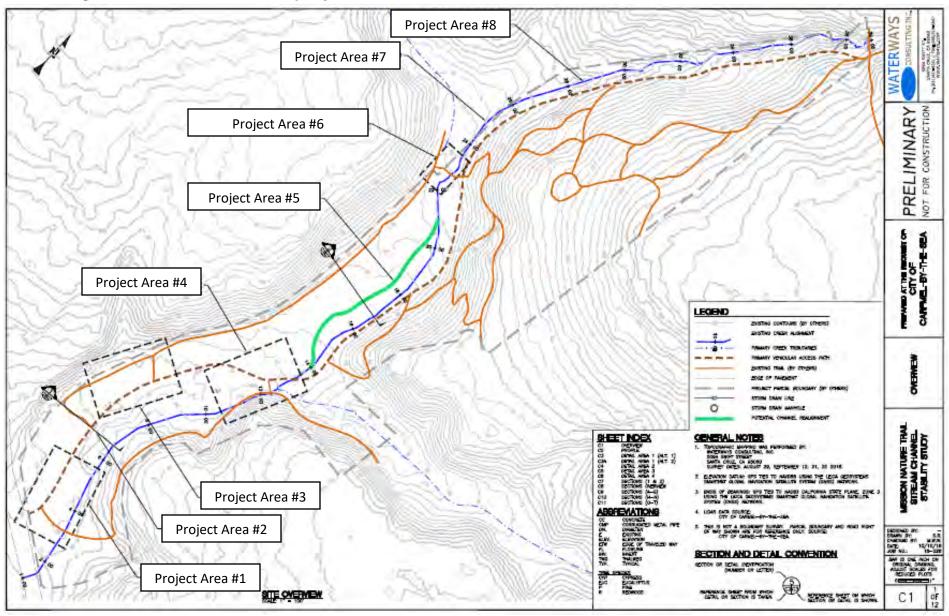
The Stream Stability Study was completed in 2019 to determine factors contributing to channel instability in Mission Trail Nature Preserve, to determine the stability of drainage improvements in the Preserve, and to recommend actions to restore the stream and habitat conditions in the riparian corridor. The study identified eight projects to restore natural hydrology and stream stability in the Preserve. The projects are shown on Figure 2 below and listed in Table 2.

**Table 2: Mission Trail Stream Restoration Projects** 

		APPROXIMATE COSTS			
PROJECT AREA	PROJECT COMPONENTS	DESIGN	IMPLEMENTATION & ESTABLISHMENT		
1 (Alt 1)	RAISE ENTRANCE ROAD, INSTALL NEW CULVERT BELOW ENTRANCE ROAD, CONSTRUCT OPEN SWALE TO CREEK	\$17,000	\$90,000		
1 (Alt 2)	RAISE ENTRANCE ROAD, INSTALL NEW CULVERT BELOW ENTRANCE ROAD, CONSTRUCT PIPE TO CREEK	\$17,000	\$95,000		
1 (Alt 3)	RAISE ENTRANCE ROAD, INSTALL NEW CULVERT BELOW ENTRANCE ROAD	\$15,000	\$75,000		
2	CONSTRUCT APPROX. 100 LF PEDESTRIAN BOARDWALK	\$8,000	\$40,000		
3	INSTALL CULVERT OR ROCKED FORD AND REALIGN TRIBUTARY DRAINAGE, INSTALL SMALL DITCH CULVERT AND PERFORM DITCH MAINTENANCE	\$7,500	\$22,500		
4	DEMOLISH PORTION OF EXISTING FORD, RESTORE DOWNSTREAM REACH OF CHANNEL, REALIGN TRAIL, CONSTRUCT PEDESTRIAN BRIDGE, RESTORE OLD TRAIL ALIGNMENT	\$17,500	\$100,000		
5	REALIGN APPROX. 700 LF OF CHANNEL. RESTORE 5 OLD CHANNEL BED, REVEGETATE DISTURBED AREAS		\$300,000		
6	REPLACE EXISTING UNDERSIZED BRIDGE, RESTORE DOWNSTREAM CHANNEL AND ARMOR REACH TO PREVENT FURTHER INCISION UPSTREAM	\$25,000	\$230,000		
7	REMOVE EXISITING WEIR, LOWER CHANNEL, STABILIZE NEW CHANNEL BED AND BANKS	\$9,500	\$30,000		
8	PERFORM BOUNDARY SURVEY, DETAILED TOPOGRAPHY, GEOLOGIC & GEOTECHNICAL INVESTIGATION. PRIORITIZE A PHASED REPAIR PLAN, AND PREPARE PRELIMINARY AND FINAL DESIGNS FOR GRADE CONTROL.	\$50,000	N/A		

**Implementation Status:** *Initiated.* A successful grant application for \$178,000 for the design and construction of Projects 1-3 has been submitted to the Per Capital Grant Program and is awaiting contract.

Figure 2: Mission Trail Stream Stability Projects



### b. North Dunes

### Del Mar Master Plan and North Dunes and Del Mar Dunes Habitat Restoration Plan (2009)

Adopted by the City Council: September 2009

The Del Mar Master Plan provides a framework for improving parking, circulation, pedestrian flow, handicap accessibility, aesthetics and environmental resources in the Del Mar and North Dunes areas. At the time of the Master Plan development, the North Dunes were a 4 to 5 acre tract of substantially disturbed dunes with small pockets of remaining native species. The Master Plan has several policies that support the restoration of the native habitats in the North Dunes, which will improve sensitive habitat resilience in the face of climate change:

- P5-103: Identify and protect environmentally sensitive habitat areas against any significant disruption of habitat values. Only uses dependent upon those resources shall be allowed.
- P4-48: Discourage any further incursion of recreational activities into the North Dunes habitat. Sensitive resources in the North Dunes habitat area shall be protected.
- P5-28: Restore dune areas to improve habitat for Tidestrom's lupine and other native dune plants.
- O5-7: Protect the fragile dunes and sensitive plants in the Del Mar Dunes and North Dunes against any significant disruption of habitat values.
- P5-27: Maintain an attractive mix of plant material that favors native species and other, drought-tolerant, noninvasive species.
- P5-29: Control the spread, and prohibit planting of, invasive non-native plants.
- O5-40: Ensure that long-term management activities maintain the natural dune ecology of Carmel Beach in a manner consistent with public safety. Protect areas of the beach from the loss of habitat, where special status plant species are growing.
- P5-173: Retain a qualified botanist to monitor the population of Tidestrom's lupine and other special status species on the North Dunes of Carmel Beach. The population should be assessed annually (or based upon a schedule agreed upon by the Department of Fish and Game, Coastal Commission and U.S. Fish and Wildlife Service) to determine if the population is stable and if measures to protect the population should be instituted. If the population appears heavily affected by public use, the City should consider fencing or placing barriers around the lupine habitat on the beach.
- P5-176: Implement a Dune Restoration Plan.
- P4-34: Post educational/interpretive signs where appropriate along Scenic Road and in the North Dunes area.
- P4-3: Improve and sign the vertical access at Fourth Avenue. Consider development of a pedestrian path from the foot of Jane Powers walkway to the Fourth Avenue beach access through Sand and Sea. Investigate and implement opportunities to establish or reestablish additional vertical access from North San Antonio to the beach to the extent feasible.

P4-18: Improve the pedestrian experience through the Del Mar Parking area for those arriving on foot and from parked vehicles to the beach. Consider construction of boardwalks or other improvements to aid beach circulation, protect tree roots and protect the sensitive vegetation in the North Dunes area.

A Habitat Restoration Plan for the North Dunes and Del Mar Dunes is included as an appendix to the Del Mar Master Plan, which guides the specific habitat restoration actions at the North Dunes. The Habitat Restoration Plan has the following success criteria:

- Aggressive non-native species shall have less than 1% of coverage in the project area.
- The dune scrub plant coverage should reach at least 70% coverage in the project area, with the other 30% occupied by bare sand or Monterey cypress within the cypress corridor.
- All planted species must be displaying evidence of reproduction.
- The dune scrub shall be comprised of all 22 native species listed in the report.
- Successful establishment of 10 locations of Tidestrom's lupine with at least 100 plants each.
- Successful establishment of the quantity and quality of available habitat for Black Legless Lizards, including the habitat corridor between Del Mar and North Dunes.
- Annual monitoring of the Tidestrom's lupine population is performed and results reported to the CA Department of Fish and Game's Data Base.
- The trail system has been established and is being used exclusively for visiting or traversing the dunes. No foot traffic impact is occurring within the Del Mar or North Dunes.
- Interpretive panels are increasing the visitors' experience and knowledge of the dune habitat.

Implementation Status: substantial progress. In 2010, the City installed a boardwalk connecting the 4<sup>th</sup> Avenue beach stairway to the dune access at the end of 4<sup>th</sup> Avenue, which reduces impacts on dune habitat and endangered Tidestrom's lupine. In 2016, the City obtained a CDP to conduct habitat restoration actions at the North Dunes. Significant strides have since been made in removing invasive weeds and restoring native dune vegetation throughout the North Dunes. The City retained a biologist who has been monitoring the progress of restoration activities. The latest preliminary results for the 2021 monitoring indicate that average percent cover of native species along 18 transects in the dunes is 65% and the average weed cover is 10%. The monitoring also indicated that 39 different native species were recorded in the North Dunes.

### c. Urban Forest

### Forest Management Plan (2000)

Prepared by: Michael Branson, City Forester, December 2000

Adopted by the City Council: March 2001

The Forest Management Plan establishes a broad set of goals and policies for management of the City's urbanized forest. Some policies of the Forest Management Plan are beneficial to drought and wildfire mitigation, and provide other adaptation benefits:

- Promote undergrounding of utilities where feasible and with minimum detriment to the root systems of trees.
- Monitor tree pest and disease problems and take appropriate measures to minimize their impact.
- Plant native Monterey pine seedlings of different genotypes to maximize resistance to diseases and make these seedlings available to the public.
- Establish and implement a procedure for removal of invasive vegetation.
- Maximize retention of surface water on each site through site design and use of best management practices.
- Where feasible, direct street runoff to open-space areas on public property for percolation into the soil.
- Implement development standards that minimize runoff and the amount of area paved with impervious surfaces.
- Require approval of landscape plans for drought tolerance and trees by the Forestry department on new construction.

**Implementation Status:** *Initiated.* Requirements for stormwater infiltration, drought tolerance, and trees on private property are in place in the municipal code and are enforced by City staff. The City Forester monitors tree pest and disease problems. Invasive vegetation removal is an on-going task.

### d. Opportunities to build on Existing Adaptation Strategies for Natural Resources:

The following opportunities to build on existing adaptation strategies were identified based on technical expert presentations at Committee meetings (Appendix B) and from the review of previous reports:

- Update the Forest Management Plan to (1) address transitioning the urbanized forest to tree species that can withstand the projected temperatures of the second half of the century, and (2) include planting guidelines to improve tree health, (3) incorporate tree species that have greater drought and wildfire resistance, and (4) in addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.
- Encourage stormwater infiltration features as part of street CIP projects to reduce runoff volume and increase groundwater infiltration.
- When designing projects recommended in the Mission Trail Stream Stability Study, size improvements to handle larger storms.
- Earmark CIP funding for design, permitting, and implementation of stream stability study projects. Include strategies in 2021 MJHMP and Integrated Regional Watershed Management Program (IRWMP) for potential regional funding.
- Update the Mission Trail Nature Preserve Master Plan to consider the potential impacts of climate change and to reduce wildfire risk for neighboring private properties. Incorporate Best Practices into an annual maintenance plan, including cost estimates for implementation and revenue sources for implementation.
- Continue maintenance and monitoring at the North Dunes to determine how the changing climate will affect dune habitats.

### Community

### a. Elderly population and people with disabilities

### Climate Change and Health Profile Report: Monterey County (2017)

Prepared by: California Department of Public Health, Office of Health Equity

Researchers have examined the pathways in which increased temperatures and hydrologic extremes can impact health and generally recognize three main pathways: direct exposures, indirect exposures, and socio-economic disruption. As shown in Figure 3 below, all Californians are vulnerable to the health impacts of climate change.

**Impact of Climate Change on Human Health** Injuries, fatalities, Asthma, mental health impacts cardiovascular disease Air Severe Malaria, dengue, Pollution Weather Heat-related illness and death, Rift Valley fever, cardiovascular failure Changes Lyme disease, chikungunya, Extreme Ecology West Nile virus Heat Increasing Allergens Respiratory Forced migration, Degradation allergies, asthma Water and Food Water Supply Impacts **Quality Impacts** Cholera, Malnutrition, cryptosporidiosis, diarrheal disease campylobacter, leptospirosis, Source: harmful algal blooms Federal Centers for Disease Control and Prevention

Figure 3: Impact of Climate Change on Human Health

Based on medical reviews of individuals who died during heat waves and other extreme weather events, those who are particularly vulnerable to the direct effects of climate change include the very old and very young, individuals who have chronic medical conditions and psychiatric illness, people taking multiple medications, people without means for evacuation (no access to public transit or private cars), people who are socially isolated, medically fragile, and those living in institutions.

A much larger part of the population is vulnerable to intermediate or socioeconomic factors such as preexisting physical and mental health conditions, cultural or physical isolation, occupations involving outdoor or high risk work, a precarious socioeconomic status, or lack of social cohesion and collective

efficacy. Collective efficacy and local community cohesion may be associated with effective action to plan and coordinate responses to climate threats.

The Health Profile Report provides the following useful health statistics for the County of Monterey:

- In 2012, nearly 46% of adults (149,059) reported one or more chronic health conditions including heart disease, diabetes, asthma, severe mental stress or high blood pressure.
- In 2009, approximately 86% of households were estimated to lack air conditioning.
- In 2010, Monterey County had approximately 28,971 outdoor workers whose occupation increased their risk of heat illness.
- In 2005-2010, there was an annual average of 27 heat-related emergency room visits in the County.
- In 2010, approximately 14% (58,314 residents) of the county's population lived in fire hazard zones of moderate to very high severity.

### b. Residents and Private Properties

### California Green Building Standards (CALGreen) (2019)

CALGreen is California's first green building code and first in the nation state-mandated green building code. It is formally known as the California Green Building Standards Code, Title 24, Part 11, of the California Code of Regulations. The purpose of CALGreen is to improve public health, safety, and general welfare through enhanced design and construction of buildings using concepts which reduce negative impacts and promote those principles which have a positive environmental impact and encourage sustainable construction practices. CALGreen applies to the planning, design, construction, use, and occupancy of every newly-constructed building or structure on a statewide basis unless exempt. Additions and alterations to existing buildings which increase the building's conditioned area, interior volume, or size are also covered by CALGreen.

The latest iteration of CALGreen standards was issued in 2019. CALGreen includes minimum requirements for water and energy efficiency, waste reduction and recycling, use of materials that are less polluting, and better indoor air quality.

### **Defensible Space Inspection Program**

Community wildfire preparedness is supported by Monterey Fire's Defensible Space Inspection Program and coordination with surrounding fire prevention organizations to limit fire and wildfire risk through planning, prevention, and mitigation. CalFire's Fire & Resource Assessment Program (FRAP) and Fire Hazard Severity Zone (FHSZ) maps are available online with information on forest assessment, fire severity zones, and defensible space. Monterey Fire personnel have inspected and graded all Carmel parcels as pass, pending, or fail. Grading criteria are evolving as knowledge on fire spread is developed. Current criteria are based on dry fuel accumulation, spark arrestors, and overhanging tree limbs.

### Multi-Jurisdictional Hazard Mitigation Plan (2015)

Prepared by: The Monterey County Hazard Mitigation Planning Team with Professional Planning Assistance from AECOM, June 2015

The Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) provides a framework for regional collaboration on hazard mitigation and resilience. The goals of the plan are: (1) To protect life and property by reducing the potential for future damages and economic losses that result from known hazards; (2) To qualify for additional grant funding, in both the pre-disaster and post-disaster environment; (3) To speed recovery and redevelopment following future disaster events; (4) To sustain and enhance existing governmental coordination throughout Monterey County; and (4) To comply with federal and state requirements for local hazard mitigation plans. The MJHMP is currently in the process of being updated. The following City-specific community outreach projects that would improve community and private property resilience were included in the 2016 MJHMP:

**Table 3: MJHMP City Community Resilience Actions** 

Action No.	Description	Priority	Admin. Dept	Potential Funding	Timeframe	Narrative Update/ Explanation
2	Develop a sustained public outreach program that encourages consistent hazard mitigation content. For example, consider publishing tsunami inundation maps in telephone books, wildland fire defensible space tips with summer water bills, and the safe handling and disposal of hazardous waste and chemicals with garbage bills.	High	City Clerk	General Funds, HMGP, and PDM Grants	0-1 years	The City has installed new tsunami warning signs along shoreline areas and beach access points. The City will be revamping its website in the next few years and can add information on hazard mitigation such as wildland fire prevention actions, evacuation routes, and hazardous waste disposal.
5	Develop and provide funding and/or incentives for defensible space measures (e.g., free chipping day, free collection day for tree limbs).	High	Fire	General Funds, HMGP, and PDM Grants	Ongoing	Due to staff and fund shortages, this item has not been implemented. The City has provided, and will continue to provide, inspection, information, and enforcement of fuel management on private property as appropriate.

### General Plan Environmental Safety Element (2009)

Adopted by the City Council: 2009

The Environmental Safety Element focuses on reducing human injury, loss of life, property damage, and the economic and social dislocation caused by natural and human-caused hazards. The policies included in this element are intended to provide a framework to address natural and human induced hazards through prevention and emergency response. This element seeks to guide the continuous development of preventative measures that address existing and potential hazards, while also providing contingent emergency response procedures in the instance of a local or regional emergency.

The following issues were identified as relevant to the City of Carmel-by-the-Sea and are addressed in the Goals, Objectives, and Policies and Supporting Information sections.

- Earthquakes
- Landslides
- Drainage/Flooding
- Tsunami
- Fire
- Disaster Preparedness

The following policies from the safety element relate to storms, wildfire, sea level rise, drought, and increased temperatures:

- P8-14 Educate the public regarding seismic, geologic, flood, fire, tsunami, and other potential disasters, by preparing periodic news articles for local media outlets, such as Carmel Pine Cone.
- P8-16 Encourage property owners to retrofit older structures with fire detection and/or warning systems.
- P8-19 Encourage new development located in or adjacent to fire hazard areas to incorporate fire preventative site design, access, landscaping and building materials, and other fire suppression techniques.
- P8-20 Control excessive buildup of flammable vegetative material on vacant lots and within and adjacent to high severity fire hazard zones (such as Mission Trails and Pescadero Canyon), especially following wet springs.

### c. Opportunities to build on Existing Community Adaptation Strategies:

The following opportunities to build on existing adaptation strategies were identified based on technical expert presentations at Committee meetings (Appendix B) and from the review of previous reports:

- Update City Planning guidelines to reflect and/or not conflict with current California codes (CBC Chapter 7 & CRC R337) in the Very High Fire Hazard Severity (VHFHS) Zone.
- Incorporate defensible space design in landscaping guidelines.

- Collaborate with Monterey Fire on its inspection and outreach efforts to reduce fire risks. Help spread information at critical times to increase resident awareness and knowledge of how to reduce wildfire risk and prepare for emergencies.
- Evaluate the feasibility of gaining Firewise Community Certification in Carmel-by-the-Sea.
- Consider updating the General Plan's Safety Element policy P8-17 to include "move or remedy existing" utilities in high severity fire hazard zones.
- Review and publicize the evacuation plan for the community in the event of a wildfire or other disaster.

### **Utilities**

### a. Water Supply

### Integrated Regional Water Management Plan

The Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management Plan (IRWMP) was updated in 2019. Integrated regional water management in California is established as a way to increase regional self-sufficiency by encouraging local water resource managers to take a proactive role in solving water management problems through collaboration with stakeholders to create innovative strategies and effective actions to achieve water management objectives. The Monterey Peninsula Regional Water Management Group (RWMG), the body responsible for the development and implementation of the IRWM Plan, includes 17 local agencies and organizations, including the City. The Monterey Peninsula IRWM Plan region is approximately 350 square miles and includes the coastal cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside. Also included are the unincorporated portions of Monterey County in Carmel Valley, Pebble Beach, the Carmel Highlands, the Laguna Seca area, and a portion of the Ord Community.

The IRWMP has the following prioritized regional objectives, which support climate change resilience:

- Improve regional water supply reliability through environmentally responsible solutions
  that promote water and energy conservation. Protect the community from drought and
  climate change effects with a focus on interagency cooperation and conjunctive use of
  regional water resources.
- Protect and improve water quality for beneficial uses consistent with regional community interests and the RWQCB Basin Plan through planning and implementation in cooperation with local and state agencies and regional stakeholders.
- Ensure that flood protection strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects and maximize opportunities for comprehensive management of water resources.
- Ensure that erosion management strategies are developed and implemented through a collaborative and watershed-wide approach and are designed to consider climate change effects.

- Develop watershed scale management strategies, considering climate change effects and maximizing opportunities for comprehensive management of water resources.
- Preserve the environmental health and well-being of the Region's streams, watersheds, and the
  ocean by taking advantage of opportunities to assess, restore and enhance these natural
  resources when developing water supply, water quality, and flood protection strategies.
   Seek opportunities to conserve water and energy, and adapt to the effects of climate change.
- Adapt the region's water management approach to deal with impacts of climate change using science-based approaches, and minimize the regional causal effects related to water resources.
- Identify an appropriate forum for regional communication, cooperation, and education. Develop protocols for encouraging integration and reducing inconsistencies in water management strategies between local, regional, State, and Federal entities.

The IRWMP identified the high priority adaptation strategies included in Table 3 below. Additionally, within the City of Carmel-by-the-Sea, the following three projects were submitted as concept proposals for inclusion in the IRWMP and potential future grant funding:

- Carmel-by-the-Sea Pilot Wet-Dry Weather Diversion Program: The goal of this project is to capture and treat runoff to substantially reduce the pollutants that enter the Carmel Bay Area of Special Biological Significance (ASBS). This project proposes to install a diversion facility at the City's 4th Avenue and Ocean Avenue storm drains, which capture most of the residential areas on the north side of the City and the downtown area. These diversion facilities would capture dry weather, first flush and small storm runoff from approximately 170 acres (approximately 50% of the City's watersheds that drain directly to the Pacific Ocean at Carmel Beach). Runoff captured would flow to the sanitary sewer collection system and ultimately to the Carmel Area Wastewater District's Wastewater Treatment Plant where the water would be treated and beneficially reused for irrigation of landscape at the Pebble Beach property.
- Forest Hill Park Creek Restoration: The goal of this project is to reduce erosion of the drainage channel that flows through Forest Hill Park on the north side of the City of Carmel-by-the-Sea and provide sediment capture to improve water quality flowing to the Carmel Bay ASBS from the City's largest watershed. The restoration would consist of rerouting and stabilizing the creek channel, which is eroding and impacting tree roots, slopes and nearby pedestrian walkways. Reducing sediment loads that flow into the storm drain system and to Carmel Bay from the City will also reduce heavy metals that bind to sediments such as lead and particulate copper.
- Park Branch Library-Devendorf Rainwater Capture: The goals of this project are to harvest and
  use dry weather flows and storm water from the Park Branch Library site for irrigation of
  neighboring Devendorf Park. This project also proposes to install permeable pavement at the
  Park Branch Library to allow storm water to infiltrate into the ground instead of running off in
  the street. This project could be integrated with the proposed Sixth Avenue / Devendorf Park
  Plaza.

**Table 4: IRWMP High Priority Climate Adaptation Strategies** 

ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE						
Climate Change Effects	Adaptation and Response Strategies	Initial Actions				
Rangelands are expected to be drier	Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies.  Implement adaptation strategies to conserve California's biodiversity.	N/A				
Domestic landscaping water needs will be higher	Integrate land use and climate adaptation planning	Education Incentive programs Demonstration programs  Grey water Xeriscaping  Expand water supplies (purple pipe) and storage  Aquifer management				
Decrease in local rainfall	Promote community resilience to reduce vulnerabilities: Food sustainability Implement water conservation and supply management efforts Manage watersheds, habitat, and vulnerable species	Education Incentive programs Demonstration programs Grey water Xeriscaping				
Sea level rise and higher groundwater extraction will lead to increased rates of seawater intrusion	Prepare a regional sea level rise adaptation strategy Promote working landscapes with ecosystem services Integrate land use and climate adaptation planning	Education Incentive programs  Demonstration programs  Grey water Xeriscaping  Expand water supplies (purple pipe) and storage  Aquifer management  Expand agriculture water conservation programs				

### ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE

Climate Change Effects	Adaptation and Response Strategies	Initial Actions	
Droughts will be more frequent and severe	Implement adaptation strategies to conserve California's biodiversity. Educate, empower, and engage citizens regarding risks and adaptation Integrate land use and climate adaptation planning Promote community resilience to reduce vulnerabilities	Human safety response  Education Incentive programs  Demonstration programs  Grey water Xeriscaping  Expand water supplies (purple pipe) and storage  Aquifer management  Expand agriculture and urban water conservation programs	
Lower seasonal surface flows can lead to higher pollutant concentrations	Manage watersheds, habitat, and vulnerable species	Minimize non-point source pollution Buffers	
Changes in storm intensity will increase sediment loading in many systems	Prepare fire reduction strategies to protect watershed lands using ecologically sustainable strategies	Erosion control on farms and creeks Buffers	
Channel stability will be impacted from higher storm flows causing additional turbidity	Provide guidance on protecting critical creek/river ecosystems and development	Erosion control on creeks  Wastewater and stormwater infrastructure vulnerability analysis	
Sea level rise will impact current estuary brackish water interface towards more marine systems	Implement adaptation strategies to conserve California's biodiversity	Retain freshwater in watershed Habitat migration Buffers Erosion control	
Regional levees will provide less protection during higher storm flow events	Support essential data collection and information sharing Manage watersheds, habitat, and vulnerable species Prepare a regional sea level rise adaptation strategy	Refurbish or expand levees or tide gates (upgrade priority infrastructure)  Map/inventory infrastructure	

### ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE

Climate Change Effects	Adaptation and Response Strategies	Initial Actions
Natural creeks throughout the region and managed conveyance within the Carmel Valley will see higher flow rates leading to increased erosion and flooding	Manage watersheds, habitat, and vulnerable species	Refurbish or expand levees or tide gates(upgrade priority infrastructure)  Map/inventory infrastructure
Coastal levees and control structures will be undersized to manage the combined influences of higher flow events and sea level rise	Support essential data collection and information sharing Prepare a regional sea level rise adaptation strategy	Refurbish or expand levees or tide gates(upgrade priority infrastructure)  Map/inventory infrastructure/levee locations and WCS, ownership  Phase II task 5 activity 3 - ecosystem services - be aware of services available  Elevations of levees and sea walls - maybe with PWA-management strategies  USGS elevation data
State recommendations suggest no new critical facilities be built within the 200-year flood plain(DWR 2008, DWR 2009b, CNRA2009)	Integrate land use and climate adaptation Planning	Work with Monterey County and cities, Coastal Commission (local jurisdiction)
Migration patterns and species distribution will change	Establish a system of sustainable habitat Reserves	Reduce migration impediments (dams, etc.)  Compile data on species distribution  Primary focus species - amphibians, waterfowl, salmonids, redwoods, tide water gobies  Maintain habitat corridors - contiguous areas  Fish and Game - wildlife adaptation plan - vulnerability for key species for each region
Invasive species populations will expand	Habitat/ecosystem monitoring and adaptive management	What are the invasive species and their ranges? Will they expand, be introduced? How are the habitats shifting (awareness)?  Ecological adaptation investigation and strategy

### ADAPTATION RESPONSE STRATEGIES TO THE EFFECTS OF CLIMATE CHANGE

Climate Change Effects	Adaptation and Response Strategies	Initial Actions
Coastal wetland systems are especially vulnerable to the combined influences of climate change	Establish regional policies to protect critical habitats Provide guidance on protecting critical coastal ecosystems and development	Identify critical habitats and ecosystems Integrate ecosystem management Regulatory mechanisms dedicated to protecting future locations of these areas Inventory of wetlands currently
Some locally unique species such as coastal redwoods and giant kelp are susceptible to changes in certain locally favorable climate variables (fog duration, coastal upwelling)	Manage watersheds, habitat, and vulnerable species	Identify how they will be impacted - What are the changes?  USGS study outcome - get a better handle on modeling fog changes in climate change

### b. Wastewater

### Carmel Area Wastewater District Sea Level Rise Study

CAWD conducted a Sea Level Rise study for their wastewater treatment facility in 2018. According to CAWD's study, the sea level rise projections do not identify new hazards to the WWTP of greater concern than the 100-year flood risks that CAWD has previously planned for. However, increased storm intensities as well as higher sea levels may increase the base flood elevations. According to the study, increased storm intensity, as well as sea level rise, will not detrimentally effect the CAWD WWTP before the year 2062 under the "Extreme Risk Aversion" scenario. The study also identified facility retrofits needed to maintain operations of essential infrastructure. This will allow for 40 years of continued operation in the existing location while evaluating options of future improvements to increase flood resiliency vs. relocating the WWTP. Long term options for the facility seem to be:

- Retreat up Carmel Valley
- Pump to Monterey One Water

### c. Opportunities to build on Existing Utilities Adaptation Strategies:

The following opportunities to build on existing adaptation strategies were identified based on technical expert presentations at Committee meetings (Appendix B) and from the review of previous reports:

- Provide information and incentives for residential water use reduction.
- Incorporate the Carmel projects included in the IRWMP into the City's 5-year CIP. Seek potential regional or State funding for projects.

### Infrastructure

### a. Local Infrastructure

### General Plan Environmental Safety Element (2009)

Adopted by the City Council: 2009

The Environmental Safety Element focuses on reducing human injury, loss of life, property damage, and the economic and social dislocation caused by natural and human-made hazards. The following policies from the safety element relate to local utilities and infrastructure resilience to storms, wildfire, sea level rise, drought, and increased temperatures:

- P8-7 Ensure that water, gas, and sewage utilities serving critical facilities are in good condition and are engineered to withstand damage from disasters.
- P8-17 Avoid and discourage locating public structures and utilities in high severity fire hazard zone.
- P8-18 Ensure adequate water supply for fire emergencies.

P8-30 Reduce flooding hazards in areas with flooding potential by improving drainage and minimizing the alteration of natural drainage and natural protective barriers that accommodate or channel floodwaters.

### Multi-Jurisdictional Hazard Mitigation Plan (2015)

Prepared by: The Monterey County Hazard Mitigation Planning Team with Professional Planning Assistance from AECOM, June 2015

The following City-specific infrastructure and utility projects were included in the 2016 Multi-Jurisdictional Hazard Mitigation Plan:

**Table 5: MJHMP Infrastructure and Utility Resilience Actions** 

Action No.	Description	Priority	Admin. Dept	Potential Funding	Timeframe	Narrative Update/ Explanation
1	Identify hazard-prone critical facilities and infrastructure and carry out acquisition, relocation, and structural and nonstructural retrofitting measures as necessary.	High	Planning and Building	HMGP and PDM Grants	Ongoing	The City has retained an engineering firm to assist in project management of Public Services Department hazard evaluation. The City will also be retaining an engineering consultant to evaluate the City's revetments and other shoreline protection structures in the next year or two.
4	Continue to conduct current fuel management programs and investigate and apply new and emerging fuel management techniques.	High	Fire	General Funds and PDM Grant	Ongoing	The City has provided for fuel management on City owned lands and will provide that service annually. Staff will explore the use of goats as a new method to do this work to improve the fuel management in steeper terrain areas.
6	Work with the Utility Companies (especially PG&E) to build and strengthen relationships to improve communication regarding emergency situations and develop an emergency response plan that includes all emergency responders and 911 communications.	Priority / Moderat e	Public Safety/PD	General Funds	Ongoing	New action for 2014-2019.

### b. Storm Drainage System

### Storm Drain Master Plan (2020)

Prepared by: Schaaf & Wheeler for the City

The Storm Drain Master Plan was completed in 2020. The master plan identifies current system capacity, condition, and maintenance issues. The master plan also identifies 17 projects to restore the system's ability to handle a 10-year 24-hour storm without localized flooding in various locations in the City. The projects are shown on the map below (Figure 4) and listed, with cost estimates in Table 6. Modeling of a 16% increase in storm intensity that could be associated with Climate Change showed that, with the system upgrades outlined in the plan, most of the system could handle the increased storm intensity, with some localized flooding in Mission Trail Nature Preserve, the northeast part of the City, the 4<sup>th</sup> Avenue drainage, and the southwest near Santa Lucia Avenue. There is greater risk for flooding for larger storms as the city's drainage system was only designed for 10-year, 24-hour storms.



Figure 4: Map of Storm Drain Master Plan Projects

**Table 6: Storm Drain Improvement Projects** 

Priority	Asset Name	Estimated Costs
racin .	Mission Street Bypass	\$820,000
High Priority	Forest Hill Park - Emergency Repair	\$130,000
Priority	Santa Rita 1	\$220,000
	\$1,170,000	
	Junipero	\$800,000
	Rio Road 1	\$2,420,000
	Santa Rita 2	\$170,000
11.00	Ocean Ave	\$250,000
Medium Priority	Santa Fe	\$490,000
Priority	Carpenter	\$270,000
	11th and San Antonio	\$400,000
	2 <sup>nd</sup> and Monte Verde	\$830,000
	Forest Hills Park - Realignment	\$700,000
	Medium Priority Total	\$6,330,000
	2 <sup>nd</sup> Avenue	\$150,000
	5th and Junipero	\$660,000
	Mission Trail Preserve Projects	\$940,000
Low Priority	Camino del Monte	\$30,000
	Dolores	\$20,000
	Rio Road 2	\$140,000
	Lasuen	\$460,000
	Low Priority Total	\$2,400,000
<b>Grand Total</b>		\$9,900,000

<sup>&</sup>lt;sup>1</sup>Includes Contingencies (40%), 2020 Construction cost only, Construction cost includes mobilization, traffic control, trench, and surface restoration. Does not include costs associated with permitting, land acquisition, or other unforeseen special circumstances.

**Implementation Status:** *Initiated.* Staff is seeking funding to design and construct some priority repairs. Implementation included in the City's 5-year Capital Improvement Plan.

## c. Shoreline Access and Protection Infrastructure

## Shoreline Management Plan (2003)

Prepared by: David Shonman and Greg D'Ambrosio Accepted by the City Council: September 2003 The Shoreline Management Plan provides an overview of the many resources of the Carmel coastline and management policies for long-term maintenance and enhancement of coastal resources. The Shoreline Management Plan includes information on erosion processes along the shoreline and the City's existing shoreline protection structures. A long-term coastal bluff erosion analysis was conducted by Johnson (1984), who analyzed aerial photographs from 1908 to 1983, and indicated that the coastal bluff was eroding at an average rate of 0.4 feet/year in the north and 0.3 to 0.7 feet/year in the southern portion. Aerial photograph analysis indicated some periods of extreme bluff erosion, including the loss of at least 20 feet of bluff near 13<sup>th</sup> Avenue and near Martin Way between 1968 and 1970.

Approximately 50% of the City's shoreline protection structures are seawalls. Most of Carmel's seawalls have held up well over the years. One seawall built in 1978 failed, apparently due to poor design. Since 1978, the City has used rock revetments to protect nearly one quarter of its shoreline.

Shoreline Management Plan Policies supporting sea level rise adaptation:

- Pursue scientific studies that document physical processes occurring at Carmel Beach (e.g. sediment transport, sand bar dynamics, influences from the Carmel Bay offshore canyon).
- Limit development along the Carmel shoreline to facilities that support passive and active
  recreational activities, beach access, bluff protection and protection of infrastructure. Bluff
  protection and protection of infrastructure shall be permitted only when required to protect
  existing structures that are in danger from erosion.
- Discourage any further incursion of recreational activities into the North Dunes habitat. Sensitive resources in the North Dunes habitat area shall be protected.
- Protect the fragile dunes and sensitive plants in the Del Mar Dunes and North Dunes against any significant disruption of habitat values.
- Maintain records of sand moved and the volumes needed to cover each revetment. When
  revetments fail or need to be substantially reconstructed, consider vertical seawalls as an
  alternative.
- Construct new shoreline armoring in areas previously unprotected only when required to
  protect existing structures in danger of erosion and when designed to eliminate or mitigate
  adverse impacts on local shoreline sand supply.
- Obtain and maintain an accurate digitized map of the Carmel shoreline to develop the City's
  beach management and maintenance policies. Analyze historic beach trends using aerial photo
  analysis and other available tools. Update topographic information at least every 5 years and
  analyze shoreline changes to facilitate early identification of erosion hot spots, sand
  losses/gains, migration of revetments, and other long-term impacts.
- Place a series of permanent surveyed benchmarks inland of the bluffs running the length of Carmel Beach for long-term monitoring.
- Protect public access, Scenic Road, and the aesthetic character of the coast by maintaining
  existing seawalls and engineered revetments. When any existing seawalls or revetments need to
  be replaced or substantially reconstructed, review other beach management strategies and

determine the best balance among objectives for access, aesthetics, and protection of coastal resources. Protect the natural character and features of the Del Mar and North Dunes by prohibiting the construction of any new shoreline protective structures unless required to protect existing structures in danger of erosion.

- Sand and bluff profiles shall be surveyed in 2003 and 2005 to establish a baseline. Thereafter, a
  set of sand profiles shall be taken at five-year intervals, beginning in 2010 to establish an ongoing record of shoreline trends on Carmel's beaches and bluffs. For each set of profiles,
  measurements shall be taken at mid-winter (lowest sand level), at spring (prior to sand
  redistribution activities), at early summer (after sand redistribution), and in the early fall (before
  offshore retreat).
- After each 5-year period of monitoring beach sand elevations, review available data to make preliminary determinations on the effects of seawall structures and sand redistribution activities.
- If data indicate that the beach has been losing sand over time, investigate options for beach nourishment using offshore deposits or other sources matching Carmel Beach sand.

## Geotechnical Inspection of Carmel Beach Shoreline Improvements (2016) and 2016 Shoreline Assessment Update

Inspections of the City's shoreline infrastructure were conducted in the winters of 2015 and 2016 by Easton Engineers. The inspection noted that the shoreline improvements were in acceptable condition with relatively minor repairs required. The Inspection results included the recommendations shown below in Table 7. Additional recommendations were included in the 2016 Shoreline Assessment Update and are included in Table 8.

Table 7: Recommendations from the Geotechnical Inspection of Carmel Beach Shoreline Improvements (2016)

Location	Recommendation
4 <sup>th</sup> Avenue Outfall	Replacement of the outfall structure should be considered in the next
	few years, with a focus on how drainage can be appropriately released
	in a non-erosive manner.
	Additional recommendations: Prevent public access atop the structure
	and inspect the outfall structure when the beach is scoured and the
	structure's base is exposed.
10 <sup>th</sup> Avenue Stairs Retaining	Settled portions of revetment should be restacked. Stairs, walls, and
Wall and Revetment	and revetments should be inspected when the beach is scoured.
10 <sup>th</sup> Avenue Retaining Wall	Wall footing appears in good condition. Inspect when the beach is
	scoured.
Revetment south of 11 <sup>th</sup>	Downcoast third of the revetment should be monitored. Additional
Avenue Stairs	large rip rap should be added to the downcoast third of the revetment
	and this portion keyed into bedrock and restacked to a more stable
	configuration.

Unprotected bedrock at 12 <sup>th</sup>	Inspect location when the beach is scoured so the base of the bluff is
Avenue outfall	exposed. To protect the base of the bluff from undercutting, rip-rap
	revetment may be extended downcoast to a point just beyond the
	storm drain outfall.
Cove North of 13 <sup>th</sup> Avenue	The wall's footing and repaired areas should be monitored and infilled
Point	with concrete as needed to help prevent further undermining.
	Remaining undercuts should be filled. Where constructed on
	potentially unstable material, the footing of the retaining wall should
	be underpinned. Restack fugitive rip-rap.
Retaining wall just north of	Footing is significantly undermined and should be protected from
13 <sup>th</sup> Avenue Point	further erosion by restacking the seaward revetment or constructing a
	deepened footing.
Rip-rap at Santa Lucia Stairs	The blufftop should be monitored for continued signs of erosion. The
	toe of the revetment should be monitored when the sand is scoured.
Seawalls between Santa	Wall segment A footing should be protected from further undermining
Lucia & Martin Way	by constructing a deepened footing or a rip-rap revetment across the
	areas of concern. The undercut, exposed portions of the footing
	should at a minimum be infilled with structural concrete to prevent
	further undermining.
	A deepened footing along the entire A through F wall segments will
	improve the stability and longevity of the walls. Alternatively, a rip-rap
	revetment along the base of the walls will help prevent continued
	undermining.
Martin Way Stairway	A concrete pedestal or piers should be constructed at the base of the
	stairs to support the stairs.

Table 8: Recommendations from the 2016 Carmel Shoreline Assessment Update

Location	Recommendation
Revetments: Unstable Rip	Carmel's shoreline revetments should be regularly monitored
Rap	(especially after the end of the storm season); perched riprap should
	be re-stacked and exposed revetments covered with redistributed sand whenever feasible.
Revetments: Migrated	The re-stacking of migrated riprap should be conducted the next time
Riprap (12th & 13th Ave.	conditions allow. This will best be accomplished if conducted during
Coves)	low sand conditions. Such work has been conducted in the past, but
	usually during periods of significant sand scour, a condition that is
	often accompanied by strong waves and a narrowing of Carmel Beach.
	This operation should be conducted with the advice of a qualified
	geotechnical specialist. It should be planned in advance so that all
	necessary preliminary steps (including funding, permits, and contracts)
	can be in-place of ahead of time, increasing the chances that it will be
	completed before the high sand level returns.
Stairways: general	The extensive list of stairway repairs recommended in the Graebe
	report (dated March 2, 2015) should be addressed as soon possible.
Shoreline Landscape	The Shoreline Landscape Barriers should be redesigned during FY
Barriers (SLBs)	2016/2017, and rebuilt as soon as feasible. Their design should

Location	Recommendation
	conform with Carmel's design traditions, and the new barriers should be able to be maintained, repaired and replaced by staff. The installation and locations of the new SLBs should be coordinated with the re-surfacing of the Pathway and re-vitalization of the Carmel bluff-top landscape. Because people often trampled landscape vegetation to walk over to the SLBs, it has been suggested that new barriers be placed within 12-18" of the Pathway.
Monitoring Program	An effective monitoring program should be developed to be conducted by City staff as they work along the shoreline. This program would take advantage of the skills of staff as well as their familiarity with the Carmel shoreline. If done correctly, it will encourage staff to report conditions that are not necessarily in their direct area of responsibility. Asking staff to be alert for conditions of concern as they work along the shore would serve as a "force multiplier," greatly expanding the City's ability to address conditions at an early, more manageable, stage.
Stairway Closures	To protect the safety of those who use Carmel's shoreline stairways, the City should employ effective methods for closing these access ways when conditions warrant. Such methods should involve physical barriers, clearly worded signage and enforcement. City staff should also focus on re-opening the stairways to public use, once safer conditions return.

**Implementation Status:** *Partially initiated.* Public Works closes stairways to the public when hazardous conditions exist. Essential repairs to the stairs have been made. A landscape design was created and approved by the Planning Commission that incorporated restoration of the shoreline landscape barriers.

## d. Regional Infrastructure

## Climate Change Vulnerability Assessment Summary Report: Caltrans District 5 (2019)

Prepared by: Caltrans

Caltrans' District 5 incorporates the Counties of Monterey, Santa Cruz, San Benito, San Luis Obispo, and Santa Barbara. The Summary Report presents information on potential vulnerabilities to the Caltrans District 5 portion of the State Highway System (SHS), including climate stressors and their potential effects on how highways are planned, designed, built, operated, and maintained. Identified vulnerabilities are summarized below:

## • Higher temperatures:

- Higher temperatures could cause expansion that deteriorates bridge joint seals, which could accelerate replacement schedules, and even affect bridge superstructure.
- Extreme heat could affect employee health and safety, especially for those working long hours outside.

- High temperatures for extended periods could increase the need for protected transit facilities along roadways.
- Right-of-way landscaping and vegetation must be able to survive longer periods of high temperatures.
- o Pavement quality will be affected by long-term temperature changes

### Wildfires:

- o Much of the SHS lies within high fire hazard zones.
- Maintenance issues associated with wildfires for the SHS include: increased erosion and runoff, increased landslide potential, debris blocking culverts and bridges during rain events, destruction of signs and guardrails, damage to culverts and bridges

## • Sea Level Rise:

SHS impacts from sea level rise are expected to be significant in Monterey County. Significant impacts of combined sea level rise and storm surges to Highway 1 are expected in the low-lying areas between Moss Landing and Castroville, and south of Carmel-by-the-Sea where the highway crosses the mouth of the Carmel River. Additionally, cliff erosion is expected to impact Highway 1 in Big Sur.

Additionally, Caltrans will need to consider the role of the SHS during a disaster when planning for climate change. The SHS is the backbone of most county-level evacuation plans and often provides the only high-capacity evacuation routes from rural communities. State highways also serve as the main access routes for emergency responders, and may serve as a physical line of defense such as a firebreak, an embankment against floodwaters, etc. As climate-related disasters become more frequent and more severe, this aspect of SHS usage will assume a greater importance that should be reflected in highway design.

## e. Opportunities to build on Existing Infrastructure Adaptation Strategies:

The following opportunities to build on existing adaptation strategies were identified based on technical expert presentations at Committee meetings (Appendix B) and from the review of previous reports:

- Determine the feasibility of undergrounding power lines in Mission Trail Nature Preserve and in priority transportation corridors in the VHFHZ
- Upsize SDMP improvements, especially when making repairs in the lower reaches of watersheds, to handle larger storms.
- Consider incorporating green infrastructure in street and sidewalk projects to reduce runoff volumes into the City's storm drain system.
- Earmark CIP funding for design, permitting, and implementation of storm drain repairs. Include strategies in 2021 MJHMP for potential regional funding.
- Reinstate beach sand monitoring program described in the Shoreline Management Plan.
- Implement bluff structural monitoring program and do follow-up monitoring post-storm to identify additional footing stability issues.

- Earmark CIP funding for design, permitting, and implementation of repairs. Include strategies in 2021 MJHMP for potential regional funding.
- Reach out to local researchers (e.g. CSUMB) or other sources to conduct Carmel Cove sand supply dynamics analysis.
- Hire a coastal engineer with experience in planning for climate change to conduct:
  - Further assessment of the risks to our coastal assets, including sea walls, revetments, bluffs, stairs and access, public bathrooms, parking areas, drainage infrastructure, and utilities.
  - Determine adaptation measures and LCP policy options.
    - Prioritize adaptations and projects that protect and maintain public resources and beach access, and the viability of the community and tourism.
    - Determine how the options and strategies along the coast are different for the:
      - Mostly natural, unarmored North Dunes area
      - Mostly armored bluffs along Scenic Road south of 8<sup>th</sup> Avenue
      - Unarmored dunes along private property between 8<sup>th</sup> Avenue and Del Mar Parking Lot
      - Armored private properties on the bluffs at the north end of the City (Pescadero Canyon area).
    - Evaluate feasibility and phasing, the use of thresholds for when different elements of these strategies are implemented. For example, maintaining armory or other defenses up to a point, but then if a threshold is reached, embracing a new bluff line and different adaptive measure.
- Update Shoreline Management Plan and LCP based on results of coastal engineering analysis.
- The City has an opportunity in 2021 to provide an updated list of projects to include in the MJHMP Update. The City should include a comprehensive list of projects based on its existing plans, as well as identified gaps in this Vulnerability Assessment.

## VIII. Vulnerability Scoring Matrix

The vulnerability scoring matrix incorporates the potential threat of a climate hazard with the existence of current policies to mitigate hazards to vulnerable assets and populations. The matrix provides information to identify and prioritize vulnerable assets and populations that have not yet been addressed by City policies or projects.

Color coding:

Already causing observable impacts or a near-term significant risk Mid- to long-range impacts

Not enough data

YES Some policy/action initiated

NO No policy/action initiated

	Priority Hazards						
Priority Assets at Risk	Stronger Storms	Wildfires	Sea Level Rise	More Droughts	Increased Temperature	Fog changes	Ocean Warming
Natural Assets							
Mission Trail Nature							
Preserve	YES	YES	Х	YES	YES	Х	
North Dunes			NO	YES	YES	Х	
Urban Forest	YES	NO		YES	NO	Х	
Marine Sanctuary	Х			Х	Х	Х	Х
Carmel Beach	YES		YES			Х	Х
Community							
Elderly population and							
people with disabilities	NO	NO		NO	NO		
Residents	YES	YES		YES	NO		
Visitors	NO	NO					Х
Local Businesses	NO	NO	NO	YES	NO		X
Service industry							
workers	NO	NO	NO		NO		
Second homes	YES	YES	NO				
Utilities							
Water Supply		YES	YES	YES	YES		
Sanitary Sewer System	Х		YES				
Power Grid	NO	NO			NO		
Overhead communication	NO	NO			X		

	Priority Hazards						
Priority Assets at Risk	Stronger Storms	Wildfires	Sea Level Rise	More Droughts	Increased Temperature	Fog changes	Ocean Warming
PG&E/communication underground lines (gas, cable)		NO	NO				
Regional Infrastructure							
Wastewater Treatment Facility	YES		YES		Х		
Transportation Infrastructure (Caltrans)	YES	YES	YES				
Hospital and emergency medical care facilities	Х	Х			X		
Landfill & Waste Management	YES		Х				
Local Infrastructure							
Shoreline Access Infrastructure: Scenic trail, public restrooms, beach stairs, coastal roadways, and parking	YES		YES		X (visitors)	X	
Seawalls and revetments	YES		YES		X (VISICOIS)		
Storm drainage system	YES		YES				
Emergency response facilities (Fire station, EOC, PD, PW, City Hall, etc.)	YES	YES			NO		

## IX. Conclusion And Next Steps

The Climate Change Vulnerability Assessment provides the basis for the City to develop a Climate Adaptation Plan by identifying existing hazards, assets and communities at risk, as well as actions that have already been taken that enhance climate change resilience. The Climate Committee should utilize the Vulnerability Scoring Matrix and the list of opportunities to build on existing strategies as a starting point to identify and prioritize potential climate change adaptation strategies.

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## **APPENDIX A - Historical Hazards**

Data sources for historical hazards include: Monterey County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), the National Oceanic and Atmospheric Administration (NOAA) Storm Events Database, and historic records at the Carmel Library

Disaster Type (Storm, drought, wildfire, heat event)	Date	Location	Local Impact
Storm	Winter of 1982/83	Monterey Peninsula	El Niño winter. During this period, severe winter storms struck Carmel every 10 days.  More sand was removed from the beach than at any previous time in the memory of long-term residents or documented history. Additionally, heavy rains overwhelmed the City's storm drain system. Uncontrolled stormwater flows washed away portions of the City's coastal bluffs and undermined beach access stairways. Between 1983 and 1988, the entire Scenic Road storm drain system was rebuilt with larger drain pipes and catch basins, and moving outfalls to less erosive locations.  Johnson (1984) recorded several areas of significant erosion during the 1982/83 winter:  - Loss of 20 feet of bluff north of 8 <sup>th</sup> Avenue,  - Loss of 30 feet of bluff between 10 <sup>th</sup> and 11 <sup>th</sup> Avenues,  - Loss of 30 feet of bluff near Santa Lucia Avenue,  - Loss of 40 feet of bluff between 9 <sup>th</sup> and 10 <sup>th</sup> Avenues.
Wildfire	July 1987	Pebble Beach/Carmel	The fire that rushed up a canyon and destroyed 32 homes in Pebble Beach on May 31 was fueled by acres of dead underbrush and thick stands of trees, according to a forester who toured the area Thursday. Bill Ruskin, a vegetative management coordinator with the California Department of Forestry and Fire Protection in Felton, said after the tour: "It was a situation that was waiting to happen." Ruskin described the devastated residential area as one located in a "perilous" position, on top of a box canyon containing an "incredible number of stems per acre — about 200 to 300 per acre." Fanned by strong winds and funneled by steep terrain, the fire raced up the canyon as it burned dense underbrush and released gases that ignited above the tree crowns, creating a "crown fire" effect, Ruskin said. Ruskin collected fuel data in Del Monte Forest to simulate the path of the fire in a computer model. He said results would not be available until later this summer. "It may or may not verify whether the response should have been different," Ruskin said. In the computer model, Ruskin said, he will be able to use fuel data, topography and weather conditions to determine ways to manage the forest and devise ways to fight further fires in the area. As for the disastrous Sunday afternoon when heat from an illegal campfire ignited pine needles and set off the tragic chain of events,

leaving 49 people homeless, Ruskin said the heat was so intense from the fire that houses began burning just from the radiated heat instead of flames. "The point is that you had so much heat going up that canyon," said Ruskin, 36, who has been a forester with CDF for five years and received a forestry management degree from the University of California at Berkeley. The point of origin of the fire has been determined as being on forested property owned by Pebble Beach Co. and adjacent to the Morse Botanical Reserve. Notified of Results The property was surveyed Tuesday by Pebble Beach Co., which notified the Del Monte Forest Foundation, owner of the botanical reserve, of the results in a letter this week. Ruskin said that dead materials, including fallen limbs and pine needles, burned the thickly packed Monterey pine trees and sent gases above the ground smoke to be fanned by oxygen and winds. The intense gaseous fire created "radiated and convected" heat that spared few of the homes." Only the houses made of stucco and not having wood on the outside and one with double-pane windows were able to withstand the heat," Ruskin said. "It was not a crown fire in those trees," Ruskin said. "... Flames shooting up and over the trees could very well have been gases going up to meet oxygen in the wind. That's where they were being ignited." In the wake of the fire, Ruskin said, the bad news is that many of the trees in the 160-acre swath cut by the four-day blaze did not survive. However, he said, seeds released by exploding pine cones will regenerate the forest. Alternative Vegetation Ruskin said that as equipment is used to clear trees and brush, now is a good time to consider alternative vegetation — coastal and coyote brush — that would stay succulent throughout a fire season and be less likely to add fuel to a fire. Ruskin added that selective hand-cutting of trees could also be done in forest management. Controlled burns, Ruskin said, can be effective but "it may not be aesthetically desirable from what we learned at Point Lobos." Foresters learned that a controlled burn last October at Point Lobos led to "an unexpectedly high amount of tree mortality." "The Monterey pine is a shallow-rooted tree," Ruskin said. "Even in a controlled burn, you are killing a lot of roots." In addition, Ruskin said, the controlled burn at Point Lobos created "burning pitch pockets," which also weaken trees. "I'm not sure that a prescribed burn is an acceptable management alternative," Ruskin said. Ruskin observed after the tour that the fire appeared to have fed on pine trees 60 to 80 years old and "petered out" in younger trees. Mission Trail Park Ruskin also toured Camel's Mission Trail Park to assess the amount of fuel there that could lead to fire. Ruskin recommended to Gary Kelly, Carmel city forester, that some clearing of brush and fallen trees should take place and that a "pre-suppression plan" should be devised for the park area. Ruskin said that "fire-retardant vegetation" should be planted at the park rather than pine trees. Ruskin said the Mission Trail Park area did not have as much stored fuels as the Pebble Beach area. "He didn't seem to find any major concerns other than cleanup and a pre-fire plan," Kelly said. Ruskin was invited to tour the area by Kelly and Roy Perkins, CDF district fire chief.

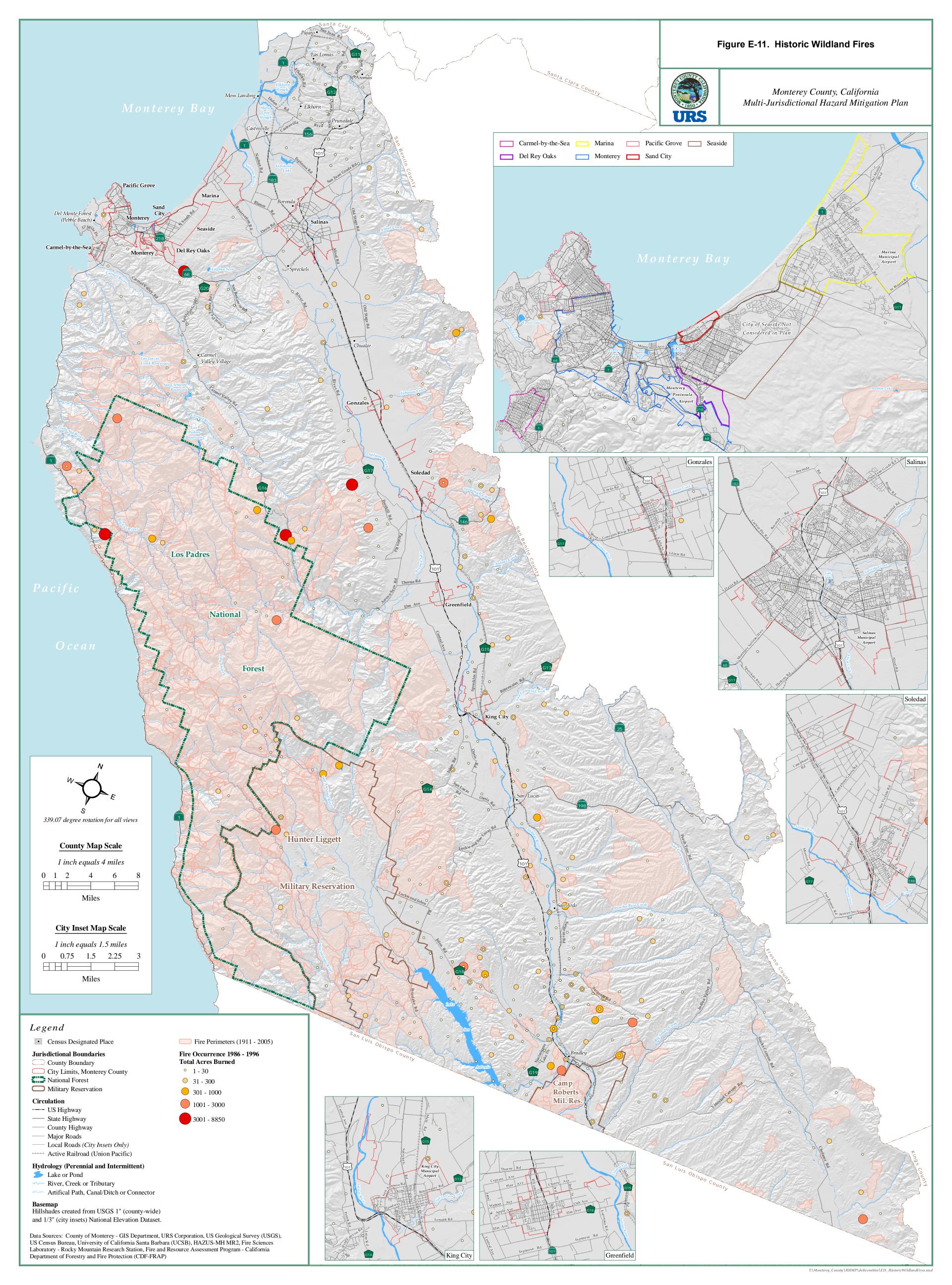
Heat Event	April 1988	Monterey Region	Hot temperatures Sunday in the mid-80s in Monterey and into the low-90s in Carmel Valley set weather records for April 10. Monterey's high temperature of 86 degrees at 2 p.m. topped the record of 80 degrees in 1968 for the date, according to Robert J. Renard, observer in Monterey for the National Weather Service. It also marked only the seventh time in 37 years of recordkeeping that the temperature reached 86 or higher during a day in April, he said. There has never been an 86-degree reading recorded in Monterey for January, February and March, he said, and Sunday's high temperature was the third earliest recording of an 86 or higher in a calendar year. Twice in previous years on April 2, the temperature climbed to 86 or above, with 88 and 87, respectively. Sunday's low temperature in Monterey also was a record. The 57 degrees was the highest minimum not only for April 10 but also for this early in the calendar year, Renard said. Meanwhile, in Carmel Valley, where temperatures on hot days are typically up to 10 degrees warmer than Monterey, the high temperature got up to 93 after an early morning low of 51, according to Graham Matthews, who keeps weather records for Carmel Valley. The 93 reading, which set a record for the date, topped the previous mark of 85 degrees set in 1968, Matthews said.  Source: Monterey Herald, April 1988
Storm	January 1995	Monterey Region	In January 1995, sustained precipitation fell throughout the region and over 125 residential properties in the Carmel Valley sustained damage. Two months later, Monterey County experienced a second significant winter storm, which resulted in further sustained precipitation falling on already saturated watersheds. Devastating flooding occurred throughout Monterey County, particularly in the unincorporated communities of Castroville, Mission Fields, Carmel Valley, Cachagua, Carmel Highlands, Spreckels, and Big Sur. Over 1,500 residences and 100 businesses were damaged.
Storm	January 10, 1995	Carmel Area	A Monterey County Sheriffs deputy evacuates two elderly residents from their flooded Mission Fields neighborhood home in Carmel on January 10,1995. According to a new study, extreme weather swings — a historic drought followed by drenching winter storms that cause flooding — will become the norm over coming generations.  Source: Monterey Herald, April 2, 2018
Wildfire	Oct – Nov 1996	Northern Big Sur	This fire known as the Big Sur fire began Oct 18 near Ventana Camp Park. Much of the fire occurred in the Ventana wilderness area. 2500 Fire fighter participated. 4400 acres were burned. Light rain helped control fire. The cost of fighting the fire is estimated 12.3 million. 180 fire engines were used. 13 helicopters and 3 air tankers were used.
Storm	December 21, 1996	Monterey Peninsula	2.96" of rain in 11 hours at Monterey, Seaside had 2.5" and Marina had 2.12". Streets and intersections were flooded in Monterey, Del Rey Oaks, Pacific Grove, Carmel Highlands, and Carmel. HWY 101 N of Salinas was flooded.

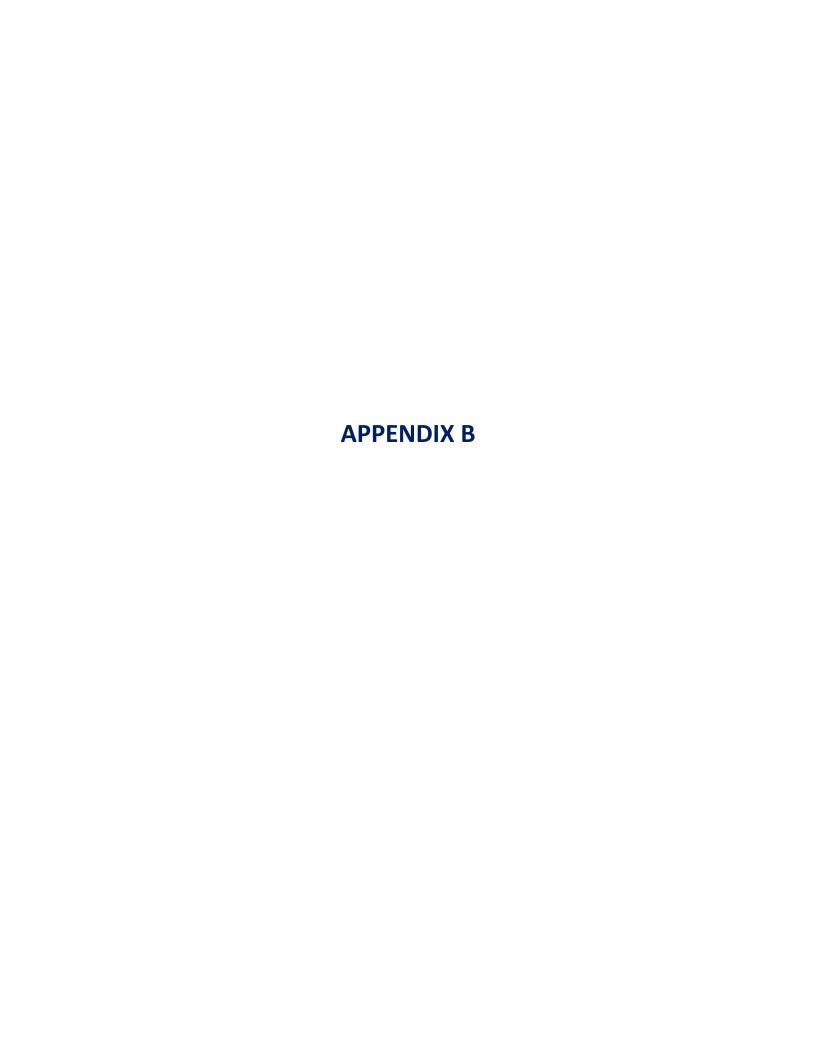
Wildfire	September 1999	Carmel Valley	A surface low off the CA Coast brought tropical moisture and mild instability over the coastal CA are and lightning continued through the night over the entire Central Coast and San Francisco Bay area.  Kirk Complex (consisted of Tassajara, Five, Big Pine, Elephant, Lone Pine, Freed, 7, Torre, Devil, Kirk and Hare Fires) Complex was divided into the North and South Components).  Cause: Lightning strikes  Location: In the Ventana Wilderness approximately 20 miles Southeast of Carmel, CA.  Monterey Co.  Size: 85,634 acres (as of 10/19/99)  Containment: October  Fatalities: none  Structures Lost: none  Cost: \$66.9 million (as of 10/19/99)
Storm	January 2008	Monterey Peninsula	Strong coastal storm brought flooding rains, high winds, record high surf and coastal flooding to Monterey County and resulted in nearly \$1 million in property damages.  Approximately 30 homes in the Carmel Lagoon area were affected by some degree of flooding.
Wildfire	December 2013	Northern Big Sur	The Pfeiffer Fire started on December 17th 2013 around midnight in the vicinity of Pfeiffer Ridge in the Monterey Ranger District of Los Padres National Forest. The fire burned 917 acres. Thirty four (34) residence and 4 outbuildings were damaged/destroyed. The fire was declared contained on December 20 2013 at 6:00 p.m.
Storm	January 8, 2017	Monterey Peninsula	Potent atmospheric river bringing heavy rain, strong southerly winds, and storm surge issues. This AR is following a normal to slightly above normal 3 month period, meaning the grounds were saturated. Three to four feet of standing water at Casa Verde Road and SR 1N.
Storm	February 9, 2017	Monterey Peninsula	A cold front passed over the area Thursday Feb 9. There were strong winds ahead of the front and heavy rains associated with the frontal passage that produced roadway flooding and debris flows.
Storm	February 20, 2017	Monterey Peninsula	Potent AR brought copious amounts of rain to the region causing widespread flooding, debris flow, accidents, and over topping of reservoir spillways.  Roadway flooding on Quail Meadows Dr in Carmel Valley. Large section of roadway flooded, vehicles sliding.
Lightning / Wildfire	September 11, 2017	Central Coast/Monterey County	A disturbance rotating around an upper level low west of San Diego brought thunderstorm activity to the Bay Area on September 11. Widespread reports of lightning were received along with a few small hail reports and strong wind gusts. It has been reported that there were over 40,000 lightning strikes across the Central Coast of California during this event. Several brush fires were also ignited due to lightning strikes.

Storm	November 29, 2018	Monterey Peninsula	Various lightning strikes sparked 15 fires in Monterey County that were contained on the same day http://www.mercurynews.com/2017/09/13/crews-contain-15-fires-started-by-lightning-in-monterey-county/. Timing has been estimated.  A mid/upper level low moved through the region at the end of November. A cool unstable air mass allowed for the development of scattered thunderstorms across the region that produced lightning and small hail. An associated surface low approached the coast during this time causing high surf and gusty winds. Some locations saw wave heights above 25 feet. This system caused roadway flooding, minor debris flows, and downed trees along with damage from gusty winds.  Flooding at Hwy1 and Hwy 68.
Storm	January 2019	Carmel/Monterey Peninsula	After a strong cold front brought severe weather to the Central Coast on Wednesday night, the cleanup process began Thursday. Pacific Gas & Electric Co. crews worked to restore power after more than 10,000 Monterey Peninsula customers lost power due to the storm. Power was restored to about half of those without power by early afternoon Thursday and spokeswoman Mayra Tostado said PG&E was aiming to restore power by the evening to customers without any access issues caused by mudslides, flooding or blocked roads According to Carmel City Administrator Chip Rerig, a significant trunk line transformer just outside the city blew up, causing a citywide power outage. In Carmel, 12 streets were closed due to trees that fell on electrified wires. City crews began cleaning up the streets after PG&E removed trees touching or adjacent to live wires. "The storm last night hit us hard," Rerig wrote in a post to Carmel's website. "Fortunately there have been no reported injuries to residents, guests, staff, or contractors." The city opened the Carmel Youth Center as a warming center, welcoming residents to stop by and charge their mobile devices and get a cup of coffee or water. Speaking by phone Thursday afternoon, Rerig said city staff worked with PG&E to open up many of the streets that had been closed and explained the city came together overnight into Thursday to respond to the storm damage. "We really had a great concerted effort last night with our police department, our public works, who are fantastic, Monterey Fire (Department), which is our contracted fire services, responded to 1 think 32 calls, we had a series of volunteers, our Community Emergency Response Team and a litany of other staff members," he said. People from Senior Helping Seniors checked in on some of the city's elderly population to make sure they were OK during the outage. The Carmel Unified School District canceled classes and activities at all of its schools for Thursday due to the road closures and power outages but planned on opening its sch
Storm	February 4, 2019	Monterey Peninsula	A mid/upper low with a very cold air mass moved through in early February bringing snow to lower elevation peaks across the region prompting a rare Winter Weather Advisory. Junipero Serra Peak received around a foot of snow. Rainfall just ahead of this

			system also brought roadway flooding and minor debris flows. Carmel River flooding near
Storm	November 30,	Carmel	Mid Valley. SR 1 at Rio Rod culvert is flooding, water going over the roadway.  A low pressure system moving in from the Gulf of Alaska and drawing in moisture from
	2019		the tropics combined to bring the first atmospheric river event of the winter season to the Greater Bay Area. This system brought widespread heavy rainfall, roadway flooding,
			and strong winds to the region. Rare Storm Warnings were issued over the coastal waters
			where buoys reported wind gusts in excess of 50 mph. Bay Area peaks recorded wind
			gusts between 60 to 70 mph with gusts along the Monterey Peninsula and Big Sur Coast
			at 50 to 60 mph. These winds caused downed trees and power outages across the area.
			Street at 3438 Martin Rd in Carmel, CA is flooding along with potential flooding at
Chama	Danambar 2, 2010	Common	residence as water is being diverted down reporting party's driveway.
Storm	December 3, 2019	Carmel	A low pressure system moving in from the Gulf of Alaska and drawing in moisture from the tropics combined to bring the first atmospheric river event of the winter season to
			the Greater Bay Area. This system brought widespread heavy rainfall, roadway flooding,
			and strong winds to the region. Rare Storm Warnings were issued over the coastal waters
			where buoys reported wind gusts in excess of 50 mph. Bay Area peaks recorded wind
			gusts between 60 to 70 mph with gusts along the Monterey Peninsula and Big Sur Coast
			at 50 to 60 mph. These winds caused downed trees and power outages across the area.
			Carmel River Lagoon rose significantly overnight after 3 to 5 inches of rain fell over the
			Carmel River Basin. The Monterey OES phoned to say Public Works tried to breach the
			Lagoon and was unable to do so in time so the surrounding area had to be evacuated due
			to flooding. Minor Street flooding was observed along 15th, 16th, 17th Ave as well as
1			Carmelo St and Scenic Rd. The unofficial flood stage of the Carmel River Lagoon is 10 ft.
			The gauge exceeded 10 ft during this time period before the Lagoon was breached and
Wildfire	August -	Central Coast,	the water level fell dramatically just after 1 am.  A prolonged and oppressive heat wave swept the Central Coast and Bay Area for almost a
vviidille	September 2020	Carmel Valley	week from August 14th to August 19th with widespread record breaking temperatures
	September 2020	Carmer valley	observed across the region. This was caused by a strong high pressure system over the
			Desert Southwest that expanded westward into California. This dome of heat brought hot
			temperatures to the area for several days. Multiple days of triple digit afternoon highs
			were recorded inland with some coastal locations even reaching the mid-90s. Several
			days of hot and dry weather further dried fuels over the area increasing fire danger.
			During this event, a surge of monsoonal and tropical moisture from a former Tropical
			Storm advected northward with sufficient instability to generate multiple high based and
			dry thunderstorms that produced several thousand lightning strikes over the Greater Bay
			Area. Many locations saw wind gusts of 40-50 mph with isolated areas seeing gusts of 60-
			75 mph. This prompted the San Francisco Bay Area forecast office to issue a rare severe
			thunderstorm warning. These lightning strikes in combination with gusty and erratic
			outflow winds sparked hundreds of wildfires across the state of California. Several smaller

	fires combined to form complexes some of which are now among the largest wildfires in state history. Most of which were still actively burning at the end of August. Hundreds of thousands of acres have been burned with several hundred structures destroyed as well as a handful of deaths and injuries. Tens of thousands of residents were also forced to evacuate. Additionally, all of these wildfires burning simultaneously across the state gave the Bay Area the worst air quality in the world at one point.  Lightning sparked the River Fire in Monterey County on the afternoon of the 16th. Several evacuation orders were issued throughout the month and four people including fire personnel and civilians were injured. Both the River and Carmel Fires caused smoke and ash to rain down on surrounding cities. The River Fire continued to burn through early September. A total of 48,088 acres burned with 30 structures destroyed, 13 damaged, and 4 injuries https://www.fire.ca.gov/incidents/2020/8/16/river-fire/.
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## Hazard and Asset Summary Sheet for Wastewater Treatment Facility and Associated Underground Infrastructure

**September 17, 2020** 

TO: Climate Committee Members

**SUBMITTED BY:** Jeff Baron, Councilmember

## **SUMMARY**

Asset: Wastewater treatment facility and associated underground infrastructure (CAWD)

Hazards: Sea level rise, Stronger Storms, More variable rainfall

Version: 2

**General Comments and Outlook**: The Carmel Area Wastewater District treatment facility (and underground infrastructure) will be under increasing environmental pressure as sea level rises and storms (and hence rainfall drainage down the Carmel River watershed) increase in intensity. CAWD's prediction is that the facility will need to be relocated by 2062, which is approximately 40 years in the future. The long term options for the facility seem to be

- 1. Retreat up the valley
- 2. Pump to Monterey One Water

## **Identified Issues:**

- Both long term projects are said to be expensive, in the neighborhood of \$100,000,000.
- It will take a significant amount of time to make the decision as to which path to take.
- The value (cost) of the current facility (which may have to be abandoned) is approximately \$200.000,000
- The lagoon situation will become increasingly precarious as time passes.

## Outstanding Issues:

- Do not understand (yet) an overrun scenario if the move is not completed in time. What are the consequences and/or costs if the plant is flooded during an extreme weather event?
- Of lesser visibility but still important are possible mitigation measures required for the CAWD underground and pumping infrastructures, particularly along the coastline.

## **Possible Committee Comments or Actions for Final Report**

- The committee could/should recommend that the Carmel City Council pass a resolution on this topic, ensuring that the city monitors the transition towards a relocated plant, and perhaps has formal, written input into this process. The resolution might:
  - Document the asset and the various hazards
  - Assign staff/council personnel as liaisons to CAWD, with an eye towards resolution of this asset's vulnerability
  - Urge CAWD to take specific actions

## **REFERENCES**

- The CAWD Sea Level Rise Study can found at <a href="https://www.cawd.org/2018-sea-level-rise-study">https://www.cawd.org/2018-sea-level-rise-study</a>
- The CAWD presentation to the Committee: <a href="https://ci.carmel.ca.us/sites/main/files/file-attachments/ccc">https://ci.carmel.ca.us/sites/main/files/file-attachments/ccc</a> presentation v3.pptx?1600365293
- Recording of the September 17, 2020 Meeting at which CAWD presented: https://drive.google.com/file/d/1PZK0tP8b2jB XoTtBJLPcXmLVEl9kY1Z/view

## **HISTORY**

- Version 1 presented at Committee meeting on 10/15/2020
- Version 2 presented at Committee meeting on 11/19/2020.



## **Hazard and Asset Summary Sheet for the Urban Forest**

October 15, 2020

TO: Climate Committee Members

SUBMITTED BY: Scott Lonergan, Committee Member

## **SUMMARY**

**Asset**: Urban Forest

Hazards: Stronger Storms & Wind, More Variable Rainfall, Increased Temperature, Wildfires

Version: 1

### **General Comments and Outlook:**

- Carmel-by-the-Sea's upper canopy trees impart a distinctive ambiance and identify to the City, and
  provide several climate adaptation benefits including reducing urban heat island effect, capturing
  stormwater runoff, improved air quality, and sequestering carbon
- Increased transpiration and water demand, coupled with less consistent water availability as a result of fewer, larger storms, and reduced fog, is increasing tree stress
- Tree species selection and density is a 50 to 100-year decision with implications for 1) tree resilience and ecology, 2) aesthetics, and 3) safety and maintenance cost

### Identified Issues:

• Our urban forest lacks age and species diversity and is currently showing signs of stress.

## Remaining Issues to be Understood:

 Urban forest consideration as part of Action Plan e.g. carbon capture, walkability and desirability of the environment

## Possible actions to be recommended in the committee's Final Report

 Update the CBTS Forest Management Plan, including a public process to determine tree canopy species and density objectives, and a process for ongoing monitoring and plan review.

### **REFERENCES**

- CBTS Forest Management Plan: <a href="https://ci.carmel.ca.us/sites/main/files/file-attachments/forest-management-plan-0.pdf?1510272614">https://ci.carmel.ca.us/sites/main/files/file-attachments/forest-management-plan-0.pdf?1510272614</a>
- Sara Davis, City Forester 15-Oct-2020 Climate Change Committee presentation video: <a href="https://carmel.novusagenda.com/agendapublic/VODPreview.aspx?meetingVideoID=898ec714-3a25-42a8-ae8f-2441cf4c1440&index=329">https://carmel.novusagenda.com/agendapublic/VODPreview.aspx?meetingVideoID=898ec714-3a25-42a8-ae8f-2441cf4c1440&index=329</a>
- Canopy.org including the 16-Jul-2020 Resilient Trees for a New Climate webinar, including presentations from Igor Lacan, and Dave Muffly: <a href="https://canopy.org/more-trees-please/">https://canopy.org/more-trees-please/</a>

## **History**

- Version 1 presented at committee meeting on 11/19/2020
- Sent for comments to Sara Davis (City Forester) on 11/10/2020



# Hazard and Asset Summary Sheet – Community Wildfire Preparedness

October 15, 2020

TO: Climate Committee Members

**SUBMITTED BY:** John Hill, Committee Member

## **SUMMARY**

**Asset**: Public and Private Property, Public Safety

**Hazards**: Local Fires and Wildfire damage due to accumulated dry fuel & increasing wind and weather events.

Version: 1

General Comments and Outlook: The severity of fires and wildfires in California continues to increase in intensity and occurrence. California had low intensity fires until the logging of old growth forests, the introduction of grazing and invasive grasses, indigenous burning was replaced by fire suppression, and urban sprawl invaded the wildland areas. Community wildfire preparedness is supported by Monterey Fire's Defensible Space Inspection Program and coordination with surrounding fire prevention organizations to limit fire and wildfire risk through planning, prevention, and mitigation. Monterey Fire and the Carmel Public Works Department have working relationships with the Pebble Beach Services District for fire mitigation in Pescadero Canyon, and partner with the Friends of Mission Trail Nature Preserve for fuel reduction in Mission Trail Nature Preserve. CalFire's Fire & Resource Assessment Program (FRAP) and Fire Hazard Severity Zone (FHSZ) maps are available on line with information on forest assessment, fire severity zones, and defensible space. Monterey Fire personnel have inspected and graded all Carmel parcels as pass, pending, or fail. Grading criteria is evolving as knowledge on fire spread is developed. Current criteria is based on dry fuel accumulation, spark arrestors, overhanging tree limbs, etc.

### Identified Issues:

- Some northern and eastern areas within City limits are within the Very High Fire Hazard Severity and Wildland Urban Interface (WUI) Zones.
- Some areas within the City limits and adjacent communities have accumulated fuel levels as well as overhead infrastructure (i.e. Mission Trail Park) that present fire and wildfire risks.
- An integrated approach to fire resilience in the landscape along with hardening structures against fire are ways to mitigate fire impact on lives and property.
- Fire resiliency can be controlled by creating defensible space with Fire Defense Zones around structures, an ignition zone (5 feet ), a defense zone (30 feet) and reduced fuel zone (100 feat)
- Fuel is affected by the height and placement of plants & their chemical content. Pine forests and Oak woodlands are resilient but dead material and limbed branches in the understory must be maintained.
- Fire retardant plants, trees, and ground covers can absorb heat and fire without burning, trap embers, reduce wind speed, and slow the travel of a fire.
- 9 out of 10 structures lost are due to low intensity ground fire and embers in the 5-foot zone around them. Combustible materials such as decks, wood chips, and plant material should not be located within 5 feet of nor attached to the structure.

- Vents and windows are the most vulnerable areas in a house, gaps in vent screening should be no more than 1/8" maximum and plants should not be located near or below windows.
- The City's Building Department has adopted the California Building Code requirements in the Very High Fire Hazard Zone but the City's planning guidelines currently do not address them or may be in conflict with them.

## Possible actions to be recommended in the committee's Final Report

- Carmel City Council consider fire hazard severity and evacuation plans in the safety elements of the General Plan and monitor the level of fire hazards within and surrounding the community. Resolutions and/or Ordinances could include:
  - Documenting the various existing hazards.
  - Assigning staff/council personnel as liaisons to CalFire (Cypress Fire District), and adjacent communities which could threaten Carmel in a wildfire.
  - o Assist Monterey Fire in its current efforts in inspecting and identifying fire risks.
  - City Forester consider fire retardant trees and plants in City controlled areas and for tree replacement requirements for private property.
  - Update City Planning guidelines to reflect or not conflict with current California codes (CBC Chapter 7 & CRC R337) in the Very High Fire Hazard Severity (VHFHS) Zone.

## REFERENCES

- Fire and Resource Assessment Program (FRAP) ResilientCA.org
- Monterey Fire Defensible Space Inspection Program mry.maps.arcgis.com, monterey.org/fire
- CalFire Defensible Space/Home Hardening <u>readyforwildfire.org</u>
- CalFire Fire Severity Zone Viewer <u>gis.data.ca.gov</u>
- Wildland Urban Interface (WUI) frap.fire.ca.gov
- Every Building's Wildfire Risk in Monterey County <u>defensibleapp.com</u>
- The A.I.A. Designing for Fire Presentation http://youtu.be/MWslhXidZnc

### **History**

Version 2 presented at committee meeting on 12/17/2020



# Hazard and Asset Summary Sheet for the Multi-Jurisdictional Hazard Mitigation Plan

November 19, 2020

TO: Climate Committee Members

**SUBMITTED BY:** Agnes Martelet, Environmental Compliance Manager

## **SUMMARY**

**Asset**: multiple **Hazards**: multiple

Version: 1

#### **General Comments and Outlook:**

- The Multi-jurisdictional Hazard Mitigation Plan (HMP) was presented by Kelsey Scanlon of the Monterey County Office of Emergency Services. The HMP establishes a broad local vision and guiding principles for reducing hazard risk, and proposes specific mitigation actions to reduce identified vulnerabilities. The plan is due for renewal in 2021.
- This plan helps local jurisdictions comply with the climate change planning requirements of SB 379, and also allows them to be eligible for pre- and post-disaster mitigation project grant funding from the Federal Emergency Management Agency (FEMA).
- Objectives of the HMP include:
  - o Protect life and property
  - o Minimize economic losses
  - o Enhance community resilience
  - Reduce burden on local government and taxpayers
  - o Break the cycle of repetitive disaster damages
  - Speed disaster recovery
  - o Integrate hazard mitigation planning with other local planning and decision-making
- The HMP addresses the impacts of Climate Change and shares many objectives with Climate
  Adaptation Plans. Identified hazards that will be exacerbated by Climate Change in Monterey County
  include: wildfires, flooding, coastal erosion, landslides and debris flows, extreme heat and drought,
  human health hazards, and mass migration.

## Identified Issues / To-do:

• Each of the 12 cities in the County will provide mitigation strategies and projects to include into the HMP. By including projects into the HMP, jurisdictions may be eligible for FEMA grant funding.

#### **Possible Committee Actions**

 The Committee could provide feedback and recommendations for hazard mitigation projects to include in the HMP. The Monterey County Office of Emergency Services anticipates soliciting comments and projects in the Spring of 2021.

## **REFERENCES**

 Monterey County Hazard Mitigation webpage: http://www.co.monterey.ca.us/government/departmentsa-h/administrative-office/office-of-emergency-services/hazard-mitigation

## History

• Version 1 presented at committee meeting on 12/17/2020



## Hazard and Asset Summary Sheet – Storm Drain Master Plan

**December 17, 2020** 

TO: Climate Committee Members

**SUBMITTED BY:** Agnes Martelet, Environmental Compliance Manager

## **SUMMARY**

**Asset**: Public and Private Property, Public Safety

Hazards: Flooding due to stronger storms

Version: 1

**General Comments and Outlook**: The Director of Public Works presented the City's first Storm Drain Master Plan (SDMP), which was completed in 2020. The plan includes an evaluation of the physical condition of the existing storm drain system, a hydrologic and hydraulic analysis, and a prioritization of improvements to fix deficiencies and capacity issues. With the proposed improvements outlined in the SDMP at an estimated cost of \$9.9 million, the drainage system could handle a 10-year storm (3 inches in 24 hours) without flooding.

#### Identified Issues:

- The City's storm drain system was built to handle only a 10-year storm; it was less costly to construct
  over the years but incurs the potential for more frequent flooding due to reduced capacity. Most agencies have storm drainage systems that accommodate 20-year storms.
- Repairs are needed for the system to currently be able to handle a 10-year storm.
- Climate change may cause storm intensities to increase by 12 to 20%. Models indicate that, with larger storms, some flooding may occur in the northeast part of the City, the southwest corner near Santa Lucia, and in Mission Trail Nature Preserve, even with improvements.

### Possible actions to be recommended in the committee's Final Report

- Funding of the SDMP projects as part of the City's CIP and including them in the Multi-jurisdictional Hazard Mitigation Plan for potential FEMA funding.
- Upsizing pipes as repair projects are conducted so that critical components of the system can eventually handle larger storms

## REFERENCES

Carmel-by-the-Sea Storm Drain Master Plan: <a href="https://ci.carmel.ca.us/sites/main/files/file-attach-ments/complete-final-sdmp-report-september-2020-small.pdf">https://ci.carmel.ca.us/sites/main/files/file-attach-ments/complete-final-sdmp-report-september-2020-small.pdf</a>?1602098761

## History

Version 1 presented at committee meeting on 2/18/2021



Hazard and Asset Summary Sheet for the Beach, Bluff, Coastal Armoring, Public Infrastructure, and Private Property

February 18, 2021

TO: Climate Committee Members

**SUBMITTED BY:** Scott Lonergan, Committee Member

## **SUMMARY**

**Asset**: Beach, Bluff, Coastal Armoring, Public Infrastructure, and Private Property **Hazards**: Sea Level Rise, Stronger Storms and Waves, More Variable Rainfall

Version: 8-Feb-2021

### **General Comments and Outlook:**

- It is not widely understood that the climate change threat to coastal infrastructure, private property, the beach, along with the associated impacts on tourism and Carmel's economy, is so substantial, and that the potential solutions so complex.
- Nearly the entire coastline south of 8th Avenue has been armored by a combination of seawalls, vertical or stepped retaining walls, or engineered rock revetments. Secondary impacts to armoring often include escalating maintenance costs, and the loss of beach, aesthetics, and ecology.
- Coastal erosion and storm events already pose a threat, and climate change driven sea level rise and storm intensity will dramatically increase that threat.
- Longer term, the degree to which the City should, or can, forestall the natural processes driven by climate change is not fully understood.

### Identified Issues:

- The frequency and duration of beach inundation and wave attack on armoring and natural barriers is increasing. The impacts of armoring on beach sand loss, as well as the seasonal migration of sand on and off shore, has not been investigated.
- The natural erosion processes along the mostly unarmored North Dunes area will accelerate bluff retreat and potentially create space for the beach to migrate inland. North Dune habitat at the retreating bluff would be reduced in this case.
- Seawall integrity is being compromised by ongoing erosion of the relatively soft sandstone base of some seawalls. Equipment access to areas on the beach required for completing repairs and maintenance is increasingly limited.
- Public infrastructure at risk along the coast including Scenic Road and the bluff walkway, beach access stairways, bathrooms, armoring, Del Mar Avenue beach parking, and some utilities.
- Private property at risk along the coast including: 1) that along Scenic Road, 2) that between 8<sup>th</sup> Avenue and Del Mar Avenue, and 3) that at the north end of the City (Pescadero Canyon area).
- The need to educate the community about the climate change threat to coastal infrastructure, private property, the beach, and the associated impacts on tourism and Carmel's economy, along with the potential solutions.

## Remaining Issues to be Understood (in Preparation for the Committee's Final Report):

- Engagement of a coastal engineer with experience in planning for climate change in an LCP context.
  - Further assessment of the risks to our coastal assets.

- Determine adaptation measures and LCP policy options. Draft updated or new LCP for certification with the Coastal Commission.
  - Prioritize adaptations and projects that protect and maintain public resources and beach access, and the viability of the community and tourism.
  - Coordinate with regional partners (e.g. County, Pebble Beach) and align with the Coastal Commission on acceptable plans.
  - Determine how the options and strategies along the coast are different for the:
    - Mostly natural, unarmored North Dunes area
    - Mostly armored bluffs along Scenic Road south of 8<sup>th</sup> Avenue
    - Unarmored dunes along private property between 8<sup>th</sup> Avenue and Del Mar Avenue
    - Armored private properties on the bluffs at the north end of the City (Pescadero Canyon area).
  - Evaluate feasibility and phasing, the use of thresholds for when different elements of these strategies are implemented. For example, maintaining armory or other defenses up to a point, but then if a threshold is reached, embracing a new bluff line and different adaptive measure.
  - Consider legal liabilities, coastal armoring and building regulations, real estate disclosures, and fiscal impacts.
  - Community-wide outreach and education, including that focused on exposed property owners.
- Actions independent of engaging a coastal engineer including:
  - Characterize erosion hot spot areas of particular concern along the City's coastline based on maintenance records, historical knowledge, and further assessment.
  - Research Carmel Cove sand supply dynamics through the engagement of local experts (e.g. CSUMB, NPS) or other resources.
  - o Assess risks with the USGS Coastal Storm Modeling System (CoSMoS).
  - o Investigate and, if appropriate, apply for pre-disaster planning and mitigation funding from the State or other sources.
  - Amend City documents, if appropriate, to enable the request of FEMA disaster relief postdisaster.

## Possible Actions to be Recommended in the Committee's Final Report

- Update the CBTS Shoreline Management Plan and the General Plan / LUP.
- Proactive sourcing or contracting for repair resources prior to episodic events.

## REFERENCES

- Coastal Resource Management Element of the Carmel-by-the-Sea General Plan: https://ci.carmel.ca.us/post/general-plan
- Carmel-by-the-Sea / Shoreline Management Plan: <a href="https://ci.carmel.ca.us/post/additional-forestry-division-resources">https://ci.carmel.ca.us/post/additional-forestry-division-resources</a>
- David Shonman and Greg D'Ambrosio 19-Nov-2020 Climate Change Committee presentation slides: <a href="https://ci.carmel.ca.us/sites/main/files/file-attachments/shonman - ccc presentation - final nov 19 2020.pdf?1605903015">https://ci.carmel.ca.us/sites/main/files/file-attachments/shonman - ccc presentation - final nov 19 2020.pdf?1605903015</a>
- USGS representative, Andrea O'Neill, 17-Dec-2020 Climate Change Committee presentation video: <a href="https://carmel.novusagenda.com/agendapublic/MeetingView.aspx?MeetingID=922&MinutesMeetingID=510&doctype=Agenda">https://carmel.novusagenda.com/agendapublic/MeetingView.aspx?MeetingID=922&MinutesMeetingID=510&doctype=Agenda</a>
- California Coastal Commission and Local Government Public Workshop on 17-Dec-2020 to discuss sea level rise planning in an LCP context: <a href="https://documents.coastal.ca.gov/reports/2020/12/SM-Th3/th3-12-2020-report.pdf">https://documents.coastal.ca.gov/reports/2020/12/SM-Th3/th3-12-2020-report.pdf</a>

### **History**

Version 8-Feb-2021



## **Water Supply Summary**

January 21, 2021 Meeting

TO: Climate Committee Members

**SUBMITTED BY:** Michael LePage, Committee Member

## **SUMMARY**

### Asset:

Monterey Peninsula water supply

#### Hazards:

Seasonal drought, climate warming, sea level rise

#### **General Comments and Outlook:**

California is located in a drought-prone area of the United States. Even though there are yearly seasonal variations in rainfall, the average temperature in California is trending up. This is the result of climate change. A warming climate leads to the increase of drought frequency and duration.

Additionally, climate change is predicted to increase local sea level rise by 1.5 meters by the century's end. Storm surges along with high tides and extreme weather events will result in much higher levels of sea level rise. This will have an impact on the local water delivery infrastructure which is located in the areas of projected sea level rise.

The Monterey Peninsula's water supply has historically been provided by the Carmel River, local reservoirs and ground water. The State Water Resources Control Board has issued a Cease and Desist Order, 95-10, that requires California American Water Company (CalAm) to reduce its unlawful pumping of water from the Carmel River. The original pumping deadline has been extended to 2021. In response to the Cease and Desist Order, CalAm is pursuing a permit for a desalinization water treatment plant located in Marina that would utilize slant wells to source seawater for desalinization.

Simultaneously with this project, the Monterey Peninsula Water Management District (MPWMD) has worked in collaboration with 9 local agencies to create the Pure Water Monterey Project. The project sources water from four sources, domestic waste water, agriculture produce water, agriculture waste water and storm water. By the use of advanced water recycling technology, all these water sources are purified to provide potable water for domestic and agricultural use. Additionally, the project injects seasonal water flows into the Seaside aquifer to provide ground water replenishment. The project potentially will provide one third of the water demand for the area it serves.

### Identified Issues:

- California is located in a drought-prone area of United States.
- Average temperatures are trending upward because of climate change
- Global warming is causing dryer weather patterns resulting in more frequent droughts.

- The State Water Resources Control Board has issued a Cease and Desist Order (95-10) to reduce unlawful pumping from the Carmel River.
- The proposed desalinization plant requires a cumbersome permitting process resulting in an expensive water source.
- Climate change is causing sea level rise that will impact water related infrastructure, both delivery and waste treatment

## Possible actions to be recommended in the committee's Final Report

- Keep informed regarding the Carmel Lagoon Ecosystem Protective Barrier and the Scenic Road Protective Barrier System.
- Provide maps of predicted sea level rise for the required shore line assessment reports
- Review city infrastructure opportunities for implementing additional water conservation measures

## **REFERENCES**

- Monterey Peninsula Water Management website, https://www.mpwmd.net/
- Pure Water Monterey Project, <a href="https://purewatermonterey.org/">https://purewatermonterey.org/</a>
- Monterey Peninsula Integrated Regional Water Plan, <a href="https://www.mpwmd.net/environmental-steward-ship/irwm-program/final-draft-monterey-peninsula-integrated-regional-water-management-plan-update/">https://www.mpwmd.net/environmental-steward-ship/irwm-program/final-draft-monterey-peninsula-integrated-regional-water-management-plan-update/</a>
- Carmel Lagoon Ecosystem Protective Barrier and Scenic Road Protective Barrier System, <a href="https://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/plan-ning/current-major-projects/carmel-lagoon-ecosystem-protective-barrier-and-scenic-road-">https://www.co.monterey.ca.us/government/departments-i-z/resource-management-agency-rma-/plan-ning/current-major-projects/carmel-lagoon-ecosystem-protective-barrier-and-scenic-road-</a>

## **History**

Version 1 presented at committee meeting on 4/15/21



### CITY OF CARMEL-BY-THE-SEA

### 2018 Draft Greenhouse Gas Inventory Summary

February 18, 2021 Meeting

TO: Climate Committee Members

SUBMITTED BY: Evan Kort, Associate Planner

### **SUMMARY**

#### Asset:

2018 Draft Greenhouse Gas (GHG) Inventory

### Hazards:

N/A

### **Key Terms:**

- Baseline Year: A specific year against which emissions are tracked over time.
- Greenhouse gases (GHG): Carbon dioxide (CO2), methane (CH4), and nitrous oxide (N20). Emissions
  are expressed in equivalents of carbon dioxide (CO2e).
- Community Greenhouse Gas Inventory: A calculation of GHG emissions generated as a result of activities within a community.

#### **General Comments and Outlook:**

The Association of Monterey Bay Area Governments (AMBAG) has prepared GHG Inventories for member agencies for 2005, 2010, 2015. Starting 2018, in partnership with Central Coast Community Energy (3CE), AMBAG is preparing GHG Inventories for 3CE member jurisdictions for 2018, 2019, and 2020 –this 2018 GHG Inventory was prepared as part of the MOU between AMBAG and 3CE.

The state of California has adopted a baseline year of 1990 for statewide targets. The 2020 target (AB 32) was to return to 1990 emission levels, and the 2030 target (SB 32) is a 40% reduction from 1990 levels with the 2050 target (executive order: S-3-05) being an 80% reduction from 1990 levels. In 2018, the Governor signed an executive order (B-55-18) with the goal of achieving carbon neutrality by 2045. Most cities do not have 1990 inventories and it is not possible to go back and establish a 1990 baseline. Therefore, in order to quantify targets, most cities use 2005 inventories and assume emissions increased by approximately 15% between 1990 and 2005.

The emission inventory is broken into 5 sectors: Residential, Commercial/Industrial, Transportation, Solid Waste, Wastewater. Residential and commercial/industrial sectors inventory electricity and natural gas emissions. The transportation sector is an inventory of emissions resulting from travel on local roads in the City of Carmel-by-the-Sea. Solid waste is an inventory of emissions from the waste that is generated by the community and sent to the landfill, and wastewater is an inventory of emissions from the treatment of wastewater.

AMBAG gathered data directly from PG&E and 3CE for electricity and natural gas consumption. Transportation data is gathered from an annual report prepared by the California Department of Transportation (CalTrans) that looks at the amount of Vehicle Miles Traveled on local roads as well as the CARB's EMFAC model, which is used to estimate emissions based on on-road travel. Solid waste data is obtained from CalRecycle's annual

report as well as characteristic studies that study the composition of materials in the landfill. Lastly, wastewater data is gathered from a population-based method that uses the population to estimate the emission.

### 2018 Inventory Findings:

- Electricity between 2005 to 2018 has become cleaner. Electricity use has remained stable; however, the carbon intensity of the electricity has been drastically reduced (likely due to the local energy procurement being taken over by 3CE).
- Data sources have reported less and less travel on local roads over time resulting in a reduction in GHG for the transportation sector.
- Solid waste being sent to the landfill from the city has decreased significantly (46% emission reduction)
  and the composition of the solid waste being sent to the landfill is less impactful in 2018 than it was in
  2005.
- Wastewater: not discussed.

### Identified Issues:

- The California Air Resources Board (CARB) is required to update their Scoping Plan every 5 years. The scoping plan was last updated in 2017, prior to the executive order establishing a goal of carbon neutrality by 2045 so the carbon neutrality target has yet to be included in the Scoping Plan (80% reduction by 2050 is still the official target). When the scoping plan is updated in 2022, the 2045 carbon neutrality target will likely be included in the Scoping Plan and is expected to be the main target moving forward. There is still uncertainty regarding 2045 vs 2050 goal.
- The significant decrease in GHG emissions in the transportation sector may be the result of a change in methodology by CalTrans in preparing their annual report, which may account for some or most of the reduction in GHG emissions. The report provided to AMBAG from CalTrans is a finished product that does not provide the opportunity to evaluate the methodology used.
- CalRecycle reports the solid waste data and the reason for the significant decrease in emissions is unclear.

### Possible actions to be recommended in the committee's Final Report

- Maintain the 2030 goal outlined in SB 32. Although there is still uncertainty regarding the 2045 vs 2050 goals, the Committee is interest in using the more rigorous 2045 carbon neutrality target as its goal for emissions reductions.
- Re-evaluation of emissions may be required as a result of possible changes in methodology that may
  have impacted the outcomes of the inventory. Consultant assistance will be required in making a determination regarding the accuracy of the inventory and methodology.

### **REFERENCES**

- City of Carmel Draft 2018 Greenhouse Gas Inventory
- EMFAC Model: <a href="https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools">https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools</a>

### **History**

Version 2 presented at committee meeting on 7/15/21



### CITY OF CARMEL-BY-THE-SEA

### **Central Coast Community Energy**

February 18,2021 Meeting

TO: Climate Committee Members

**SUBMITTED BY:** Agnes Martelet, Environmental Compliance Manager

### **SUMMARY**

Asset:

**Power Supply** 

Hazards:

Greenhouse gas emissions

### **General Comments and Outlook:**

Central Coast Community Energy (3CE, formerly Monterey Bay Community Power) is a Joint Powers Authority with 33 municipal members to deliver energy throughout the Central Coast. 3CE delivers the energy to the power grid that is operated by PG&E locally. 3CE has a goal to reach 100% clean and renewable energy by 2030, although they have clarified that there will be times of the day when there will be natural gas on the grid for reliability when renewables are not available.

Regionally, 3CE is investing in technology to increase supply and storage capacity for reliable and clean power. Locally, 3CE is investing in programs to increase the pace of electrification, including in the transportation and construction sectors, and in the agricultural industry. 3CE also provides an incentive for local municipalities to adopt reach codes for energy conservation and electrification to reduce the use of natural gas in the built environment. Reach codes are more advanced or enhanced building codes that go above and beyond the State's building code requirements.

### Identified Issues:

Providing 100% clean energy power supply is challenging due to the times of energy use that do not
always match the times of peak power supply from renewable sources. Thus, natural gas will remain a
source of energy on the power grid.

### Possible actions to be recommended in the committee's Final Report

Consider taking advantage of 3CE's reach code incentive to amend the City's municipal code to increase the pace of energy conservation and electrification in local construction projects.

### REFERENCES

- 3CE Presentation at the Climate Committee meeting: <a href="https://carmel.novusagenda.com/agendapub-lic/VODPreview.aspx?meetingVideoID=5ddd8ae3-bf7f-456c-8c9f-38f55eeb55a6&index=3004">https://carmel.novusagenda.com/agendapub-lic/VODPreview.aspx?meetingVideoID=5ddd8ae3-bf7f-456c-8c9f-38f55eeb55a6&index=3004</a>
- 3CE Energy Programs: <a href="https://3cenergy.org/energy-programs/">https://3cenergy.org/energy-programs/</a>

### History

• Version 1 presented at committee meeting on 5/20/21



### CITY OF CARMEL-BY-THE-SEA

## Hazard and Asset Summary Sheet for Electrical Grid Resilience May 20, 2021

**TO:** Climate Committee Members

**SUBMITTED BY:** Jeff Baron, Councilmember

### **SUMMARY**

Asset: Electrical Grid

Hazards: Stronger Storms, Increasing temperatures

Version: 1

**General Comments and Outlook**: The electrical grid in Carmel has been historically somewhat unreliable during weather events, with outages affecting from half a block to the entire community. In the future, we could see causes of disruptions (related to climate change) include:

- 1. Larger weather events (storm damage to power line infrastructure.)
- 2. Public safety power shutoffs (related to the threat of wildfire during wind events along transmission lines.)
- 3. Supply shortages (related to grid shortages, as seen during the summer of 2020.)

### **Identified Issues:**

Grid failure can lead to numerous effects, including:

- o Residential spoiled food, cold and dark homes
- Commercial essential businesses shuttered
- Tourism loss of income of reputation
- Government services impacts (police and fire, public works)

### Outstanding Issues:

- Would be good to have access to PG&E Grid map to better understand power grid
- Ask PG&E for historical outage map (or list) with causes
- Work with PG&E to understand possible PSPS transmission lines. Which lines are subject to these? How does this effect Carmel?
- PG&E: Microgrids
  - o Power sources within the power grid?
  - Could we get power from somewhere else, some dedicated "outside line" not subject to power outages?
- Community business survey to determine which businesses are grid resilient

### **Possible Committee Comments or Actions for Final Report**

Explore and make recommendations on possible mitigation measures:

- Prevention
  - o Tree planning and maintenance Work with PG&E to prioritize tree trimming
  - Explore the possibility of undergrounding select or all utility lines (via with property assessments)
- Personal resiliency
  - o Require new homes to be "ready" for home power storage
  - o Require homes to be "EV ready" (also helps with GHG metrics.)

- o Explore new home requirements for home power generation (solar, fuel cells, generators)
- Carmel resiliency
  - o Explore areas in which Carmel should or could provide resiliency services to local residents and business, beyond the simple continuation of essential government services. For example:
    - Warming or cooling areas
    - Electrical phone and other small appliance charging facilities
    - Food and other supplies (for visitors)
    - Communication infrastructure
- Regional resiliency
  - o Explore possible peninsula microgrid

### **REFERENCES**

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### **HISTORY**

• Version 1 presented at Committee meeting on 5/20/2021



### CITY OF CARMEL-BY-THE-SEA

### 2018 Draft Greenhouse Gas Inventory Summary

January 21, 2021 Meeting

TO: Climate Committee Members

SUBMITTED BY: Carrie Theis, Committee Member

### **SUMMARY**

#### Asset:

Regional recycling, waste processing and disposal facility

### Hazards:

Methane gas emissions

#### **General Comments and Outlook:**

The Monterey Regional Waste Management District is located north of Marina and has been operating since 1951 to handle the waste processing and disposal along with recycling for the Monterey Peninsula. Over the years they have added programs to their facility producing an integrated approach to reduce, reuse and recycle the waste produced on the Monterey Peninsula.

The decomposing of waste materials and organics creates methane gas. Extraction of methane from the land-fill creates renewable power for the use by the District and Monterey 1 Water (M1W) to help produce recycled water. Soon the District will be converting landfill gas to Compressed Natural Gas (CNG) to provide fuel for the trash trucks. CNG is a carbon negative fuel. The extraction of methane gas from the landfill produces 5 megawatts of power and the CO2 offset is about 22,000 tons per year.

Windrow Composting is used to manage organics processing to produce compost for nearby organic farms. This process keeps the yard trimmings and organics out of the landfill and creates a nutrient rich compost. It has been shown that applying ¼" of compost (California Carbon Project) to grasslands will improve the soil environment for over a 100 years. Plants thrive more by pulling CO2 out of the air to help offset greenhouse gas emissions. A more widespread application of compost could work to reverse climate change by becoming a carbon bank.

Food recovery and organics processing has become a priority for the State of California with the implementation of AB1826 in 2014 for the mandatory commercial organics recycling and SB1383 in 2016 to mitigate climate change with the Short-Lived Climate Pollutant Reduction Strategy.

The goal of SB1383 is to divert 75% of organic material from the landfill and 20% of edible food for recovery by 2025. To try to obtain the goal of 75% diversion of organic food waste, the waste haulers will be Implementing the collection of residential food waste sometime this year. To handle the increased tonnage of organic materials, the Waste Management District will need to implement a larger anaerobic digesting system to prevent the methane gas from being released into the environment. The edible food recovery part of this bill will be accomplished by having the restaurants partner with the Monterey County Food Bank.

### Identified Issues:

• The challenges will be to meet the diversion goals set by the State by continuing to educate the public about recycling and introduce the concept of organics waste diversion. The program logistics of diverting edible food from the restaurants to the Monterey Fook Bank program is yet to be determined.

### **REFERENCES**

- Monterey Regional Waste Management District website www.mrwmd.org.
- Monterey Regional Waste Management District presentation to the Climate Committee: https://www.youtube.com/channel/UCAu0elLwM1JCDkzD7Js86mA

### History

Version 1 presented at committee meeting on 8/19/21

### Stakeholder and Public Input

This appendix includes presentation slides, the Mural activity completed at the virtual public workshop in November 2021, and responses to comments.

# Appendix C Outreach

# Appendix C Outreach

Presentation Slide Deck from September 16, 2021, Climate Committee Meeting





# Vulnerability Assessment

- Carmel-by-the-Sea is experiencing and will continue to experience
  - Stronger storms
  - Increased wildfire risk
  - Sea level rise
  - Extended drought conditions
  - Increased temperature





# Vulnerability Assessment

- Identified gaps
- Opportunities to build on existing adaptation strategies



Priority Assets at Risk	Priority Hazards									
	Stronger Storms	Wildfires	Sea Level Rise	More Droughts	Increased Temperature	Fog changes	Ocean Warming			
Natural Assets										
Mission Trail Nature Preserve	YES	YES	×	YES	YES	x				
North Dunes			NO	YES	YES	X				
Urban Forest	YES	NO		YES	NO	X				
Marine Sanctuary	X			Х	X	X	X			
Carmel Beach	YES		YES	1		X	X			
Community										
Elderly population and people with disabilities	NO	NO		NO	NO		1 7			
Residents	YES	YES		YES	NO					
Visitors	NO	NO.					X			
Local Businesses	NO	NO	NO	YES	NO		Х			
Service industry workers	NO	NO	NO		NO					
Second homes	YES	YES	NO							



# Potential Adaptation Strategies Table

### Structure

- Goals Broad statements describing community desires
- Policies Specific position statements that support the achievement of goals and serve as guides to the City when making decisions
- Actions Specific methods to implement and achieve policies and goals.





# Potential Adaptation Strategies Table

- Action Sources
  - Carmel-by-the-Sea Vulnerability Assessment
  - State/Regional Plans
    - Safeguarding California Plan: 2018 Update, California's Climate Adaptation Strategy, California Natural Resources Agency
    - Southern California Adaptation Planning Guide
      - Appendix F General Plan and Local Coastal Plan Model Policies
      - Appendix B Matrix of Adaptation Strategies and Actions
  - Local Plans and Ordinances
    - Pacifica All-Electric Reach Code
    - Berkeley Existing Building Electrification Strategy



Safeguarding California Plan: 2018 Update

California's Climate Adaptation Strategy | January 2018





# Principles for Implementable Actions

# 6 principles to consider when selecting adaptation actions

- 1. Measurable increase in resilience
- 2. Institutional structures
- 3. Funding
- 4. Engagement
- 5. Partnership
- 6. Equity



Photo by Adomas Aleno on Unsplash



# Potential Adaptation Strategies Table

### City of Carmel-by-the-Sea Potential Adaptation Strategies

Goal/Policy/Action	Climate Hazard	Asset	Potential Metric	Timeframe	Potential Lead	Cost	Source
Goal 1. A Healthy, Safe, and							
Resilient Community							
Policy 1.1. Provide effective							Adapted from the Southern
emergency preparedness and							California Adaptation
response following a climate-							Planning Guide, Appendix F -
related disaster							General Plan and Local Coastal
							Plan Model Policies
Action 1.1.1. Improve Emergency							
Preparedness. Incorporate climate							
change risk and impact							
considerations into Carmel CERT							Adapted from the Southern
programming and materials, to							California Adaptation
promote emergency preparedness							Planning Guide, Appendix B
at a neighborhood block-by-block		Residents, Local Businesses, Second	# of block captains				Matrix of Adaptation
scale.	All	Homes	formed	TBD	TBD	TBD	Strategies and Actions



# Next Steps

- Collect comments from Climate
   Committee before the October meeting
- Refine the goals, policies and actions based on comments
- Present the refined list at the public workshop on November 18<sup>th</sup>



# Thank you for your time!

Questions?





# **Extra Slides**







### Goals

### **ICARP**

**Adaptation Visions and Principles** 



# **City of Carmel-by-the-Sea** Adaptation Goals



All people and communities respond to changing average conditions, shocks, and stresses in a manner that minimizes risks to public health, safety, and economic disruption and maximizes equity and protection of the most vulnerable.

Goal 1. A Healthy, Safe, and Resilient Community

**Natural systems** adjust and maintain functioning ecosystems in the face of change.

Goal 2. A Natural Environment Resilient to Climate Hazards

**Infrastructure and built systems** withstand changing conditions and shocks, including changes in climate, while continuing to provide essential services.

Goal 3. Resilient Infrastructure and Built Environment

# Appendix C Outreach

Presentation Slide Deck from October 21, 2021, Climate Committee Meeting





### Resources

- Summary of Comments and Responses
- Revised PotentialAdaptation Strategies





## **Comment Categories**

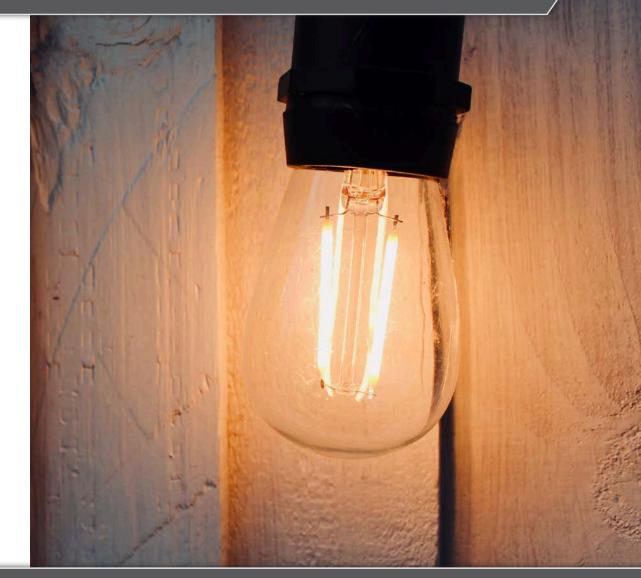
- Electrification
- Evacuation, traffic, and congestion
- Vulnerable populations
- Tree maintenance and Monterey Pines
- Stormwater runoff and wastewater





## Electrification

- It is noted that members of the Climate Committee would prefer to move these types of strategies to the Climate Action Plan.
- Electrification actions will remain in the list of potential adaptation goals, policies, and actions for the public to weigh in on.





# Evacuation, Traffic, Congestion

- New actions added
  - Action 1.1.5. Evacuation Access. Investigate potential congestion issues in the event of an evacuation and develop and maintain a list of residents who may have difficulty evacuating and provide evacuation options for residents with mobility challenges.
  - Action 1.1.6. Evaluate Evacuation Route Capacity. Evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios and identify and implement mitigating actions.
  - Action 1.1.7. Evacuation Alternatives. Develop and employ evacuation alternatives and/or alternative emergency access routes in neighborhoods that have single ingress/egress.



# Vulnerable Populations

- New actions added
  - Action 1.2.4. Social Support Network. Collaborate with the Carmel Foundation and other community-based organizations to develop an inventory of locations with isolated seniors and people with disabilities and develop a plan for a social support network to increase resilience to climate change.
  - Action 1.2.5. Back-up Power for Vulnerable Populations. Coordinate with 3CE, PG&E, and emergency management services to establish backup power and emergency grid shutdown protocols that protect the most vulnerable populations.



## Tree maintenance and Monterey Pines

- Revised action 2.1.2.
  - Action 2.1.2. Increase Forest Resilience. Update the Forest Management Plan to:
    - 1. Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics and the ecological benefits of natives or near-native (e.g., native species from the Southwestern US or Mexico would likely be preferred to European species).
    - 2. Include planting **and maintenance** guidelines to improve tree health, particularly in the public right-of-way
    - 3. Incorporate tree species that have greater drought and wildfire resistance
    - 4. In addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.
    - 5. Enhance carbon sequestration potential



### Stormwater Runoff and Wastewater

- New actions added
  - Action 3.1.3. Reduce Stormwater Runoff. Reduce stormwater runoff through implementation of a stormwater diversion project to divert all dry weather flows and first flush runoff to the large sanitary sewer that runs along San Antonio Avenue, such that they can be directed to the Wastewater District.
  - Action 3.1.9. Wastewater Treatment. Collaborate with the Carmel Area Wastewater District (CAWD) to increase the facility's resilience to sea level rise and stronger storms, and incentivize reduction of water use in the community and transitioning to reclaimed water use for irrigation. Maintain staff/council personnel as liaisons to CAWD.



# Next Steps

- Present the goals, policies, and actions at the November 18<sup>th</sup> public workshop
- Collect comments from the public
- Refine the goals, policies, and actions based on public and climate committee comments



# Thank you for your time!

Questions?





# Appendix C Outreach

Presentation Slide Deck from November 18, 2021, Public Workshop



# CITY OF CARMEL-BY-THE-SEA

## WORKSHOP

# Climate Adaptation and Greenhouse Gas Reduction Strategies for Carmel

Climate Committee

November 18, 2021

# OF CAPIFOR IN STREET STREET STREET STREET STREET

# Workshop Agenda & Logistics

- Project Background
- Carmel Vulnerability to Climate Change
- Carmel Greenhouse Gas Reduction Goals
- Forum: Vision for the Future in Carmel
- Forum: Review of Potential Climate Adaptation and Greenhouse Gas Reduction Strategies

- Providing comments during the workshop
- Providing comments after the workshop

- Climate Action and Adaptation Project initiated during Fiscal Year 2019/2020
  - Action: reducing greenhouse gas emissions
  - Adaptation: Developing strategies to adapt to the changing climate
- Climate Committee formed in Fall 2019 with 8 members:
  - 2 Council members: Jeff Baron and Carrie Theis
  - 4 members of the public: John Hill, Michael LePage, Scott Lonergan, LaNette Zimmerman
  - 2 staff members: Agnes Martelet, Environmental Compliance Manager, Evan Kort, Associate Planner
- Consultants: Rincon Consultants, LSA Associates

# Progress to Date

- Monthly presentation series to better understand climate threats and opportunities for action in Carmel
- Outreach to community groups and regional partners
- Climate Change Vulnerability Assessment
- Greenhouse Gas Inventories and Draft Forecast
- List of Potential Adaptation Strategies
- List of Potential Strategies to reduce Greenhouse Gas Emissions



#### Climate Change Vulnerability Assessment

Stronger Storms

Wildfires

Sea Level Rise

Drought

Increased Temperatures

Fog Changes

Ocean Warming



#### Climate Change Vulnerability Assessment

Stronger Storms

Wildfires

Sea Level Rise

Drought

Increased Temperatures

Fog Changes

Ocean Warming

More intense storms projected





#### Climate Change Vulnerability Assessment

**Stronger Storms** 

Wildfires

**Sea Level Rise** 

**Drought** 

**Increased Temperatures** 

**Fog Changes** 

**Ocean Warming** 

Large, severe wildfires will continue to occur in the Central Coast region





#### Climate Change Vulnerability Assessment

**Stronger Storms** 

Wildfires

**Sea Level Rise** 

**Drought** 

**Increased Temperatures** 

**Fog Changes** 

**Ocean Warming** 

Monterey County is projected to experience ~5 feet in sea level rise by 2100





#### Climate Change Vulnerability Assessment

**Stronger Storms** 

Wildfires

**Sea Level Rise** 

**Drought** 

**Increased Temperatures** 

**Fog Changes** 

**Ocean Warming** 

Dry years are projected to get drier and are likely to be followed by dry years





#### Climate Change Vulnerability Assessment

**Stronger Storms** 

Wildfires

**Sea Level Rise** 

**Drought** 

**Increased Temperatures** 

**Fog Changes** 

**Ocean Warming** 

Annual average maximum temp is projected to increase by 3.3°F by mid-century and 6.3 °F by end of the century.





### CBTS Assets to Consider

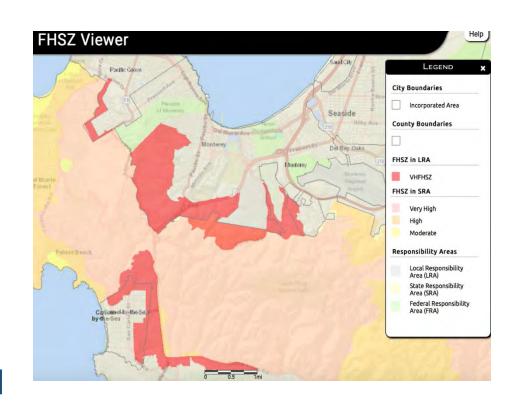
- Community
  - Elderly population and people with disabilities
  - Residents
  - Visitors
  - Local businesses and workers
- Natural Environment
  - Beach
  - Special Habitats and Open
     Spaces on land and in the ocean
  - Urban Forest

- Infrastructure and Built Environment
  - Utilities (incl. electricity, water, sewer, storm drainage)
  - Shoreline infrastructure (incl. access infrastructure and sea walls and revetments)
  - Critical community facilities
  - Downtown and residences



### Vulnerabilities - Community

- Very High Fire Hazard Severity Zones (VHFHSZ) in Carmel
- Wildfire vulnerability can be reduced with better siting, landscape design, and building materials
- Lack of a plan for evacuating at-risk community members
- Lack of a plan to support at-risk workers and businesses





### Vulnerabilities - Community

- Stronger storms could lead to localized flooding, which could isolate residents
- Increased temperature could lead to negative health impacts for older adults and individuals living with disabilities





#### Vulnerabilities – Natural Environment

- Increased tree stress due to increased heat, more variable water supply
- Open spaces with sensitive habitats will be impacted by stronger storms, hotter temperatures, drought, and wildfires
- Beach and dune loss from sea level rise
- Monterey Bay National Marine Sanctuary impacts from ocean warming and acidification
- Carmel's urban forest lacks age and species diversity





## Vulnerabilities – Infrastructure

#### **Utilities and Infrastructure:**

- Access and utility infrastructure along the coastline
- Coastal protection infrastructure: revetments, sand ramps, and sea walls. Sea walls undercutting due to erosion and retreat of surrounding sand stone. 10 hot spots with significant damage after major storms (1982-83)
- Storm drain system only designed to handle 10-year storms and in need of repairs
- CAWD wastewater facility will need to be relocated by 2062
- Power grid impacts of wildfires and storms





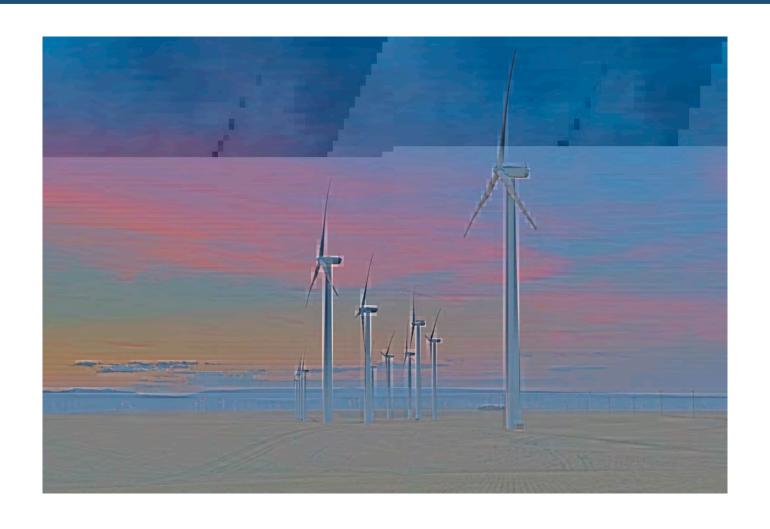
### Vulnerabilities – Built Environment

- City Planning guidelines conflict with California fire codes in the VHFHSZ
- Lack of defensible space around homes
- Extreme heat may lead to increased use of air condition which could tax the electrical grid
- Lack of cooling infrastructure





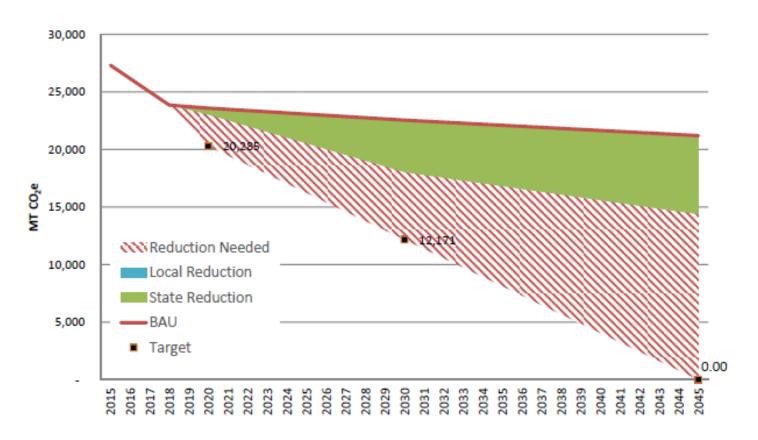
# Climate Change Mitigation





#### Carmel Greenhouse Gas Reduction Goals

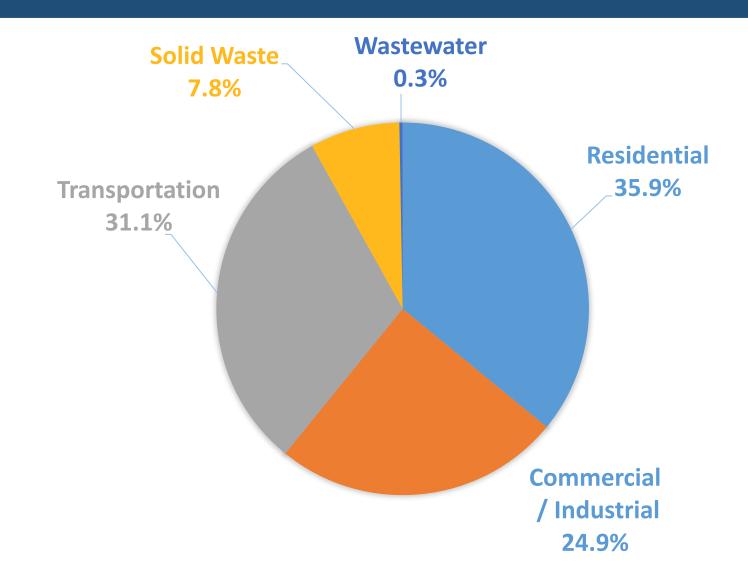
FIGURE 1: State and Local Reductions Comparison with Targets City of Carmel-By-The-Sea, 2015 - 2045



State measures and reduction goals are estimated based on the 2015 GHG Inventory and Population Forecasting by AMBAG. Targets are set based on CARB recommendations using the 2015 GHG Inventory as a baseline (2020 target = 15% reduction from 2015 emissions, 2030 target = 40% reduction from the 2020 target, 2045 target = net zero emissions).



### Carmel 2018 GHG Emissions by Sector





- What aspects of Carmel help the community's resilience? What actions have the city and constituents taken to reduce their impact and adapt to climate change?
- What does a resilient Carmel community look like? What outcomes are we hoping to achieve?





#### Forum: Envision Sustainable Carmel in 2050

## Mural



# Potential Strategies for Adaptation and GHG Reduction

#### Structure:

- Goals –Broad statements describing community desires
- Policies / Measures Specific position statements that support the achievement of goals and serve as guides to the City when making decisions
- Actions –Specific methods to implement and achieve policies and goals.



#### Potential Adaptation Goals

Goal 1. A Healthy, Safe, and Resilient Community

Goal 2. A Natural Environment

Resilient to Climate Hazards

Goal 3. Resilient Infrastructure and

**Built Environment** 



## Policy 1.1. Provide effective emergency preparedness and response in anticipation of potential climate-related disasters.

Action 1.1.1 .Improve Emergency Preparedness by incorporating Climate Change risk in CERT programming

Action 1.1.2. Collaborate with Monterey Fire on inspection and outreach for fire risk reduction

Action 1.1.3. Publicize Local Evacuation Routes

Action 1.1.4. Maintain and Update Evacuation Plan

Action 1.1.5. Evacuation Access for residents with disabilities

Action 1.1.6. Evaluate Evacuation Route Capacity

Action 1.1.7. Evacuation Alternative

Action 1.1.8. Update City Planning Guidelines in the Fire Hazard Zones

Action 1.1.9. Development Standards in the Fire Hazard Zones.

Action 1.1.10. Increase Resistance to Wildfire Structural Damage.



## Policy 1.2. Focus adaptation efforts and engagement on the most vulnerable populations.

Action 1.2.1. Establish a Resilience Hub.

Action 1.2.2. Limit the Impacts of Climate Change on the Most Vulnerable Populations.

Action 1.2.3. Educate the Community.

Action 1.2.4. Social Support Network.

Action 1.2.5. Back-up Power for Vulnerable Populations

•



#### Policy 1.3. Minimize health impacts of climate change.

Action 1.3.1. Partner with Monterey County Health Department.

Action 1.3.2. Initiate a Heat Pump Retrofit Program.

Action 1.3.3. Improve Resilience in Critical Facilities.

Action 1.3.4. Conduct a Feasibility Study for Existing Building Electrification.

Action 1.3.5. Improve Resilience in Housing Stock.

Action 1.3.6. Electrify Fireplaces.

Action 1.3.7. Identify Funding and Financing.



#### Policy 1.4. Increase Economic Resilience

Action 1.4.1. Support Displaced Workers.

Action 1.4.2. Establish Partnerships to Develop a Resilient

Economy.

Action 1.4.3. Business Resilience Outreach Program.



# Forum: Adaptation Strategies for Community Resilience

- Did we miss anything?
- Which policies and actions should be prioritized for Community Resilience?



# Forum: Adaptation Strategies for Community Resilience

## Mural



# Goal 2. A Natural Environment Resilient to Climate Hazards

#### Policy 2.1. Protect and restore climate-vulnerable habitat and ecosystems.

- Action 2.1.1. Increase Funding for Climate Adaptation.
- Action 2.1.2. Increase Forest Resilience and Update the Forest Management Plan
- Action 2.1.3. Update the Mission Trail Nature Preserve Master Plan to increase resilience
- Action 2.1.4. Increase Resilience of the North Dunes
- Action 2.1.5. Increase Resilience to Stronger Storms by sizing improvements for larger storms
- Action 2.1.6. Beach Sand Monitoring Program
- Action 2.1.7. Carmel Cove Sand Supply Analysis



# Forum: Adaptation Strategies for Natural Environment Resilience

- Did we miss anything?
- Which policies and actions should be prioritized for Natural Environment Resilience?



# Forum: Adaptation Strategies for Natural Environment Resilience

## Mural



# Goal 3. Resilient Infrastructure and Built Environment

### Policy 3.1. Support greater resilience, redundancy, and reliability of local and regional infrastructure and the built environment.

Action 3.1.1. Evaluate Undergrounding Utilities in Fire Hazard Zones

Action 3.1.2. Increase Green Infrastructure.

Action 3.1.3. Reduce Stormwater Runoff.

Action 3.1.4. Storm Drain Repair Funding and Improvements.

Action 3.1.5. Retrofit Existing Critical Buildings and Related Infrastructure to handle Climate Hazards.

Action 3.1.6. Water Conservation.

Action 3.1.7. Bluff Structural Monitoring Program.

Action 3.1.8. Hire Coastal Engineer to evaluate coastal protection infrastructure.

Action 3.1.9. Wastewater Treatment.



# Goal 3. Resilient Infrastructure and Built Environment

## Policy 3.2. Incorporate climate change adaptation into relevant plans and standards.

Action 3.2.1. Develop a Guidance Project Checklist.

Action 3.2.2. Incorporate Climate Change Adaptation into Local Plans.

Action 3.2.3. Update Shoreline Management Plan.

Action 3.2.4. Multi-Jurisdictional Hazard Mitigation Plan.



# Forum: Adaptation Strategies for Infrastructure Resilience

- Did we miss anything?
- Which policies and actions should be prioritized for Infrastructure Resilience?



# Forum: Adaptation Strategies for Infrastructure Resilience

## Mural



# Greenhouse Gas Reduction Policies for the Built Environment

### **Goal 1/3: Increase Energy Efficiency in Existing Residential and Commercial Units**

- Energy Efficiency education and recognition in the residential and commercial sectors.
- Increase participation in energy efficiency programs.
- Home / Business Energy Evaluations.
- Residential home / Commercial energy renovations.
  - Promote participation in green building programs.
  - Provide incentives to homeowners / businesses to convert to electrification.
  - Streamline the permitting process for energy efficiency retrofits.
  - Require green building programs for large commercial renovations



# Greenhouse Gas Reduction Policies for the Built Environment

#### **Goal 2/4: Increase Energy Efficiency in New Residential / Commercial Units**

- Educate City staff and the community on future Title 24 compliance.
- Promote Tier 1 and Tier 2 Green Building Standards.
- Incentivize electrification in new residential/commercial units.
- Streamline the permitting process for Tier 1 and Tier 2 Green Building applications

#### **Goal 9: Increase Clean Energy Use**

- Incentivize solar panel installation for residential and small commercial.
- Promote energy storage systems installation with solar panels.
- Require large commercial renovations to install solar panels.
- Encourage residents and businesses to participate in the 3CE 100 percent renewable Program.



# Forum: Greenhouse Gas Reduction Policies for the Built Environment

- Did we miss anything?
- Which policies and actions should be prioritized?



# Forum: Greenhouse Gas Reduction Policies for the Built Environment

## Mural

#### Greenhouse Gas Reduction Policies

#### **Goal 5: Energy Efficiency Through Water Conservation**

- Exceed State Water Efficiency Standards.
- Recycled water for certain types of commercial and multi-family landscaping.
- Grey Water Systems.
- Promote rainwater harvesting.

### Goal 6: Decrease Energy Demand by Reducing the Heat Island Effect.

- Maintain the health of the Urban Forest Canopy.
- Modify codes to allow light reflecting surfaces on rooftops (cool roofs).
- Where feasible, use cool pavement options when repaving roadways.



### Greenhouse Gas Reduction Policies

#### **Goal 7: Decrease GHG Emission By Reducing VMT.**

- Develop Bicycle Master Plan.
- Ride Sharing and Bike to Work Programs.
- Electric Vehicle Infrastructure.
- Neighborhood Electric Vehicles (NEV) and NEV Shuttles.
- Shuttle service between the Monterey Airport and destinations in the City.

#### **Goal 8: Reduce Solid Waste**

- Promote Zero Waste events.
- Promote home composting.
- Promote reusable containers rather than recyclables.
- Educate the community on use of City provided containers.



#### Forum: Greenhouse Gas Reduction Policies

- Did we miss anything?
- Which policies and actions should be prioritized?



### Forum: Greenhouse Gas Reduction Policies

## Mural



- Refine Strategy Tables based on feedback from the Workshop
- Develop cost ranges and implementation timelines, and identify primary implementation parties
- Finalize Climate Adaptation and Action Plans







## CITY OF CARMEL-BY-THE-SEA

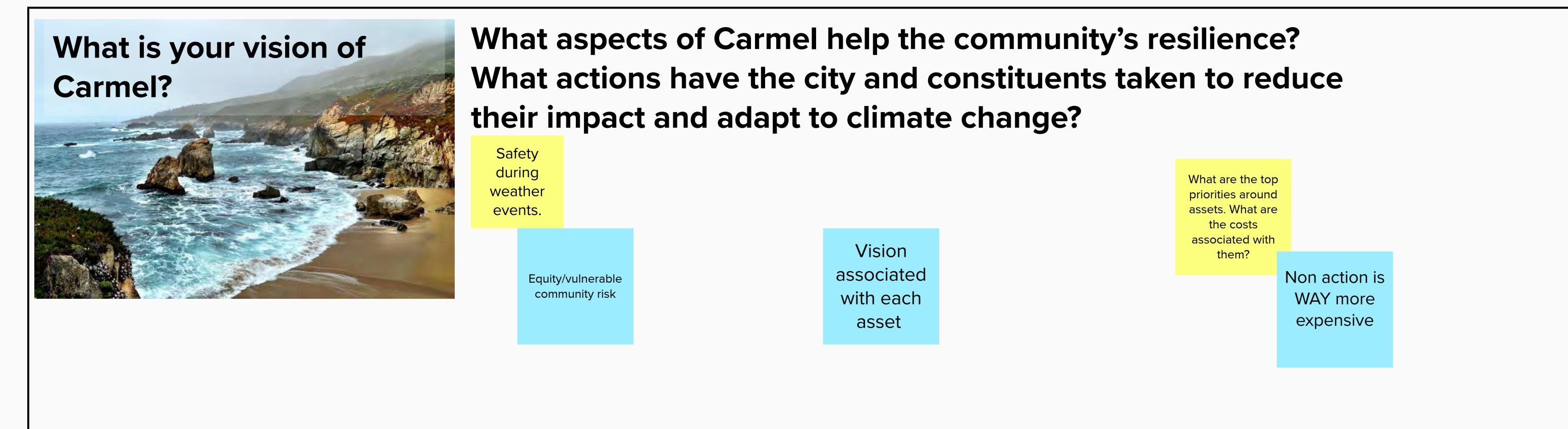
#### Thank you for participating!

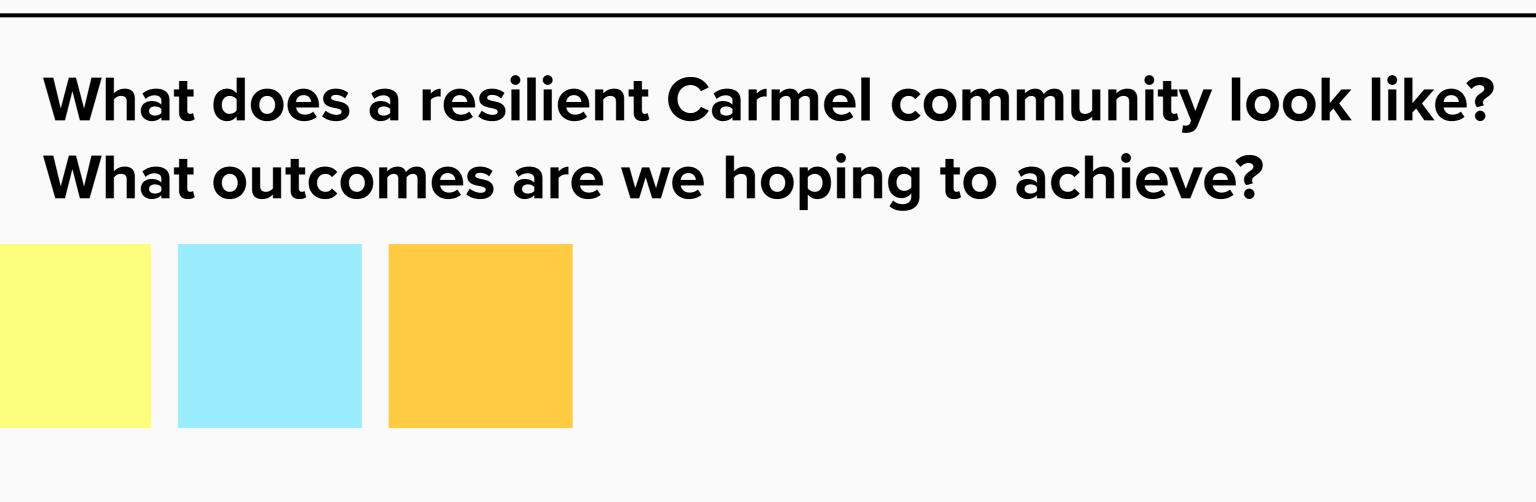
Contact for comments: amartelet@ci.carmel.ca.us

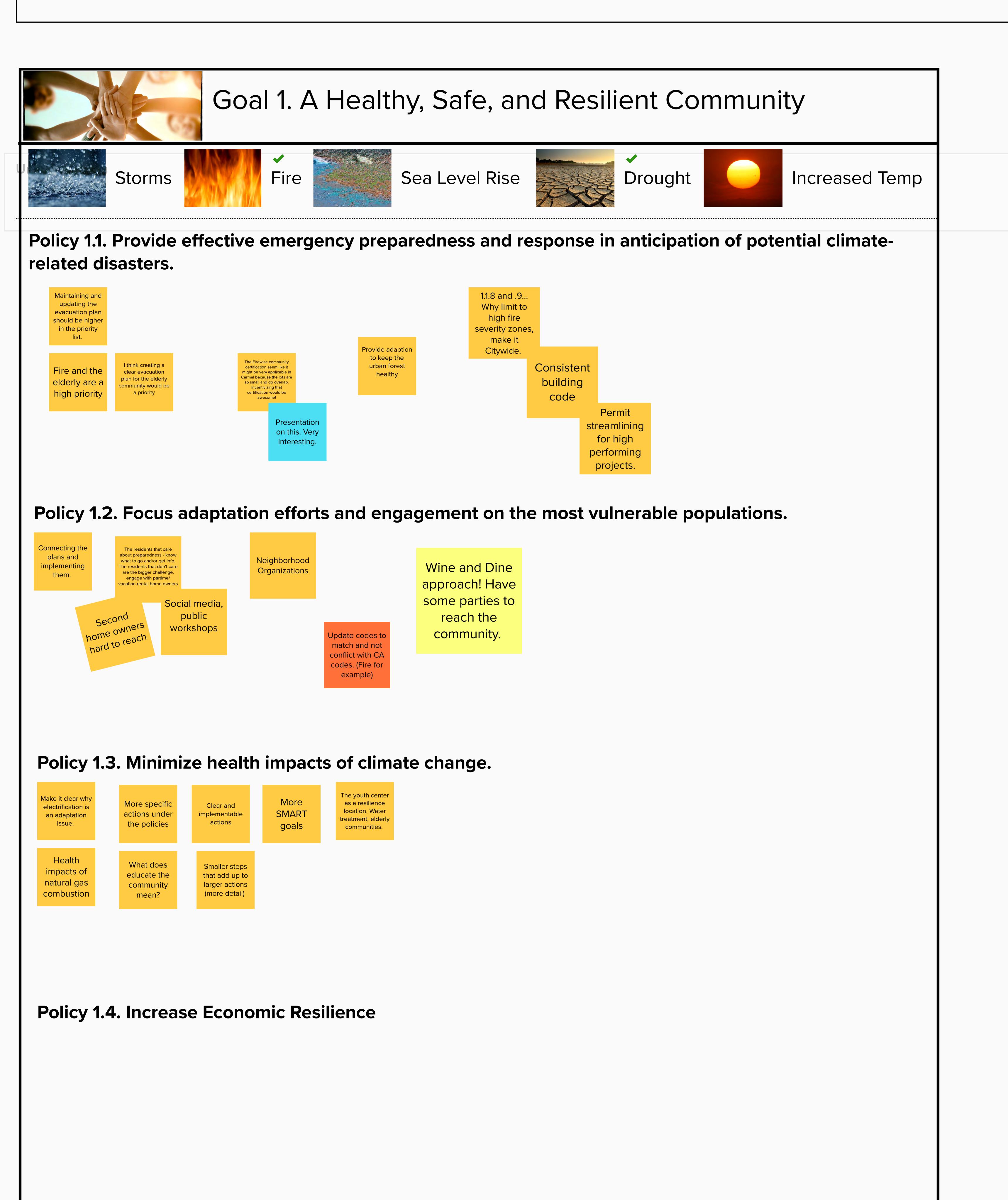


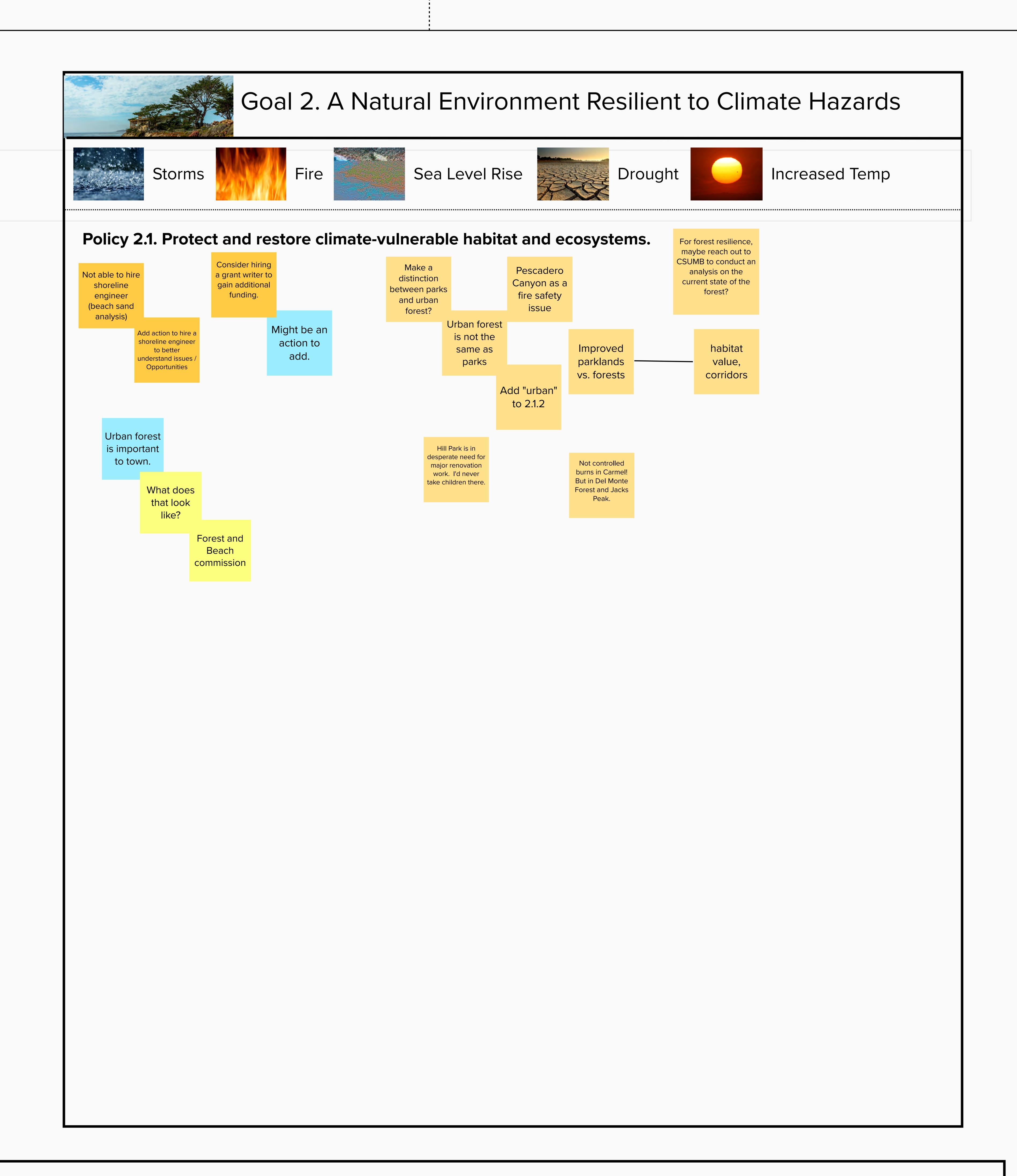
# Appendix C Outreach

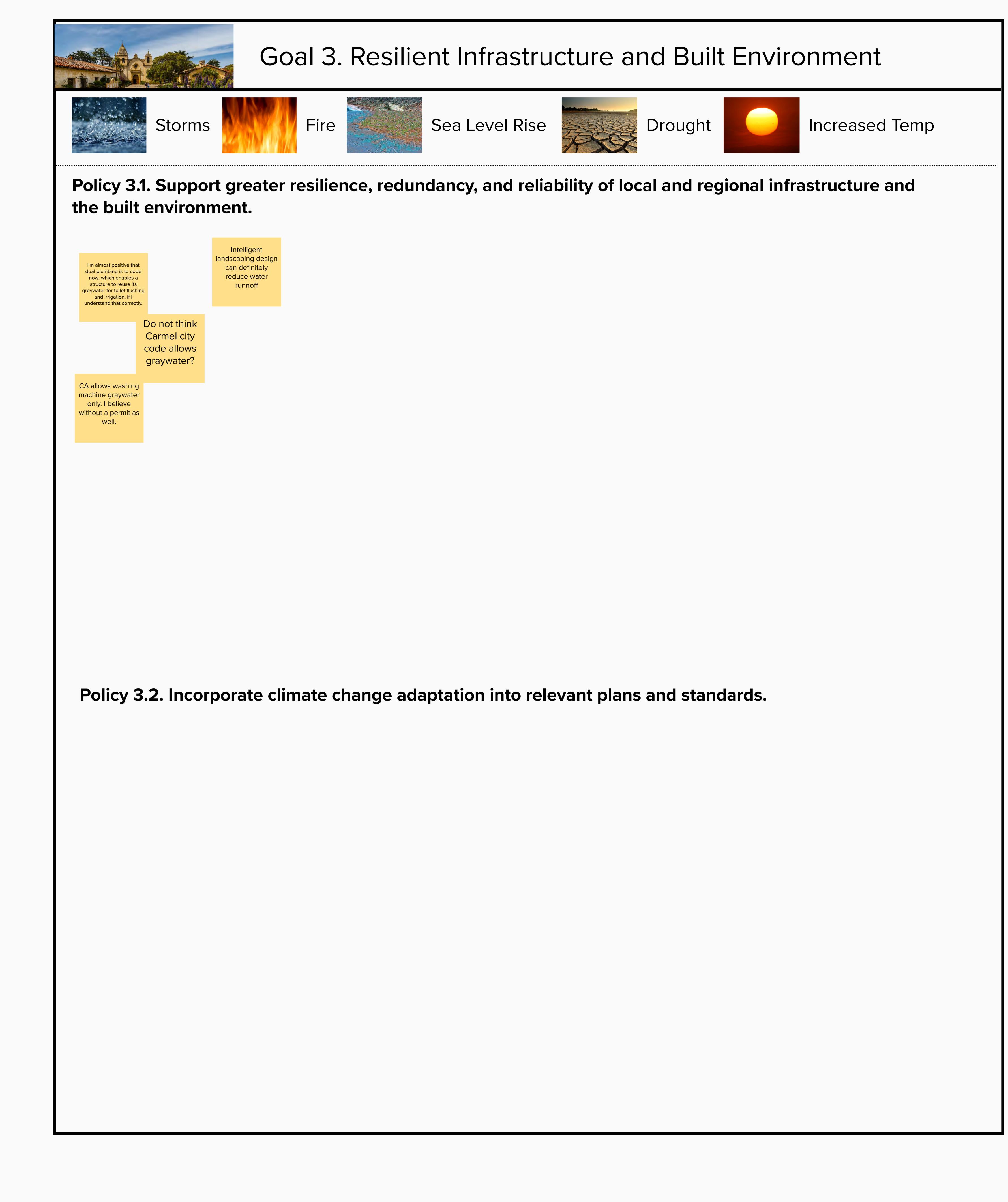
Interactive Activity Results from November 18, 2021, Public Workshop

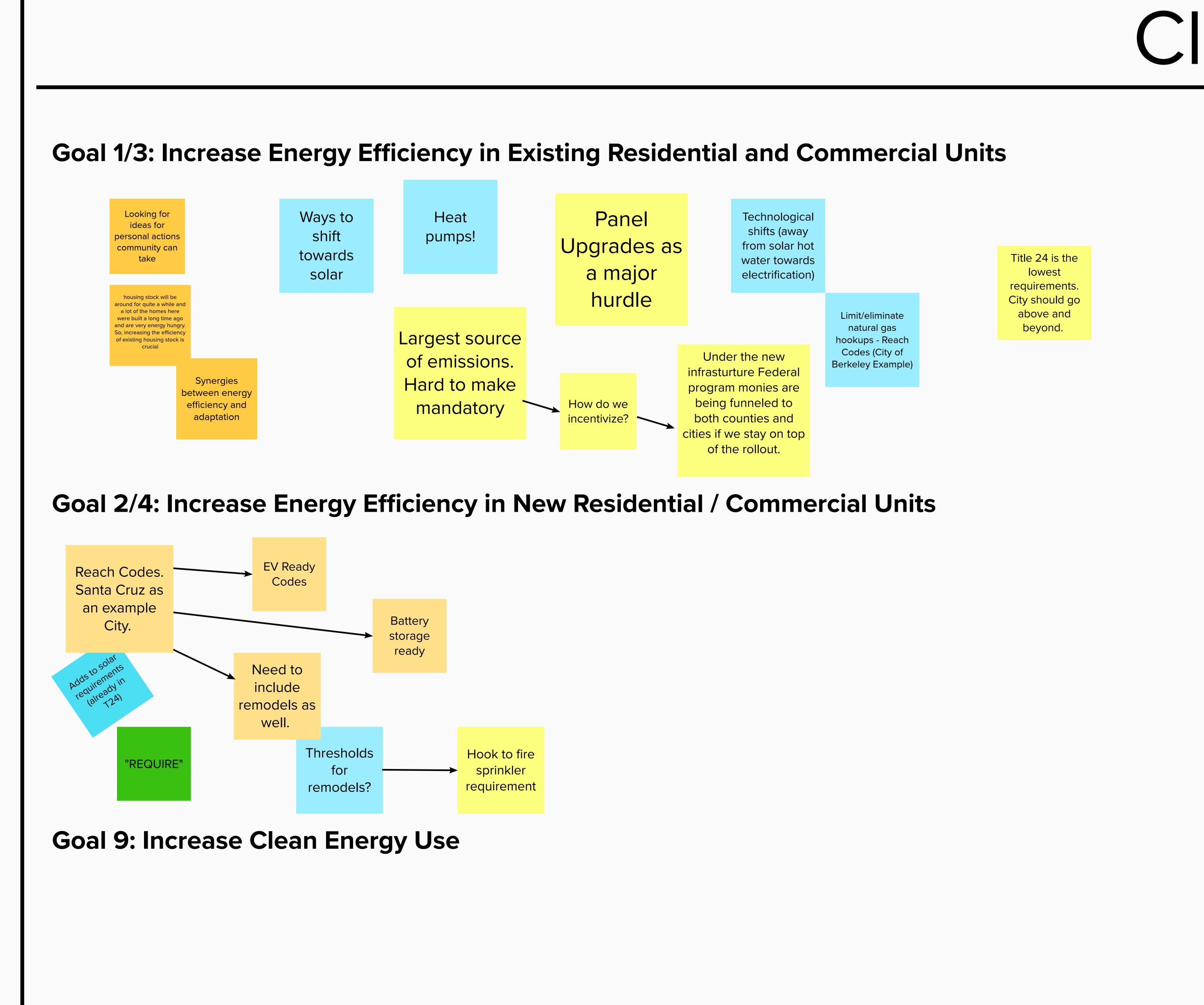


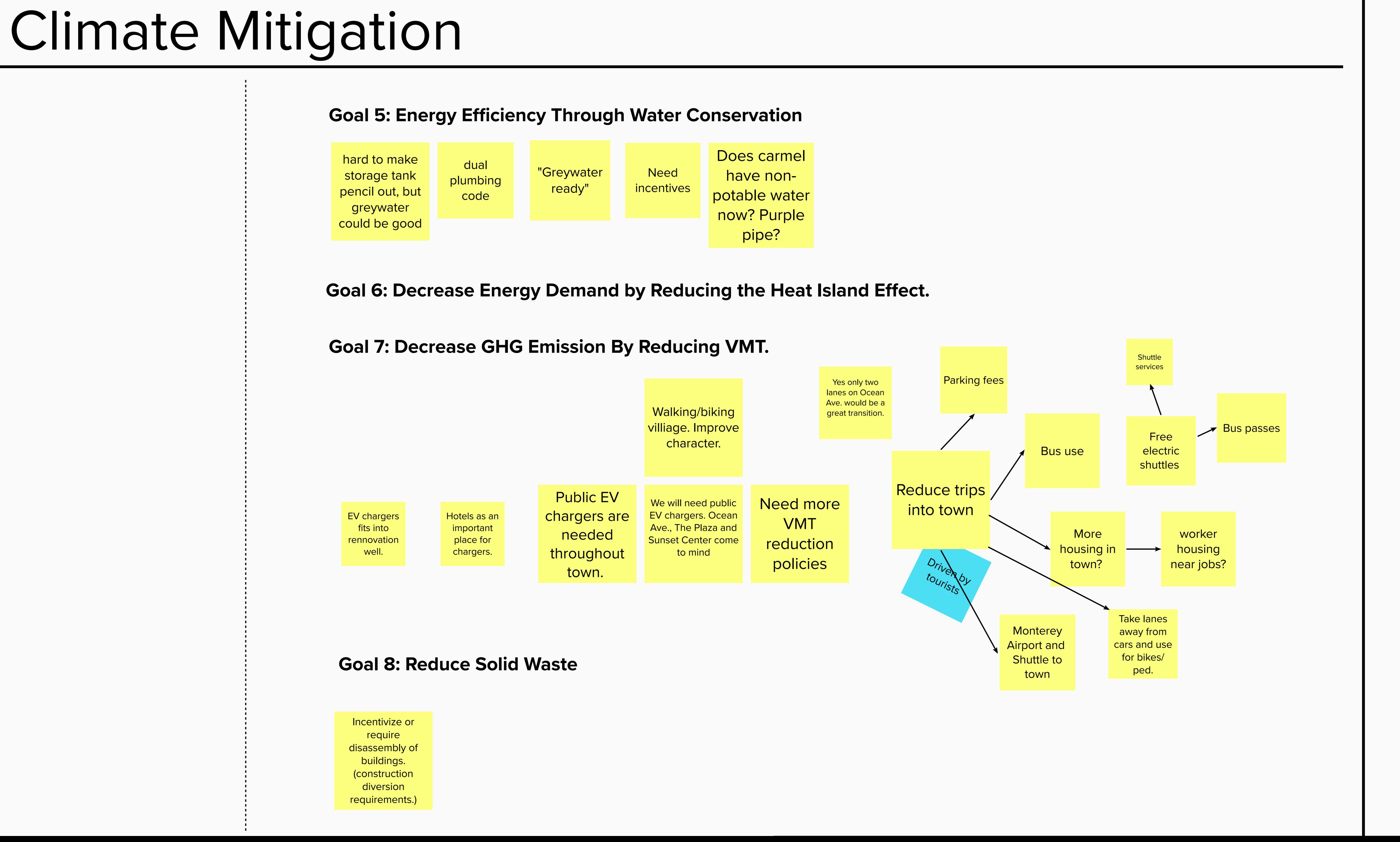




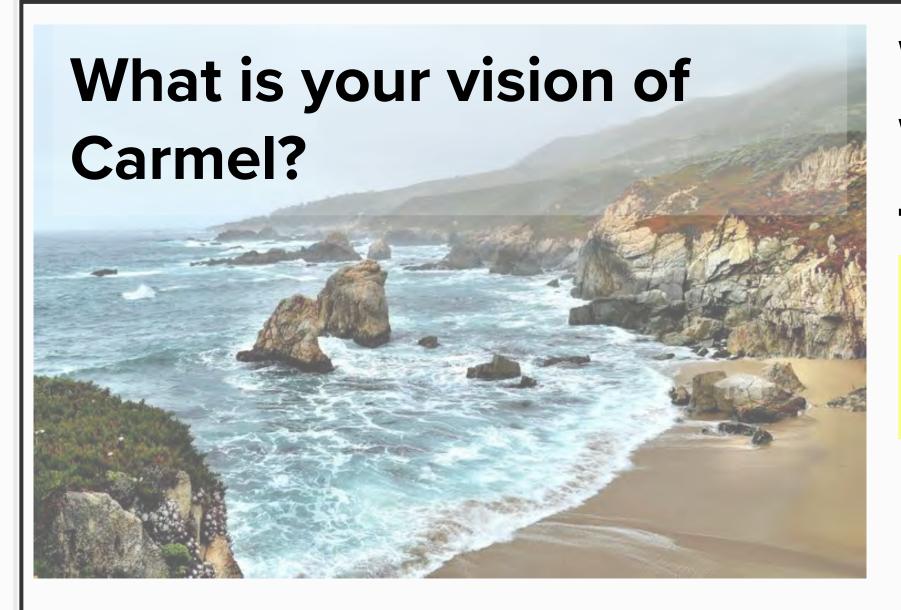








Unnamed area



What aspects of Carmel help the community's resilience? What actions have the city and constituents taken to reduce their impact and adapt to climate change?

Safety during weather events.

Equity/vulnerable community risk

Vision
associated
with each
asset

What are the top priorities around assets. What are the costs associated with them?

Non action is WAY more expensive



## Goal 1. A Healthy, Safe, and Resilient Community



Storms



Fire



Sea Level Rise

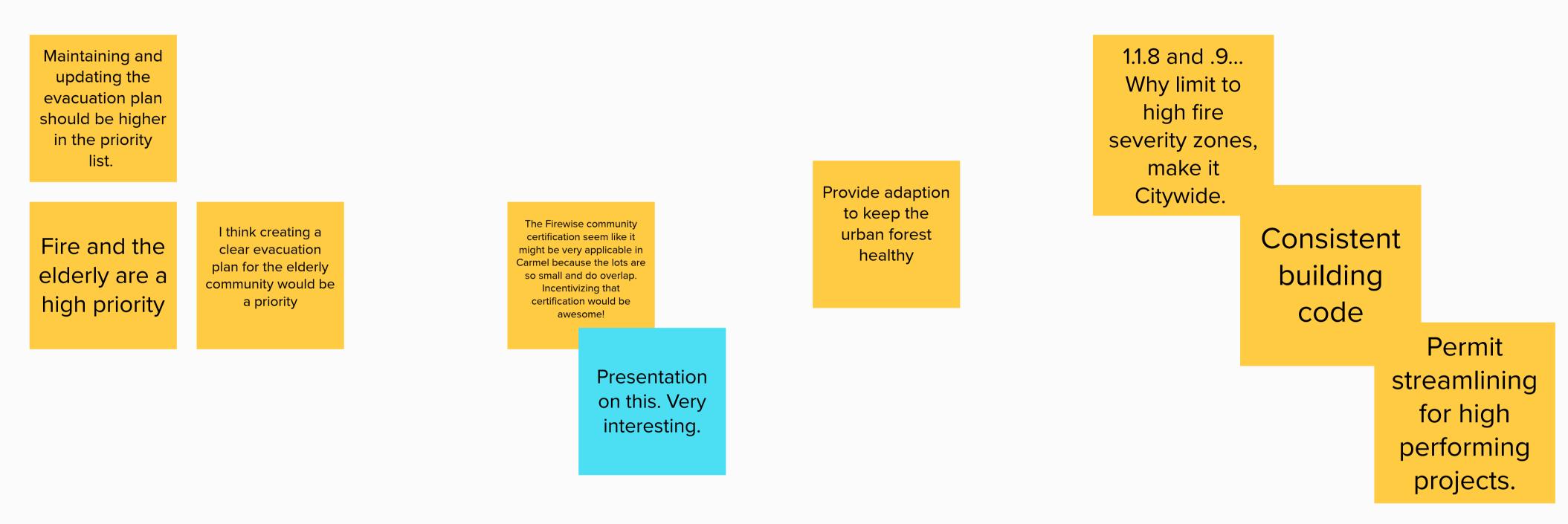


Drought



Increased Temp

## Policy 1.1. Provide effective emergency preparedness and response in anticipation of potential climaterelated disasters.



## Policy 1.2. Focus adaptation efforts and engagement on the most vulnerable populations.



## Policy 1.3. Minimize health impacts of climate change.

Make it clear why electrification is an adaptation issue.

More specific actions under the policies

Clear and implementable actions

More **SMART** goals

The youth center as a resilience location. Water treatment, elderly communities.

Health impacts of natural gas combustion

What does educate the community mean?

Smaller steps that add up to larger actions (more detail)

Urban forest

is not the

same as

parks

Hill Park is in

desperate need for

major renovation

work. I'd never

take children there.

Pescadero

Canyon as a

fire safety

issue

Add "urban"

to 2.1.2

Improved

parklands

vs. forests

Not controlled

burns in Carmel!

But in Del Monte

Forest and Jacks

Peak.

For forest resilience,

maybe reach out to

CSUMB to conduct an

analysis on the

current state of the

forest?

habitat

value,

corridors

Policy 2.1. Protect and restore climate-vulnerable habitat and ecosystems.

Make a

distinction

between parks

and urban

forest?

Consider hiring

a grant writer to

gain additional

funding.

Might be an

action to

add.

Not able to hire

shoreline

engineer

(beach sand

analysis)

Urban forest

is important

to town.

Add action to hire a

shoreline engineer

to better

understand issues

Opportunities

What does

that look

like?

Forest and

Beach

commission



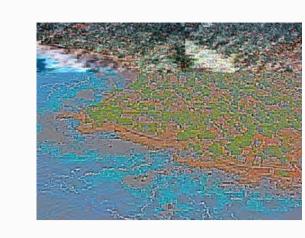
## Goal 3. Resilient Infrastructure and Built Environment



Storms



Fire



Sea Level Rise



Drought



Increased Temp

Policy 3.1. Support greater resilience, redundancy, and reliability of local and regional infrastructure and the built environment.

I'm almost positive that
dual plumbing is to code
now, which enables a
structure to reuse its
greywater for toilet flushing
and irrigation, if I
understand that correctly.

Intelligent
landscaping design
can definitely
reduce water
runnoff

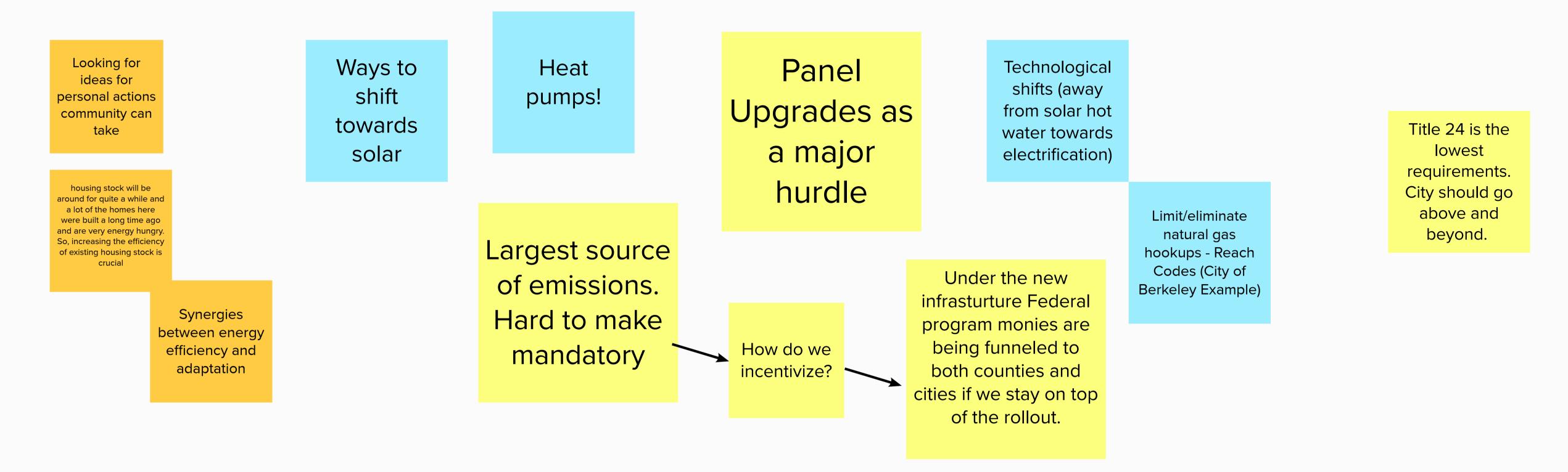
Do not think Carmel city code allows graywater?

CA allows washing machine graywater only. I believe without a permit as well.

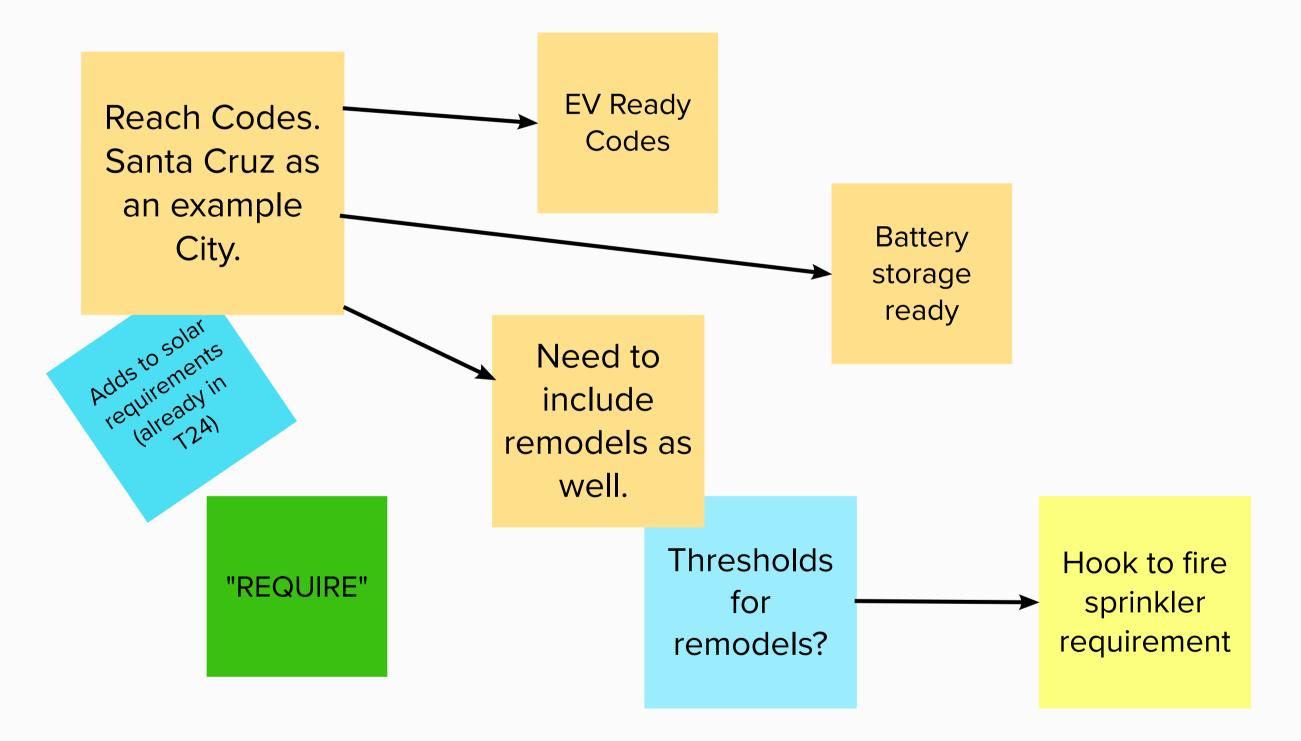
Policy 3.2. Incorporate climate change adaptation into relevant plans and standards.

# Climate Mitigation

Goal 1/3: Increase Energy Efficiency in Existing Residential and Commercial Units



Goal 2/4: Increase Energy Efficiency in New Residential / Commercial Units



Goal 9: Increase Clean Energy Use

### Goal 5: Energy Efficiency Through Water Conservation

hard to make storage tank plumbing code

"Greywater greywater could be good

"Greywater ready"

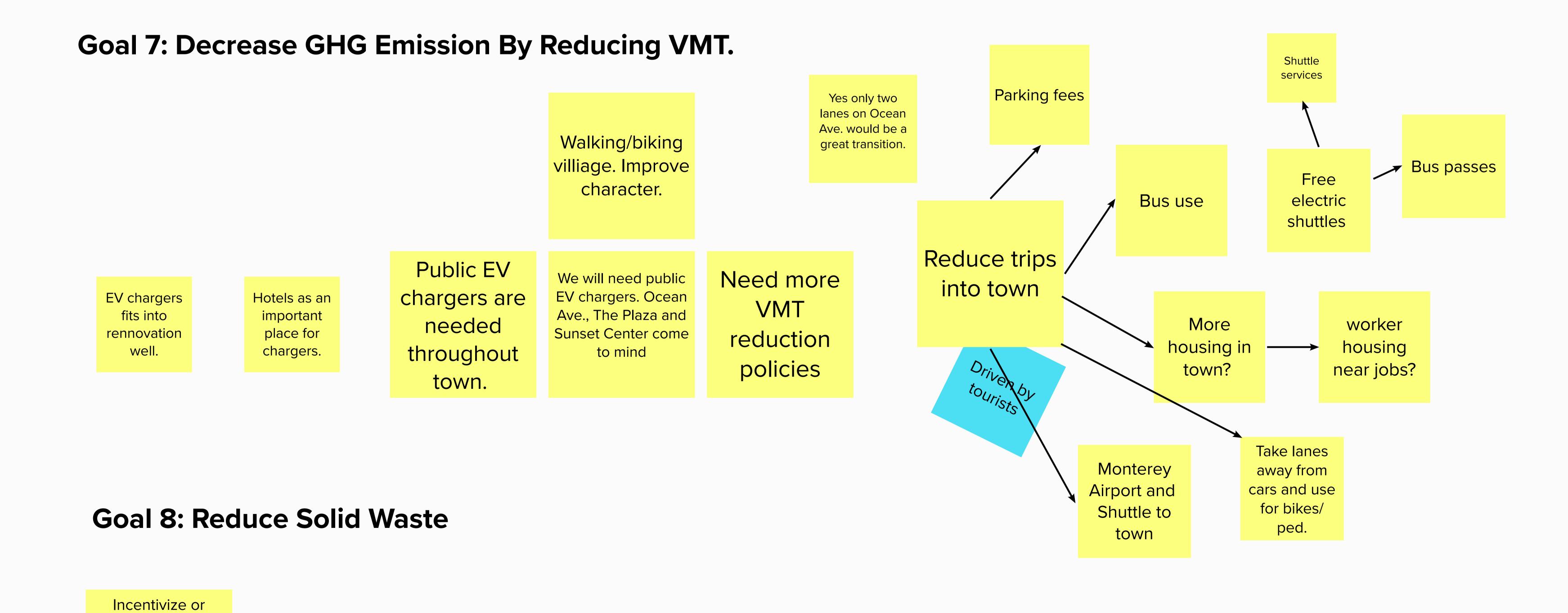
"Greywater ready"

"Need incentives

Need incentives

potable water now? Purple pipe?

Goal 6: Decrease Energy Demand by Reducing the Heat Island Effect.



# Appendix C Outreach

Presentation Slide Deck from January 20, 2022, Climate Committee Meeting





#### Agenda

- Progress to date
- Comments from 11/18/21 Public
   Workshop & how they were addressed
- Additions to the Adaptation Strategy
  - Timeframe, lead, costs
- Next Steps
- Questions/Discussion





#### Progress to Date

- Draft Adaptation Strategy developed (Aug)
- Updated Draft Adaptation Strategy based on Climate Committee comments (Sept/Oct)
- Revised Draft Adaptation Strategy shared at 11/18/21 public workshop
- Adaptation Strategy refined based on comments from public workshop
  - Timeframe, lead, and costs added to Adaptation Strategy





#### 11/18/2021 Public Workshop Comment Categories

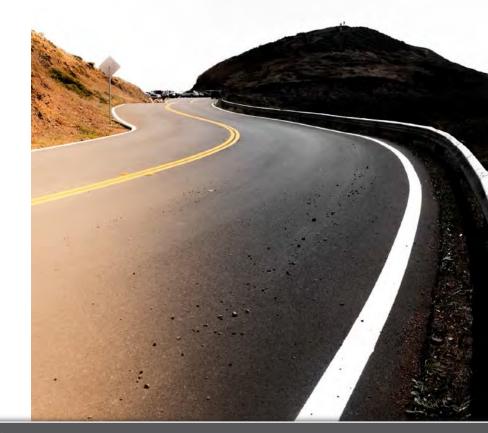
- Evacuation and senior residents
- Apply updated City Planning Guidelines and Development Standards citywide (not just in the VHFHSZ)
- Support for more partnerships in engagement efforts
- Need for a grant writer
- Desire for more specific actions
- Support for policies/actions already in place (e.g., evacuation, vulnerable communities, Firewise Community certification, and more)





#### **Evacuation and Senior Residents**

- A clear evacuation plan for seniors in the community was suggested.
- Action 1.1.1 revised:
  - Action 1.1.1. Maintain and Update Evacuation Plan. Maintain and update an Evacuation Plan every 8 years at a minimum to account for all types of emergencies. The plan should focus on the most vulnerable groups including the elderly community.





#### Planning Guidelines and Development Standards

- It was suggested that City Planning Guidelines and Development Standards apply citywide rather than only in the Very High Fire Hazard Severity Zone (VHFHSZ)
- Actions revised:
  - Action 1.1.8. Update City Planning Guidelines. Update the City's municipal code to maintain consistency with current California codes (California Building Code Chapter 7 and California Residential Code R337) throughout the City.
  - Action 1.1.9. Development Standards. Evaluate City's development standards for consistency with best practices for reducing wildfire risk for both new and existing development, including but not limited to incorporating defensible space design in landscaping guidelines.



#### More Partnerships for Engagement

- Many additional potential outreach partnerships and ideas for new outreach methods suggested.
- Examples of Actions revised:
  - Action 1.1.3. Collaborate with Monterey Fire. Collaborate with Monterey Fire on its inspection and outreach efforts to reduce fire risks. Continue to coordinate with the CERT program and reach out to new potential outreach partners such as local businesses, community groups, and utilities to help distribute information to increase resident and homeowner awareness and knowledge of how to prepare for emergencies.
  - Action 1.2.3. Engage the Community. Ensure the community knows about the
    resilience hub and how to access it by sharing updates across city and community
    channels. Partner with the CERT program and block captains, and community
    groups, to prioritize disadvantaged/marginalized communities including the elderly
    and individuals with disabilities.



#### **Grant Writer**

- Action added
  - Action 1.4.4. Hire a Grant
    Writer. Hire a grant writer to
    ensure implementation of the
    City's adaptation strategy.





#### Desire for More Specific Actions

- Actions are specific while still leaving room to refine based on new information received during the implementation process.
- Specific examples of potential projects will be included under select actions in the Carmel Climate Change Adaptation Plan.





#### Additions to the Adaptation Strategy

Timeframe	Potential Lead	Cost
Near-term (1-2		\$-Low (<\$50K); \$\$-
years); Mid-term (3-		Medium (\$50K -
5 years); Long-term		\$100K); \$\$\$-High
(5-10 years)		(>\$100K)
Near-term and		
Ongoing	Police & Fire	\$

10



#### Next Steps

- Prepare Adaptation Report January -February
- Share Adaptation Report with Climate Committee in March
- Present Adaptation Report to Commissions and City Council for feedback and approval April - May



# Thank you for your time!

Questions?





# Appendix C Outreach

Response to Comments Received From September 2021 to January 2022

Commenter	Comment	Response
Scott Lonergan	Reducing polluted runoff from going into the Bay (even if just in the form of investigation). Might be able to use Rio Park as	
	a settling pond to capture some urban runoff	Action 3.1.3. Reduce Stormwater Runoff. Reduce stormwater runoff through implementation of a stormwater diversion project to divert all dry weather flows and flist flush runoff to the large sanitary sewer that runs along San Antonio Avenue, such that they can be directed to the Wastewater District.
Scott Lonergan Scott Lonergan	Electrification, how will these be reconciled with CAP, maybe adaptation plan is not the place for these sorts of actions.  3.2.2. consider including traffic congestion/pedestrian (add here or create new item)	The electrification actions will remain in the list of potential adaptation strategies to share with the public, but it is noted that some Climate Committee Members would prefer to move these types of strategies to the Climate Action Plan.  Updated policy below to include investigation of congestion issues in the event of an evacuation. Additional evacuation policies added. More
		transportation (including active and public transportation) will be included in the Climate Action Plan.  Action 1.1.5. Evacuation Access. Investigate potential congestion issues in the event of an evacuation and develop and maintain a list of residents who may
		have difficulty execusting and provide execustion options for residents with mobility challenges.  Action 1.1.6. Evaluate Evacutation Route Capacity. Evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios and identify and implement mitigating actions.
		and implement imagening accounts.  Action 1.1.7. Evacuation Alternatives. Develop and employ evacuation alternatives and/or alternative emergency access routes in neighborhoods that have single ingress/segress.
Scott Lonergan	2.1.2. including planning AND maintenance	Added "maintenance" to action 2.1.2.  Action 2.1.2. Increase Forest Resilience. Update the Forest Management Plan to:
		1. Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the context of the expected climate of the second half of the century, reduce widtlife hazard, and that takes into account eathericts and the ecological benefits of natives or near-native (e.g. native species from the Southwestern US or Mexico would likely be preferred to European species).  2. Bicutoel pointing and maintenance guidelines to improve tree health, particularly in the public right-of-way  3. Bicorporate tree species that have greater drought and widdire resistance  4. Bi addition to drought-tolerant landscaping, include landscaping guidelines that reduce widdire hazard on private property.  5. Enhance cannon sequestration operations.
Linda Smith + Scott Lonergan	Suggest re-writing Action 2.1.2. Action 2.1.2. Increase Forest Resilience. Update the Forest Management Plan to:	Action 2.1.2. updated to reflected recommended changes.
	<ol> <li>Review and consider modifications to the preferred urbanized tree species that would result in improved resilence in the context of the expected clinate of the seconds red for the entury, reduce widlifier hearar, and that takes into account aesthetics and the ecological benefits of natives or near-native e.g. native species from the Southwestern US or Mexico would likely be preferred to European species.</li> <li>Include planting and maintenance guidelines to improve tree health particularly in the public right-of-way</li> <li>In addition to drought-folerant inadrosping, include landscaping guidelines that reduce widtfire hazard on private property.</li> <li>Enhance carbon sequestration potential</li> </ol>	Action 2.1.2. Increase Forest Resilience. Update the Forest Management Plan to:  1. Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics and the ecological benefits of natives or near-native (e.g. attained particularly in the process of the process of the process of the ecological benefits of natives or near-native (e.g. 2. Ideouted planting and maintenance guidelines to improve tree health, particularly in the public right-of-way  3. Ideocropract tree species that have greated rought and wildfire resistance  4. If addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.  5. Ethanica cathon sequestration potential
Salmeh Moghimi	Wood-burning smoke falls under the umbrella of supporting climate change and should be considered as it contributes to air nollution and GHG emissions	Action 1.3.6., shown below, is maintained in the list of potential adaptation strategies to address the health risk of wood-burning fire places.
	as possessoria un un un emissionis	Action 1.3.6. Electrify Fireplaces. Explore the feasibility of incentivizing electric fire places and induction ranges for existing and new development. Develop outreach materials explaining the health, environmental, and potential cost benefits of switching to electric fire places and induction ranges.
Jeff Baron	more likely to be the Planning commission, for one, and failing that, the city council, though the Forest and Beach commission does manage some (other) aspects of the environment. My fear is that if the climate committee begins to take	
	on items that are outside of our specific purview, it will begin to dilute the strength of the climate change message that we are endeavoring to deliver.	Action 1.3.6. Electrify Fireplaces. Explore the feasibility of incentivizing electric fire places and induction ranges for existing and new development. Develop outreach materials explaining the health, environmental, and potential cost benefits of switching to electric fire places and induction ranges.
John Hill	Action 1.1.7. add "neighborhoods within" before "Carmel-by-the-Sea	Recommended changes made to Action 1.1.7. (now 1.1.10.)  Action 1.1.10. Increase Resistance to Wildfire Structural Damage. Evaluate the feasibility of gaining Firewise Community Certification in neighborhoods within Carmel-by-the-Sea.
John Hill	Action 1.3.2.  Replacing cooling with "water heating and space heating" and heating with "cooling"	Recommended changes made to Action 1.3.2.  Action 1.3.2. Initiate a Heat Pump Retrofit Program. Create a program to aid homeowners in converting to heat pumps, which provide water heating and space heating in addition to cooling and can improve indoor air quality.
John Hill	Action 1.3.4. add "reducing or" before eliminating and words like "incentivize" instead of require. Softer language would be better.	Recommended changes made to Action 1.3.4.  Action 1.3.4. Oncount a reasibility study for Estising Building Electrification. Perform an electrification feasibility study/existing building analysis in order to understand the potential for, and associated costs of, electrification retrofitting, including heat pumps, on-site energy generation, and battery storage, in the City of Carmel-by-the-Sea and establish a plan for reducing or eliminating natural gas from existing buildings and building resilience to potential electrical grid shutoffs.
		Recommended changes made to Action 3.2.5 from "require" to "provide incentives" (this is the only action that included the term "require") (now 3.1.5.) Action 3.1.5. Retrofit Existing Critical Buildings and Related Infrastructure. Provide incentives to ensure that all first responder and municipal facilities are properly retrofited for existing and future climate change hazards including sea-level rise elated flooding and erosion, increased wind/storm events, an increase in high heat days, and/or wildfire depending upon location and risk factors.
John Hill	Action 1.3.6. add "and induction ranges" after electric fire places	Recommended changes made to Action 1.3.6.  Action 1.3.6. Electrify Fireplaces. Explore the feasibility of incentivizing electric fire places and induction ranges for existing and new development. Develop outreach materials explaining the health, environmental, and potential cost benefits of switching to electric fire places and induction ranges.
John Hill	Action 2.1.1 add "for downtown and" before in the Mission Trail	Recommended changes made to Action 2.1.5 made broader by saying designing projects in the city (rather than just downtown or Mission Trail), Action 2.1.5. Increase Resilience to Stronger Storms. When designing projects in the city, including those recommended in the Mission Trail Stream Stability Study, size improvements to handle larger storms consistent with best available climate change projections.
John Hill	Action 2.1.4. Reword second sentence to: "Coordinate with CAL FIRE, Carmel, and the Monterey Fire Departments to"	Recommended changes made to Action 2.1.3.  Action 2.1.3. Increase Resilience of the Mission Trail Nature Preserve. Update the Mission Trail Nature Preserve Master Plan to consider the potential impacts of climate change and to reduce widfire risk for neighboring private properties. Coordinate with CAL FIRE and the Monterey Fire Departments to incorporate Best Practices into an annual maintenance plan, including cost estimates for implementation and revenue sources for implementation.
John Hill	Action 3.1.1 (and maybe others) be clearer about whether we are talking about city owned buildings or all buildings (could provide incentives for residential and commercial buildings too.	Action 3.1.1. removed as it was reduntant with 1.3.3.
John Hill	3.1.2 and 3.1.4 are redundant - can combine	Policies 3.1.2. and 3.1.4. combined. Now 3.1.1.  Action 3.1.1. Underground Utilities in Fire Hazard Zones. Determine the feasibility of undergrounding power lines in the Mission Trail Nature Preserve and designated evacuation routes.
Jeff Baron Jeff Baron	Would like to see more details for each action. Concerns with banning gas fire places	More details not added to action list but can be provided for select measures in the report development phase. Electrification actions are kept in the list of potential adaptation strategies sheet, but it has been noted that some Climate Committee members prefer not
Jeff Baron	1.1.3. publicize evacuation routes, not evacuation plans, issues with publicizing plans because it all depends on the type of hazard/event what evacuation will be possible. Only 1 or 2 main way out, big issue here.	to include these types of actions in the adaptation report Recommended Changes made to Action 1.1.3. Political report Action 1.1.3. Publicize Local Evacuation Routes. Publicize both City and Monterey Country evacuation routes for the community, especially among the most vulnerable, in the event of a violifier or other disaster.  Action 1.1.4. Maintain and Update Evacuation Plan. Maintain and update an Evacuation Plan every 8 years at a minimum to account for all types of emergencies.
Jeff Baron	1.2 - more emphasis. Carmel foundation - serves the elderly	Evacuation concern addressed with new policy Action 1.1.5. Feacuation Access. Investigate potential congestion issues in the event of an evacuation and develop and maintain a list of residents who may have difficulty evacuating and provide evacuation options for residents with mobility challenges.  Action 1.1.6. Evaluate Evacuation Route Capacity, Evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios and identify and implement minigeting actions.  Action 1.1.7. Evacuation Alternatives. Develop and employ evacuation alternatives and/or alternative emergency access routes in neighborhoods that have single ingress/gergess.  Two new actions added to address vulnerable populations.
		Action 1.2.4. Social Support Network. Collaborate with the Carmel Foundation and other community-based organizations to develop an inventory of locations with isolated seniors and people with disabilities and develop a plan for a social support network to increase resilience to climate change.  Action 1.2.5. Back-up Power for Vulnerable Populations. Coordinate with 3CE, PG&E, and emergency management services to establish backup power and
Jeff Baron	Goal 3 issue with water and sewer system, make sure city takes an active role. The City has one seat on water board and	Action 1.2.5. Back-up Power for vulnerable repulsations. Locioninate with 3LL, Publ., and emergency management services to establish power and emergency grid authorism protected that protect the most vulnerable populations.  New action added related to wastewater treatment.
zen boton	ooal a state with water an a sewer system, mase stare city seads an active role. Ine Lity in as one seat on water board and wastewater district elector—use these better. Evaluate Carmel's own drought risk/SLR rather than relying on these larger districts (CAVID etc.) Call out relationships in the plan.	Action 3.1.9. Wastewater Treatment. Collaborate with the Carmel Area Wastewater District (CAWD) to increase the facility's resilience to sea level rise and stronger storms, and incentivize reduction of water use in the community and transitioning to reclaimed water use for irrigation. Maintain staff/council
Jeff Baron	Suggest moving Action 1.1.2, 1.1.5, 1.1.6, 1.1.7 (fire prevention strategies) to Goal 3, since Policy 1.1 says " following a climate-related disaster"	personnel as liaisons to CAWD.  Fire prevention actions are maintained under Goal 1 and Policy 1.1. because these are related to emergency preparedness as well as response following a disaster. See updated Policy 1.1. language below.
		Policy 1.1. Provide effective emergency preparedness and response in anticipation of potential climate-related disasters

Jeff Baron	Policy 1.3.4 belongs in the CAP, not this document (concern about access to enough power generation to be part of a micro grid. More education needed before taking it further—concerns about batteries as well.)	- The electrification actions will remain in the list of potential adaptation strategies to share with the public, but it is noted that some Climate Committee Members would prefer to move these types of strategies to the Climate Action Plan.
		Modified Action 1.3.7. to address resilience concerns regarding power generation.  Action 1.3.7. Identify Funding and Financing, Work with partners like 3CE and PG&E to identify and promote potential resilience opportunities and accessible funding and financing mechanisms to pay for home electrification, weatherization, and battery backups.
Jeff Baron	Policy 1.3.6 also does not belong in this document	The electrification actions will remain in the list of potential adaptation strategies to share with the public, but it is noted that some Climate Committee Members would prefer to move these types of strategies to the Climate Action Plan.
Jeff Baron	Policy 1.4-like this but it will be a sell-especially 1.4.1, and 1.4.2., and 1.4.3 (people that work in Carmel don't live in the City—needs more exploration of who is responsible—maybe not the City)	Noted, this could be a good policy to focus more discussion around in the plan, and it will be important to identify a lead (likely not the City).
Jeff Baron	Action 2.1.1 seems to refer to 2.1.4. Recommend keeping the policy unchanged, have the "overall funding action" first, and then three actions, one corresponding to MTNP, the urban forest, and the North Dunes. Consider adding one for the beach itself	Actions were reorganized as recommended. A new action for Carmel Beach was not created, but two actions (previously 3.2.9, and 3.2.11) regarding Carmel Beach were moved to this section.
	rsen	Action 2.1.6. Beach Sand Monitoring Program. Reinstate beach sand monitoring program described in the Shoreline Management Plan.
		Action 2.1.7. Carmel Cove Sand Supply. Reach out to local researchers (e.g., California State University Monterey Bay) or other sources to conduct Carmel Cove sand supply dynamics analysis.
Jeff Baron	Action 3.1.1. Encourage Energy Generation. Text seems to imply PV and other green systems, but that's biased towards green energy and implies discounting of generators, which probably have an important part in this action.	Action 3.1.1. removed as it was reduntant with 1.3.3.
Jeff Baron	Action 3.1.2 - Updating the GP is not strong enough. "allocating monetary resources" is stronger, and probably belongs in more policies than just this one. Money should be more prominent in the report, I think, as should policies that require more than a simple GP update. In general, actions 3.1.2, 3.1.3, and 3.1.4, should refer to the same "type of thing" (like	Action 3.1.2 updated to include feasibility study, which would include cost. Reference to GP updates removed because it is too specific (and there are many more updates that will be required). In addition, Action 2.1.1. is to increase adaptation funding.
	comment above about Action 2.1.1.) rather than being more	Action 3.1.1. Underground Utilities in Fire Hazard Zones. Determine the feasibility of undergrounding power lines in the Mission Trail Nature Preserve and designated evacuation routes.
		designate evacuation (via Action 2.1.1. Increase Funding for Climate Adaptation. Earmark Capital Improvement Program (DP) funding for design, permitting, and implementation of adaptation projects, including areas stability usudy projects. Include strategies in the 2021 Multi-arisdictional Hazard Mitigation Plan (MJHMP) and Integrated Regional Varieties Management Program (IWMMP) for potential regional funding.
Jeff Baron	Action 3.2.2. and 3.2.1 overlap. Both are good but overlap should be removed and actions more fleshed out.	Actions combined to eliminate overlap and a new action to reduce stormwater runoff was developed.
		Action 3.1.2. Increase Green infrastructure. Modify CIP project design and review approach to consistently evaluate the potential for green infrastructure to be incorporated in CIP projects in the public right-of-way and on public lands. Identify and develop a green infrastructure pilot project that will reduce runoff volume and capture and infiltrate stormwater, based on projected changes in precipitation amounts due to climate change, and incorporates tree and shrub planting to increase carbon sequestration in the city.
		Action 3.1.3. Reduce Stormwater Runoff. Reduce stormwater runoff through implementation of a stormwater diversion project to divert all dry weather flows and first flush runoff to the large sanitary sewer that runs along San Antonio Avenue, such that they can be directed to the Wastewater District.
Jeff Baron	Action 3.2.3. and 3.2.4. closely related, might be better to have one action related to the storm drain, with a few sentences underneath it.	Actions combined as recommended.
	uicemeati t.	Action 3.1.4. Storm Drain Repair Funding and Improvements. Earnack Capital Improvement Program (CIP) funding for design, permitting and implementation of storm drain repairs. Include strategies in the 2021 Multi-ursdictional Hazard Miligation Plan (MIHMP) for potential regional funding. Upsite Storm Drain Master Plan (Soft) improvements, especially when making repairs in the lower reaches of watersheds, to handle largest storms.
Jeff Baron	Action 3.2.9,3.2.10,3.2.1, and 3.2.12, aren't "infrastructure" though 3.2.10 and 3.2.12 might be. Recommend moving these to the natural environment section, with a nod to the revetments etc. in the section of "infrastructure"	Actions previously labeled 3.2.9 and 3.2.11 were moved to the natural environment section, the rest remain in the infrastructure section as they refer to coastal infrastructure.
Jeff Baron	Don't see anything related to CAWD. Nor to regional roads (possible evacuation routes) or to regional electrical infrastructure or to waste management. Should be added.	Actions related to CAWD, evacuation, and electrical infrastructure are included. Waste management actions should be included in the Climate Action Plan.
		Action 3.1.9. Wastewater Treatment. Collaborate with the Carmel Area Wastewater District (CAWD) to increase the facility's resilience to sea level rise and stronger storms, and incentivize reduction of water use in the community and transitioning to reclaimed water use for irrigation. Maintain staff/council personnel as liaisons to CAWD.  Action 1.1.5. Evacuation Access. Investigate potential congestion issues in the event of an evacuation and develop and maintain a list of residents who may have difficulty evacuating and provide evacuation options for residents with mobility challenges.
		Action 1.1.6. Evaluate Evacutaion Route Capacity. Evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios and identify and implement mitigating actions.
		Action 1.1.7. Evacuation Alternatives. Develop and employ evacuation alternatives and/or alternative emergency access routes in neighborhoods that have single ingress/egress.
		Action 3.1.1. Underground Utilities in Fire Hazard Zones. Determine the feasibility of undergrounding power lines in the Mission Trail Nature Preserve and designated evacuation routes.
Jeff Baron	Would prefer if the policies and actions and goals more closely resembled the vulnerability matrix - it would be easier to track from that document to this one.	The spreadsheet addresses all priority assets at risk identified in the vulnerability assessment (as described in the introduction tab of the adaptation strategy spreadsheet). At this stage, the policies, actions, and goals will not be reorganized given budget and timeline constraints, but can be organized differently for the report. To be discussed with the Committee.
LaNette	Big jump – who's doing what?	After the public workshop - a final list of adaptation actions will be developed and timeframe, lead agency/group, and cost will all be determined. The City will not be responsible for doing everything, but rather for coordinating with other agencies/groups.
LaNette	1.4.1 workers – service workers are a huge asset to the City – no discussion currently on the impacts of climate change on them. Chamber of Commerce can be very helpful here.	Chamber of Commerce added as potential lead for actions related to service workers (1.4.1., 1.4.2., 1.4.3.).
LaNette	1.2. more on vulnerable populations	Two new actions added to address vulnerable populations.
		Action 1.2.4. Social Support Network. Collaborate with the Carmel Foundation and other community-based organizations to develop an inventory of locations with isolated seniors and people with disabilities and develop a plan for a social support network to increase resilience to climate change.
		Action 1.2.5. Back-up Power for Vulnerable Populations. Coordinate with 3CE, PG&E, and emergency management services to establish backup power and emergency grid shutdown protocols that protect the most vulnerable populations.
Carrie	Resilience Hub (Youth Center?) Police Chief could be a good resource, this might be a continuum, rather than a new action.	Added the Youth Center to Action 1.2.1 (Establish a Resilience Hub).
Carrie	Incentivize rather than mandate	Mandate and require have been replaced with incentivize (Action 3.2.6.), and reduce was added to Action 1.3.4.
		Action 1.3.4. Conduct a Feasibility Study for Existing Building Electrification. Perform an electrification feasibility study/existing building analysis in order to understand the potential for, and associated costs of, electrification retrofitting, including heat pumps, on-site energy generation, and battery storage, in the City of Carmel-by-the-Sea and establish a plan for reducing or eliminating natural gas from existing buildings and building resilience to potential electrical grid shutoffs.
		Recommended changes made to Action 3.2.6 (now numbered 3.1.5.) from "require" to "provide incentives" (this is the only action that included the term "require")  Action 3.1.5. Retrofit Existing Critical Buildings and Related Infrastructure. Provide incentives to ensure that all first responder and municipal facilities are properly retrofitted for existing and future climate change hazards including sea-level rise related flooding and erosion, increased wind/storm events, an increase in high heat days, and/or wildfire depending upon location and risk factors.

Date Commenter	Mode	Policy Comment	Response
11/18/2021 Unknown	Workshop Mural	1.1 Maintaining and updating the evacuation plan should be higher in the priority list	Addressed. Moved to the top of the list.
11/18/2021 Unknown	Workshop Mural	1.1 Fire and the elderly are a high priority	General comment. No action required.
11/18/2021 Unknown	Workshop Mural	1.1 I think creating a clear evacuation plan for the elderly community would be a priority	Addressed by including more detail to Action 1.1.1:  Action 1.1.1. Maintain and Update Evacuation Plan. Maintain and update an Evacuation Plan every 8 years at a minimum to
			account for all types of emergencies. The plan should focus on the most vulnerable groups including the elderly community.
11/18/2021 Unknown	Workshop Mural	1.1 The Firewise community certification seem like it might be very applicable in Carmel because the lots are so	General comment. No action required, action 1.1.10 addresses exploring the feasibility of and gaining firewise community
		small and do overlap. Incentivizing that certification would be awesome!	certification.
11/18/2021 Unknown	Workshop Mural	1.1 Provide adaptation to keep the urban forest healthy	No action required. Adaptation to keep the urban forest healthy included:  Action 2.1.2. Increase Urban Forest Resilience. Update the Forest Management Plan to:
			1. Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the
			context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics and the ecological benefits of natives or near-native (e.g. native species from the Southwestern US or Mexico would likely be
			preferred to European species).
			2.Include planting and maintenance guidelines to improve tree health, particularly in the public right-of-way 3.Incorporate tree species that have greater drought and wildfire resistance
			4.Ih addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.
			5.Enhance carbon sequestration potential  Update of the Plan should include collaboration with stakeholders, such as the Monterey Pine Forest Watch and California State
			University, Monterey Bay.
11/18/2021 Unknown	Workshop Mural	1.1 1.1.8 and 1.1.9 why limit to high fire severity zones, make it citywide	Addressed. Updated to make the actions citywide.
			Action 1.1.8. Update City Planning Guidelines. Update the City's municipal code to maintain consistency with current California codes (California Building Code Chapter 7 and California Residential Code R337) throughout the City.
			Action 1.1.9. Development Standards. Evaluate City's development standards for consistency with best practices for reducing
			wildfire risk for both new and existing development, including but not limited to incorporating defensible space design in landscaping guidelines.
11/18/2021 Unknown	Workshop Mural	1.1 Consistent building code	General comment. No action required, action 1.1.9 addresses consistent codes.
11/18/2021 Unknown	Workshop Mural	1.1 Permit streamlining for high performing projects	This comment seems related to new construction - streamline permits for projects that meet GHG reduction/adaptation goals.
			Could be an option, but sometimes difficult to actually make permit process easier. Need to discuss feasbility with Planning.
11/18/2021 Unknown	Workshop Mural	1.2 Connecting the plans and implementing them	General comment. No action required. The City will ensure that plans are connected and implemented.
11/18/2021 Unknown	Workshop Mural	1.2 The residents that care about preparedness - know what to go and/or get info. The residents that don't care are	Addressed. Updated action below to include outreach to second home owners through community groups.
		the bigger challenge. engage with parttime/vacation rental home owners. Second home owners hard to reach. Social media, public workshops, home owner associations.	Action 1.1.3. Collaborate with Monterey Fire. Collaborate with Monterey Fire on its inspection and outreach efforts to reduce fire risks. Continue to coordinate with the CERT program and reach out to new potential outreach partners such as local
			businesses, community groups, and utilities to help distribute information to increase resident and homeowner awareness and
11/18/2021 Unknown	Workshop Mural	1.2 Neighborhood organizations (support for engagement)	knowledge of how to prepare for emergencies. Addressed. Updated action 1.2.3
			Action 1.2.3. Engage the Community. Ensure the community knows about the resilience hub and how to access it by sharing updates across city and community channels. Partner with the CERT program and block captains, and community groups, to
			updates across city and community channels. Partner with the CERT program and block captains, and community groups, to prioritize disadvantaged/marginalized communities including the elderly and individuals with disabilities.
44 40 (2024 11 1			
11/18/2021 Unknown 11/18/2021 Unknown	Workshop Mural Workshop Mural	<ul> <li>1.2 update codes to match and not conflict with CA codes (fire for example)</li> <li>1.2 Wine and Dine approach, have some parties to reach the communities.</li> </ul>	No action required. Action 1.1.9 addresses codes.  Addressed. Updated action below to include outreach with the support of restaurants and other community groups.
			Action 1.1.3. Collaborate with Monterey Fire. Collaborate with Monterey Fire on its inspection and outreach efforts to reduce
			fire risks. Coordinate with the CERT program, home owner associations, restaurants, and other community groups to help distribute information to increase resident and homeowner awareness and knowledge of how to prepare for emergencies.
11/18/2021 Unknown	Workshop Mural	1.3 Make it clear why electrification is an adaptation issue	No action needed. To be discussed in plan development (narrative).
11/18/2021 Unknown 11/18/2021 Unknown	Workshop Mural Workshop Mural	Health impacts of natural gas combustion     More specific actions under the policies	No action needed. To be discussed in plan development (narrative).  General comment. No action required. Actions are as specific as feasible while leaving room to refine based on new information
			during implementation. Examples will be added to the Adaptation Strategy Report.
11/18/2021 Unknown 11/18/2021 Unknown	Workshop Mural Workshop Mural	1.3 What does educate the community mean?     1.3 clear and implementable actions	Addressed. Changed to "Engage the Community."  General comment. No action required. The City will ensure the actions are clear and implementable.
11/18/2021 Unknown	Workshop Mural	1.3 Smaller steps that add up to larger actions (more detail)	General comment. No action required. Actions are as specific as feasible while leaving room to refine based on new information
11/18/2021 Unknown	Workshop Mural	1.3 More SMART goals	during implementation. Examples will be added to the Adaptation Strategy Report.  No action required. Actions are where the specifics come into play (not the goals). Measurable actions will include metrics and
			general time-frame will be added and included in the plan.
11/18/2021 Unknown	Workshop Mural	1.3 The youth center as a resilience location. Water treatment, elderly communities	No action needed. Youth center called out as resilience location in action 1.2.1. Water treatment addressed in action 3.1.9.  Elderly communities are addressed throughout actions under policy 1.1
11/18/2021 Unknown	Workshop Mural	2.1 Add action to hire a shoreline engineer to better understand issues/opportunities	Hiring a coastal engineer is addressed in the action below:
			Action 3.1.8. Hire Coastal Engineer. Hire coastal engineer with experience in planning for climate change to conduct:  1. Conduct research and prepare a Sea-Level Rise Vulnerability Study to further assess the risks to the city's coastal assets,
			including the beach, sea walls, revetments, bluffs, stairs and access, public bathrooms, parking areas, drainage infrastructure,
			and utilities.  2. Determine adaptation measures and Local Coastal Program policy options, including but not limited to:. a) Mostly natural,
			unarmored North Dunes area; b) mostly armored bluffs along Scenic Roach south of 8th Avenue; c) Unarmored dunes along
			private property between 8th Avenue and Del Mar Parking Lot; d) Armored private properties on the bluffs at the north end of the City (Pescadero Canyon area).
			<ol><li>Evaluate feasibility and phasing, the use of thresholds for when different elements of these strategies are implement. For example, maintaining armory or other defenses up to a point, but then if a threshold is reached, embracing a new bluff line and</li></ol>
			different adaptive measure. Consider applying an adaptive pathways approach which establishes trigger thresholds for different
			adaptive measures based on the severity of the impact from flooding and erosion associated with sea-level rise.
11/18/2021 Unknown	Workshop Mural	2.1 Consider hiring a grant writer to gain additional funding (potential new action)	Addressed. Added the following action:  Action 1.4.4. Hire a Grant Writer. Hire a grant writer to ensure implementation of the City's adaptation strategy.
11/18/2021 Unknown	Workshop Mural	2.1 Make a distinction between parks and urban forest? Urban forest is not the same as parks. Add "urban" to 2.1.2	Addroccod Addod "urban"
11/16/2021 UNKNOWN	workshop Mural	2.1 make a distribution between parks and urban forest? Orban forest is not the same as parks. Add "urban" to 2.1.2	Action 2.1.2. Increase Urban Forest Resilience. Update the Forest Management Plan to:
			1. Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the
			context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics and the ecological benefits of natives or near-native (e.g. native species from the Southwestern US or Mexico would likely be
			preferred to European species).  2. Include planting and maintenance guidelines to improve tree health, particularly in the public right-of-way
			3. Incorporate tree species that have greater drought and wildfire resistance
			4 Ih addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property. 5 Enhance carbon sequestration potential
			Update of the Plan should include collaboration with stakeholders, such as the Monterey Pine Forest Watch and California State
			University, Monterey Bay.
11/18/2021 Unknown	Workshop Mural	2.1 Pescadero Canyon as a fire safety issue	General comment. No action needed. To be considered in narrative/implementation of the plan. This has been discussed at
11/18/2021 Unknown	Workshop Mural	2.1 Improved parklands vs. forests - habitat value, corridors	length and fire fuel reduction is already being conducted in the canyon to the extent feasible.  No update needed. Addressed in actions 2.1.1. and 2.1.7.
11/18/2021 Unknown	Workshop Mural	2.1 For forest resilience, maybe reach out to CSUMB to conduct an analysis on the current state of the forest	Added CSUMB as potential collaborators:
			Action 2.1.2. Increase Urban Forest Resilience. Update the Forest Management Plan to:  1. Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the
			context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics
			and the ecological benefits of natives or near-native (e.g. native species from the Southwestern US or Mexico would likely be preferred to European species).
			2.Include planting and maintenance guidelines to improve tree health, particularly in the public right-of-way
			3. Incorporate tree species that have greater drought and wildfire resistance 4. In addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.
			5.Enhance carbon sequestration potential
			Update of the Plan should include collaboration with stakeholders, such as the Monterey Pine Forest Watch and California State University, Monterey Bay.
11/18/2021 Unknown	Workshop Mural	2.1 Urban forest is important to town. What does that look like? Forest and beach commission	Urban forest addressed in action below:
11/10/2021 UHKHOWN	workshop Murai	or poil forest is important to town. What does that look like? Forest and beach commission	Action 2.1.2. Increase Urban Forest Resilience. Update the Forest Management Plan to:
			<ol> <li>Review and consider modifications to the preferred urbanized tree species that would result in improved resilience in the context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics</li> </ol>
			and the ecological benefits of natives or near-native (e.g. native species from the Southwestern US or Mexico would likely be
			preferred to European species).
			<ol> <li>Include planting and maintenance guidelines to improve tree health, particularly in the public right-of-way</li> <li>Incorporate tree species that have greater drought and wildfire resistance</li> </ol>
			4.fn addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.  5.Enhance carbon sequestration potential
			$Update\ of\ the\ Plan\ should\ include\ collaboration\ with\ stakeholders,\ such\ as\ the\ Monterey\ Pine\ Forest\ Watch\ and\ California\ State$
			University, Monterey Bay.
11/18/2021 Unknown	Workshop Mural	2.1 Hill Park is in desperate need for major renovation work. I'd never take children there	No action necessary. Though Forest Hill Park could use renovation - it is not directly connected to adaptation.
11/18/2021 Unknown	Workshop Mural	2.1 No controlled burns in Carmel! But in Del Monte Forest and Jacks Peak.	General comment. No action required (the strategy does not mention controlled burns in the City.

11/18/2021 Unknown	Workshop Mural 3	flushing and irrigation, if I understand that correctly.  Do not think Carmel City code allows graywater.  CA allows washing machine graywater only. I believe without a permit as well.	Dual plumbing is a voluntary measure for non-residential uses when non-potable water is available. Greywater for washing machines is also allowed as a voluntary measure for residential. Both included in Callgreen (CA Building Code). The City code is silent on greywater.
9/23/2021 Jili Petker	Email	Intelligent landscaping design can definitely reduce water runoff  1.16. Defensible Space: I think we should get serious about this. No one is going to be able to have 100 feet of defensible space — there would be almost no trees in the city. But certainly within the first 5 or maybe 20 feet, I think we should get homeowners remove trees even if they don't meet the current size criteria. I wouldn't go so far as to require the removal of plants within the first 5-20 feet, but I don't think the city should stop anyone who wants to. This is related to 2.12, point 4.  1.3.4 Building Electrification: Just curious, why is it important to remove natural gas from buildings? 8 this seen as a first heard, or it is his just a recognition that eventually there may be no more natural gas supplies (at least without fracking, which i'm wehemently opposed to).  3.1.2 Resilience of Utilities: I'm outs we hast hist strategy means.  3.2 Green Infrastructure: How do we reconcile planting more trees and shrubs with wildfire risk?  7.1.2 I'm glad to see rain capture, gray water recycling, and what think is valene-premable surfacing on the list. I'm also glad to see solar energy on the list, but why just for city buildings? Should we facilitate solar energy for private buildings? I haven't tried, so I don't know how difficult it is to get approval for solar panels.	Defensible space will be addressed as part of the plan implementation. Specifically, the action below addresses incorporating defensible space design in landscaping guidelines.  Action 1.1.9 Development Standards. Evaluate City's development standards for consistency with best practices for reducing wildfire risk for both new and existing development, including but not limited to incorporating defensible space design in landscaping guidelines.  Electrification - this was discussed in the meeting and will be addressed in the adaptation strategy narrative. Heat pump water heaters can use electricity from rooftop or community solar to heat water and store it for over 2A hours, while modern gas water heaters (equired by A building code in new homes with gas / require electricity to pereit, as well as a functioning gas system, and will not work during gas or eletric outages. Heat pumps offer the most efficient heating and cooling systems, in one, which gas furnaces can't offer (it is also more expensive to have two seapres systems (heating) exclusing in one, which gas furnaces can't offer (it is also more expensive to have two seapres systems). The standard of one. Induction cooking also helps in heat waves as it does not heat up the whole room/house, but only the bottom of the pot/pan directly using magnet; for falmens). This is twice as efficient as gas. Storms and other manifestations of cliamte change are expected to be catastrophic to California's gas infrastructure. The gas system take 30 times longer to restore than the electric system after natural disasters. (https://www.sierraclub.org/articles/2019/10/electrification-for-climate-resiliency)  3.1.2. Updated the wording slightly to increase carity  Action 3.1.2. Increase Green Infrastructure to be incorporated in CiP projects in the public right of-way and on public lands. Identify and develop a green infrastructure to the incorporated in CiP projects in the public right of-way and on public lands. Identify and develop a green infrastructure to the incorpora
9/23/2021 Fran Vardamis	CRA meeting	Wouldn't burying the electric lines be a big step in avoiding fires and blackouts during inevitable climate-change disasters. An urban forest with electric/communication wires strung among the vulnerable trees is a recipe for eventual disaster, both from downed lines sparking and from blackouts. Buried wires is something the city can	context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics No action required. Undergrounding utilities is included in action 3.1.1
9/23/2021 Nancy Twomey	CRA meeting	and should do  What about addressing water quality and litter as part of storm drain upgrades?	No action required. Water quality and trash capture are already addressed in the City's stormwater program and ASBS requirements. Projects to reduce stormwater quality impacts are in the City's Storm Drain Master Plan.
9/23/2021 9/23/2021 Wanda Vollmer 9/23/2021 Susan Bjerre	CRA meeting CRA meeting CRA meeting	Support for burying power lines and wondering how feasible it is.  Regarding the power lines, Ivolunteer San Carlos street as test street. :)  Does PG&E have any motivation to contribute to the cost of burying power lines?	No action required. Undergrounding utilities is included in action 3.1.1, where feasibility will be explored No action required. Undergrounding utilities is included in action 3.1.1 No action required. Undergrounding utilities is included in action 3.1.1, where feasibility (including potential funding) will be
9/23/2021	CRA meeting	Might the City conduct a survey of Carmel homeowners to gauge interest in burying power lines?	explored. Yes, PG&E does have motivation to underground utilities.  Addressed. Action 3.1.1 updated:  Action 3.1.1. Underground Utilities in Fire Hazard Zones. Determine the feasibility of, and community support for, undergrounding power lines in the Mission Trail Nature Preserve and designated evacuation routes.
9/24/2021 Salmeh Moghimi	Email	Dear Jeff,  Thanks again for this environmental gathering and discussing the issues that are so relevant to climate change and our town. I am however confused that regulating wood-burning smoke does not fall under this umbrella of supporting climate change. I believe the pollution from the smoke that gets into our atmosphere in town especially when we have these deveating first that are also cranting make is an environmental issue. Also the fact that Corid is a respiratory disease, cleaner air is better for everyone. We all know wood-burning smoke is toxic and that's been already addressed. So when we speak about adapting and changing our ways, feel it starts with things we as individual Carmel residents can do too. Carmel's landscape of homes are very close to one another for this kind of activity to be left without any kind of regulation. Being part of the environmental committee, I hope you consider this.  You we're kind enough to mention that I can raise this concern to another panel of people. Can you please let me know who they are.	No action required. Wood burning smoke/natural gas issues addressed in action $13.4$ and $13.6$ .
10/15/2021 Michael DeLapa	Email	If Carmel is similar to other cities in Monterey County whose greenhouse gas inventories we've examined — and of course we would need to look a lot closer at Carmel's actual data to know for sure — the City's three most important climate mitigation strategies are:  1) Transportation policies that facilitate transition from gas cars to EVs;  2) Building policies that facilitate transition from natural gas to electric (appliances, heating, etc.) in both commercial and residential buildings.  3) Land use policies that support infill, upzoning, and mixed use to facilitate walking, biking, and public transportation fluxes).	No action required. This is a mitigation comment.
11/15/2021 Georgina Armstrong	Email	I'm particularly pleased that the bluffs are now getting the attention they deserve. Lixed to say that, while many of the non-porfists were "Firstends of me or no-Friends of the Bluffs" for obvious reasons: the hazard is too great for resident volunteers. The bluffs are the workhorses of shoreline protection, and Carmel depends upon their resiliency in the era of climate change.  I'm glad that the suggestion is for the Forest and Shoreline Management Plans to be updated, and I hope that new plans become better integrated into the day-to-day operations of the City than the first emanations. I know that Mayor Potter believes that too much money is spent on studies that end up collecting dust on shelves, but if they are incorporated into the everyday structure of staff responsibilities, they can make a difference in future outcomes. They can also save the City a lot of money, sine getting it right today is much cheaper than paying to get it done tomorrow. I remember being impressed with now the Santa Cruz Climate Action Plan was woven into everything that every department brought to the City Council or to the commissions in their department reports and recommendations which made the likelihood of success much higher. I know that grant applications are enerous when the City is short-staffed, but it seems that it will be crucial that funding sources be identified and used if the huge price tag on protecting Carmel from climate change vulnerabilities to be achieved. In looking at creating defensible space which is probably the greatest challenge of all in Carmel where roots come within 3° to 5° of touching, and buildings are about 10-15° apart, I think that accessing the big pockets of the Grinst Cleaninghouse's defensible space deficilly studge is always so tight and staffing so limited. With an ignition zone of 5° being a real issue in Carmel in keeping an adequate clearance around buildings, the 30′ defense one is daunting. There are, of course, so many residents who have decked and stafris that are attached to th	
11/22/2021 Nikki Nedeff	Email	My only suggestion about the proposed update to the Forest Management Plan is to recommend that substitute species not have to potential to invade into Montreey Pine Forest habitat. For example, in an effort to plant what seemed like a good idea at the time, Torrey pines were planted by Caltrana lang Highway 1 in Marina, and also at Rancho Canada golf course years ago. Torrey pines are now aggressively colonizing rare Maritime Chaparral habitat in Marina and have jumped Carmel Valley Road and are invading the native pine forest below Jacks Peak. Who knew this would be a problem? I	No action required. This is more of an implementation comment (very detailed). See row below for details on inclusion of explicit collaboration with stakeholder groups such as MPFW during update of the Forest Management Plan.
11/18/2021 Joyce Stevens	Email	Mr. Chairman and Members of the City of Carmel by the Sea Climate Committee: I'm Joye Stevens, a founding member and past president of Monterey Pine Forest Watch. Our group came together in 1992 in order to facilitate better understanding of our beautiful native Monterey Pine Forest, in the face of increasing threats from development. Not only does not local forest give the Perinsula its fundamental character, but it has long been of interest to a worldwide industry of forest give the Perinsula its fundamental character, but it has long been of interest to a worldwide industry of forest products besed on Monterey Pine, as it serves as the most important genetic responstory for this industry. It is serves as the most important genetic responstory for this industry. It is good to be considered to the control of the coast of Baja California. Our forest is the oldest of the coast of California and 20 into small islands of the coast of Baja California. Our forest is the oldest of the California stands. It is the largest and also the most impacted by human activity. In concert with the California stands. It is the largest and also the most impacted by human activity. In concert with the California stands. It is the largest and also the most impacted by human activity, in concert with the California stands. It is the Peninsula forest and put on two symposia to highlight its findings and to take a look at the threat of pitch nather and it's implication for the native forest have been blessedly inconsequential.  As the Climate Committee and Carmel authorities grapple with the threat of Climate Change on Carmel and its urbanized Monterey Pine forest, who pery our will include our group and use it as a resource. Carmel's forest is in special category, as Carmel was the only municipality locally to embrace it at its inception. In fact its visionary founders and residents were intertup non preserving it and living in harmony with the beautiful forest. And Carmel can play an important role in safeguarding the local native fo	

#### City of Carmel-by-the-Sea Potential Adaptation Strategies

#### Background

Carmel-by-the-Sea (City) is currently experiencing, and will continue to experience, climate change impacts, including stronger storms, increased wildfire risk, sea level rise, extended drought conditions, and increased temperature. The City developed a Climate Adaptation Plan to increase resilience of the community and assets in Carmel-by-the-Sea. In September 2019, a Climate Committee was convened to develop and guide the preparation of the Climate Adaptation Plan. The City published a Climate Change Vulnerability Assessment in July 2021. The Vulnerability Assessment characterizes climate hazards that will impact the community and City-owned assets, describes the community's major climate vulnerabilities, and identifies work that has already been done by the City to improve resilience.

This workbook provides the City's Climate Adatpation Goals, Policies and Actions to take to improve the resilience of its community members, natural environment, infrastructure and built environment. The adaptation goals, policies, and actions were developed to address all priority assets at risk in the City's Vulnerability Assessment. The **All Goals, Policies & Actions** tab shows all adaptation goals, policies and actions developed. The **Near-Term, Mid-Term**, and **Long-Term** tabs provides actions to be completed in the near term, mid-term, and long-term, respectively (organized by goal and policy) to support implementation.

#### Definitions

Goals: Broad statements describing community desires. The Carmel-by-the-Sea adaptation goals are modeled after the Adaptation Vision and Principles developed by the California Governor's Office of Planning and Research (OPR) Integrated Climate Adaptation & Resiliency Program (ICARP). Each goal is focused on increasing the resilience of one of the following broad asset categories: community, natural assets, and infrastructure and the built environment.

Policies: Specific position statements that support the achievement of goals and serve as guides to City Council, Planning Commission, and city staff, when making decisions.

Actions: Specific methods to implement and achieve policies and goals.

## Appendix D Implementation Tracking Tool

#### City of Carmel-by-the-Sea Potential Adaptation Strategies

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### City of Carmel-by-the-Sea Adaptation Strategies

Goal/Policy/Action  Goal 1. A Healthy, Safe, and Resilient Community	Climate Hazard	Asset	Metric	Timeframe	Implementation Lead	Cost	Source
Gool 1. A Healthy, Safe, and Resilient Community  Policy 1.1. Provide effective emergency preparedness and response in anticipation of potential climate-related disasters				Near-term (1-2 years); Mid-term (3-5 years); Long-term (5- 10 years)		\$-Low (<\$50K); \$\$- Medium (\$50K - \$100K); \$\$\$-High (>\$100K)	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
Action 1.1.1. Maintain and Update Evacuation Plan. Maintain and update an Evacuation Plan every 8 years at a minimum to account or all types of emergencies. The plan should focus on the most vulnerable groups including the elderly community and persons with isabilities.	Ali	Elderly Population and People with Disabilities, Residents, Service Industry Workers	Evacuation Plan updated every 8 years, with the first update by 2023	Near-term (by 2024) and Ongoing	Police & Fire	\$	Suggested by Climate Committee Members
Action 1.1.2. Update Emergency Preparedness. Incorporate climate change risk and impact considerations into Carmel-by-the-Sea ERFT programming and materials to promote emergency preparedness at a neighborhood block-by-block scale. CERT to promote block-by-block scale emergency preparedness by organizing City by blocks and recruiting Block Captains.	All	Residents, Local Businesses, Second Homes	Number of block captains formed, climate change risk incorporated into	Near-term (by 2024)	Police & Fire	\$	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions
Action 1.1.3. Collaborate with Monterey Fire. Collaborate with Monterey Fire on its inspection and outreach efforts to reduce fire risks. Continue to coordinate with the CERT program and reach out to new potential outreach partners such as local businesses, community groups, and utilities to help distribute information to increase resident and homeowner awareness and knowledge of how to prepare for emergencies.		Residents, Local Businesses, Second	Number of meetings held with Monterey Fire and CERT program; educationa				
Action 1.1.4. Publicize Local Evacuation Routes. Publicize both City and Monterey County evacuation routes for the community on the City's website, and in the newsletter and brochures. Target additional outreach to the most vulnerable such as the elderly and	Wildfire	Homes  Elderly Population and People with		Near-term (by 2024)	Police & Fire	\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
people with disabilities in the event of a wildfire or other disaster. Action 1.1.5. Evaluate Evacuation Route Capacity. Evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios and identify and implement mitigating actions in 2022, in accordance with Assembly Bill 747.	All	Disabilities, Residents  Elderly Population and People with	distributed  Analysis evaluating	Near-term (by 2024)	Police & Fire	\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 1.1.6. Evacuation Alternatives and Access. Identify neighborhoods that have single ingress/egress, pursuant to Senate Bill 99, and develop and employ exacuation alternatives, such as a gathering facility, and/or alternative emergency access routes in those neighborhoods. Evaluate potential congestion issues in the event of an evacuation and develop and maintain a list of residents who	All	Disabilities, Residents, Service Industry Workers	evacuation route capacity completed Analysis identifying neighborhoods that have single ingress/	Mid-term (by 2027)	Police & Fire	\$\$	Assembly Bill 747 Requirement
may have difficulty evacuating. Evaluate options to provide evacuation, such as a shuttle service, for residents with mobility challenges		Fided Deviation and Deviate with	egress and evacuation alternatives completed; List of limited-				
Action 1.1.7. Develop Local Partnerships to Increase Resistance to Wildfire Structural Damage. Work with local community groups to	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers	mobility residents developed	Mid-term (by 2027)	Police & Fire	\$\$	Senate Bill 99 Requirement
publicize the Firewise Community Certification program (e.g., on the City website and in the newsletter and brochures) and encourage resident involvement.			Number of meetings held to publicize Firewise Community				
Policy 1.2. Focus adaptation efforts and engagement on the most vulnerable populations.	Wildfire	Residents, Second Homes	Certification	Mid-term (by 2027)	Police & Fire	\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021) Adapted from the Southern California Adaptation Planning Guide, Appendix F - General
Action 1.2.1. Establish a Resilience Hub. Formally designate a physical resilience hub, such as the Youth Center or Public Library, and make it available during extreme heat events, poor air quality, severe weather events, and other highly hazardous conditions for use by the community. Provide the following essential resources in the resilience hub(s): health programming and resources, food, refrigeration, charging stations, basic medical supplies, and other emergency supplies. Electrified heating and cooling paired with backup power sources like battery storage provides redundancy and continues services in the event of a power outage. Designate a virtual resilience hub on the City website where residents can access information about the physical resilience hub and resilience efforts.	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers	Resilience Hub established; Existing facilities upgraded to provide all essential resources	Near-term (by 2024)	Public Works / Police & Fire / Library	\$\$	Plan and Local Coastal Plan Model Policies  Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of. Adaptation Strategies and Actions
Action 1.2.2. Limit the Impacts of Climate Change on the Most Vulnerable Populations. Develop a framework to define equity in Carmel-by-the-Sea and develop adaptation approaches that are equitably implemented.	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers	Carmel-by-the-Sea Equity Framework developed	Mid-term (by 2027)	Community Planning & Building	\$	Inspired by the City of Berkeley Existing Building Electrification Strategy
Action 1.2.3. Engage the Community. Develop educational materials notifying the community about the resilience hub and how to access it by sharing updates across city and community channels. Partner with the CERT program and block captains, and community groups, to prioritize disadvantaged/marginalized communities including the elderly and individuals with disabilities.  Action 1.2.4. Social Support Network. Collaborate with the Carmel Foundation and other community-based organizations (e.g.,	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers	Community engagement plan developed	Near-term (by 2024)	Library / City Hall / Police Department	\$	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions
Carmel Residents Association) to develop an inventory of locations with isolated elderly residents and people with disabilities and levelop a plan for a social support network to increase resilience to climate change, for example by promoting home electrification. Action 1.2.5. Back-up Power for Vulnerable Populations. Coordinate with 3CE, PG&E, and emergency management services to	All	Elderly Population and People with Disabilities	Social support network created; Inventory of location created Number of	s Mid-term (by 2027)	Police Department / CERT / Community Planning & Building	\$	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of, Adaptation Strategies and Actions
establish backup power and emergency grid shutdown protocols that protect the most vulnerable populations.	All	Elderly Population and People with Disabilities	households with backup power established	Long-term (by 2032)	Police & Fire / Public Works	\$\$\$	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions
Policy 1.3. Minimize health impacts of climate change.							Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
Action 1.3.1. Partner with Monterey County Health Department. Coordinate with Monterey County Health Department to develop and enhance disaster and emergency early warning systems to incorporate objective data and information for potential health threats such as heat-illness, and illnesses complicated by low air quality due to climate change hazards. Include information on early warning systems and other resilience efforts on the City's virtual resilience hub (Action 1.2.1.)  Action 1.3.2. Initiate a Heat Pump Retrofit Program. Create a program to help fund property owners to convert HVAC units to heat	All	Elderly Population and People with Disabilities, Residents, Local Businesses, Service Industry Workers	Emergency early warning systems updated Number of heat	Near-term (by 2024)	Police & Fire	\$	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of, Adaptation Strategies and Actions
Action 1.3.2. Imitate a near runip neutrin rungamic Cease a program to many into proper young is do unter it nyt, units to near journeys, which provide water heating and space heating in addition to coiling and can improve indoor air quality and community adaptation to extreme heat. Include a microgrid energy storage component to increase power reliability. Prioritize at-risk populations for retrofit incentives.  Action 1.3.2. Invest in Improving Resilience in Critical Facilities, Invest in sustainable backup power sources to provide redundancy	Wildfire, Increased Temperature	Elderly Population and People with Disabilities, Residents, Local Businesses, Service Industry Workers	pumps installed; Number of heat pumps serving at risk residents Number of critical		Community Planning & Building	\$\$	inspired by the City of Berkeley Existing Building Electrification Strategy
Action 1.3.3. Invest in improving Resilience in Critical Facilities. Invest in Sustainable Dataxup power sources to provide redundancy and continued services for critical facilities, including City Hall, Carmel Police Department, Carmel Fire Department, the Libraries, and assisted living facilities, in the event of a power outage triggered by a climate event.	All	Elderly Population and People with Disabilities, Residents	facilities with sustainable backup power sources.	Mid-term (by2027)		\$\$\$	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions

Action 1.3.4. Conduct a Feasibility Study for Existing Building Electrification and Back-up Power. Perform an electrification feasibility study/existing building analysis in order to understand the potential for, and associated costs of, electrification retrofitting, including heat pumps, along with on-site energy generation and battery storage to provide a more resilient back-up power supply. Establish aplan for reducing or eliminating natural gas from existing buildings, potentially through a reach code, and building residente to potential electrical grid shutoffs.  Action 1.3.5. Improve Resilience in Existing Building Stock. Develop a program for identifying funding and incentives to weatherize residential and commercial buildings that addresses severe weather protection, energy efficiency, indoor air quality improvements, and other housing improvements. Include an outreach campaign as part of this program to advertise the benefits of weatherizing and electrifying buildings.  Action 1.3.6. Promote Funding Opportunities. Work with partners like 3CE and PG&E to identify and promote potential resilience opportunities and accessible funding and financing mechanisms to pay for building electrification, weatherization, and battery backups.	Temp All	Elderly Population and People with Disabilities, Residents Elderly Population and People with Disabilities, Residents  Elderly Population and People with Disabilities, Residents	Feasibility Study for Existing Building Electrification and Back-up Power completed Nubmer of retrofitted structures  Funding identified and promoted to community, Number of projects initiated with incentives	Mid-term (by 2027) Long-term (by 2032) Near-term (by 2024)	Public Works Community Planning & Building Community Planning and Building/Police and Fire/Public	\$\$ \$\$	Inspired by the City of Berkeley Existing Building Electrification Strategy Adapted from the Southern California Adaptation Planning Guide, Appendix F - General. Plan and Local Coastal Plan Model Policies (City of Placentia policy) Passive House Principles.  Inspired by the City of Pacifica All-Electric Reach Code
Policy 1.4. Increase economic resilience.		Disabilities, Residents, Local Busiliesses	withintentives	Near-term (by 2024)	WOIRS	,	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of
Action 1.4.1. Develop Partnerhsips to Provide Support to Displaced Workers. Work in partnership with the Monterey County Workforce Development Board and the Carmel Chamber of Commerce to develop a plan to provide support for displaced workers that establishes education and training partnerships for workers displaced or workers negatively impacted by climate change or climate adaptation policies.	All	Service Industry Workers, Local Businesses	Commitment from business community to develop a plan to support displaced workers	Near-term (by 2024)	Community Planning & Building / City Hall	\$\$	Adapted from the Southern California Adaptation Planning Guide, Appendix F General Plan and Local Coastal Plan Model Policies
Action 1.4.2. Establish Partnerships to Develop a Resilient Economy. Partner with the County of Monterey Economic Development Department, Carmel Chamber of Commerce, and the Monterey County Workforce Development Board, to develop more integrated strategies for protection of jobs, economic sustenance, and for the protection of vulnerable populations more at-risk of temporary or permanent job dislocation due to climate change.  Action 1.4.3. Business Resilience Outreach Program. Collaborate with businesses in the city to better understand shared climate risks and identify opportunities to advance shared climate resilience priorities. Partner with the Carmel Chamber of Commerce and Visit	All	Service Industry Workers, Local Businesses	Number of meetings held to develop strategies for job protection Toolkit of intervention		Community Planning & Building / City Hall		Adapted from the Southern California Adaptation Planning Guide, Appendix F General. Plan and Local Coastal Plan Model Policies
Carmel to pilot and implement a local business resilience initiative to build small business capacity before a time of crisk by increasing the awareness of, and preparedness for, business continuity risks faced by the city's local businesses, providing a toolkit of intervention to help local businesses manage risks and enhance business resilience, and conducting outreach campaigns to engage leaders from the business, government, and community sectors to enhance preparedness for economic resilience.  Action 1.4.4. Hire a Grant Writer/Climate Coordinator. Hire a grant writer/Climate coordinator to pursue available grants to fund climate adaptation implementation and track progress.	All	Service Industry Workers, Local Businesses	developed to help support local businesses manage risks and enhance resilience	Near-term (by 2024)	Community Planning & Building / City Hall	\$\$	Adapted from Gateway Cities Climate Adaptation Model General Plan Language (December 2018)
	All	All		Near-term (by 2024)	City Hall	\$\$\$	Suggested at the 11/18/2021 public meeting
Goal 2. A Natural Environment Resilient to Climate Hazards  Policy 2.1. Protect and restore climate-vulnerable habitat and ecosystems.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of
Action 2.1.1. Increase Funding for Climate Adaptation. Earmark Capital Improvement Program (CIP) funding for design, permitting, and implementation of adaptation projects and strategies, such as those in the 2021 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) and Integrated Regional Watershed Management Program (IRWMP).  Action 2.1.2. Increase Urban Forest Resilience. Update and implement the Forest Management Plan to:  1. Beview and consider modifications to the preferred urbanized tree species that would result in improved resilience in the context of the expected climate of the second half of the century, reduce wildfire hazard, and that takes into account aesthetics and the ecological benefits of natives or near-native (e.g., native species from the Southwestern US or Mexico would likely be preferred to European species).  2. Biculude planting and maintenance guidelines to improve tree health, particularly in the public right-of-way  3. Bicorporate tree species that have greater drought and wildfire resistance	All	Urban Forest, Mission Trail Nature Preserve, North Dunes, Carmel Beach, Water Supply	Number of adaptation projects funded through CIP	Near-term (by 2024)	Public Works	\$\$	Adaptation Strategles and Actions  Carmel-bv-the-Sea Vuinerability Assessment (July 2021)
<ol> <li>In addition to drought-tolerant landscaping, include landscaping guidelines that reduce wildfire hazard on private property.</li> <li>Enhance carbon sequestration potential</li> </ol>					Public Works		
Update of the Plan should include collaboration and engagement with stakeholders, such as the Monterey Pine Forest Watch, California State University, Monterey Bay, and vulnerable communities.  Action 2.1.3. Increase Resilience of the Mission Trail Nature Preserve. Update and implement the Mission Trail Nature Preserve Master Plan to consider the open to potential impacts of climate change and to reduce wildfire risk for neighboring private properties.	Drought, Increased Temp, Wildfire	Urban Forest	Forest Management Plan Updated Mission Trail Nature	Near-term (by 2024) and Ongoing	Forestry Division / Forest and Beach Commission Community Planning	\$\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Coordinate with CAL FIRE and the Monterey Fire Departments to incorporate Best Practices into a nanual maintenance plan, including cost estimates for implementation and revenue sources for implementation.  Action 2.1.4. Increase Resilience of the North Dunes. Continue to fund maintenance and monitoring at the North Dunes to determine how the changing climate will affect dune habitats. Implement enhancement efforts to improve resilience of the North Dunes.	All	Mission Trail Nature Preserve	Preserve Master Plan updated Regular maintenance	Mid-term (by 2027) and Ongoing	& Building and Public Works	ss	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 2.1.5. Increase Resilience to Stronger Storms. When designing projects in the city, including those recommended in the Mission Trail Stream Stability Study, size improvements to handle larger storms consistent with best available climate change projections.	All	North Dunes	and monitoring occurring at North Dunes Number of projects sizing improvements	Ongoing	Community Planning & Building and Public Works	\$\$	Carmel-by-the-Sea Vuinerability Assessment (July 2021)
Action 2.1.6. Beach Sand Monitoring Program. Reinstate beach sand monitoring program described in the Shoreline Management Plan.	Stronger Storms	Mission Trail Nature Preserve	to handle larger storms. Active beach sand monitoring program	Near-term (by 2024)	Public Works	ss	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 2.1.7. Carmel Cove Sand Supply. Partner with local researchers (e.g., California State University Monterey Bay) or other sources to conduct Carmel Cove sand supply dynamics analysis.	Sea Level Rise	Carmel Beach	in place  Carmel Cove sand supply dynamics	Near-term (by 2024)	Public Works  Community Planning & Building and Public	\$\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
	Sea Level Rise	Carmel Beach		Long-term (by 2032)	Works	\$\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Goal 3. Resilient Infrastructure and Built Environment  Policy 3.1. Support greater resilience, redundancy, and reliability of local and regional infrastructure and the built environment.							Adapted from the Southern California Adaptation Planning Guide. Appendix B Matrix of
Action 3.1.1. Underground Utilities in Fire Hazard Zones. Determine the feasibility of, and community support for, undergrounding power lines in the Mission Trail Nature Preserve, designated execuation routes, and in other high priority areas in the Very High Fire Hazard Severity Zone. Develop a plan for undergrounding utilities based on results from the feasibility study and begin implementation in the most vulnerable communities.	n	Water Supply, Sanitary Sewer System, Power Grid, Overhead Communication,	Feasibility Study completed; Plan developed based on Feasibility Study:		Community Planning		Adapted from the Southern Camornia Adaptation Hamming Guide, Appendix 6 Matrix Of, Adaptation Strategies and Actions

Action 3.1.2. Increase Green Infrastructure. Modify Capital Improvement Program (CIP) project design to consistently evaluate the potential for green infrastructure to be incorporated in CIP projects in the public right-of-way and on public lands. Identify and develop a green infrastructure pilot project that will reduce runoff volume and capture and infiltrate stormwater, based on projected changes in precipitation amounts due to climate change, and incorporates tree and shrub planting to increase carbon sequestration in the city.  Action 3.1.3. Reduce Stormwater Runoff. Reduce stormwater runoff through implementation of stormwater diversion and infiltration.	Increased Temp, Wildfire	Urban Forest, Storm Drain System	Change in impervious surface coverage.	Near-term (by 2024)	Public Works	\$\$	Adapted from the Carmel-by-the-Sea Vulnerability Assessment (July 2021)
projects that reduce pollution problems caused by more frequent and intense storms and more extreme flooding events.	Stronger Storms	Storm Drain System, Carmel Beach	Stormwater diversion project implemented	Long-term (by 2032)	Public Works	\$\$\$	Suggested by Climate Committee Members
Action 3.1.4. Storm Drain Repair Funding and Improvements. Earmark Capital Improvement Program (CIP) funding for design, permitting and implementation of storm drain repairs. Include strategies in the 2021 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) for potential regional funding. Upsize Storm Drain Master Plan (SDMP) improvements, especially when making repairs in th lower reaches of watersheds, to handle larger storms.  Action 3.1.5. Retrofit Existing Critical Buildings and Related Infrastructure. Conduct an evaluation of all first-responder and municipa	Stronger Storms	Storm Drain System	Number of adaptation projects funded through CIP			\$\$\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
facilities to determine retrofits that may be needed for long-term resilience to climate change hazards including sea-level rise related flooding and erosion, increased wind/storm events, an increase in high heat days, and/or wildfire depending upon location and risk factors. Develop a budget and schedule for retrofits based on the findings of the municipal facilities. Retrofit existing critical buildings as detailed in the program schedule.  Action 3.1.6. Water Conservation. Partner with the Monterey Peninsula Water Management District to reduce water demand and	All	Emergency Response Facilities – Fire station, EOC, PD, PW, City Hall, etc., Hospital and Emergency Medical Care Facilities	List of critical buildings and related infrastructure requiring retrofits	Near-term (by 2024)	Public Works	\$\$\$	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
increase water recycling, such as stormwater capture and grey water reuse, through education and outreach. Provide information an incentives for residential water use reduction, focusing engagement on vulnerable communities first.	ı		Water demand reduced, incentives for grey water reuse developed and		Community Planning & Building and Public		
Action 3.1.7. Bluff Structural Monitoring Program. Implement bluff structural monitoring program and do follow-up monitoring post storm to identify additional footing stability issues.	Drought	Water Supply	shared  Bluff structural	Near-term (by 2024)	Works	\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.1.8. Sea Level Rise Coastal Vulnerability Study. Hire coastal engineer with experience in planning for climate change to:	Sea Level Rise	Carmel Beach	monitoring program implemented	Mid-term (by 2027)	Public Works	\$\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
<ol> <li>Conduct research and prepare a Sea-Level Rise Vulnerability Study to further assess the risks to the city's coastal assets, including the beach, sea walls, revetments, bluffs, stairs and access, public bathrooms, parking areas, drainage infrastructure, and utilities.</li> <li>Betermine adaptation measures and Local Coastal Program policy options, including but not limited to: a) Mostly natural, unarmored North Dunes area; b) mostly armored bluffs along Scenic Roach south of 8th Avenue; c) Unarmored dunes along private property between 8th Avenue and Del Mar Parking Lot; d) Armored private properties on the bluffs at the north end of the City (Pescadero Canyon area).</li> <li>Bualuate the use of thresholds for phasing adaptation projects based on changing coastal conditions. Consider applying an adaptive pathways approach which establishes trigger thresholds for different adaptive measures based on the severity of the impact from flooding and erosion associated with sea-level rise.</li> </ol>							
		Carmel Beach, Shoreline Access	Sea-level rise vulnerability study				
	Sea Level Rise	Infrastructure, Seawall and Revetments	completed	Near-term (by 2024)	Public Works	\$\$\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.1.9. Wastewater Treatment. Collaborate with the Carmel Area Wastewater District (CAWD) to increase the facility's resilience to sea level rise and stronger storms. Maintain staff/council personnel as liaisons to CAWD.	Sea Level Rise Sea Level Rise,				Community Planning		Carmel-by-the-Sea Vulnerability Assessment (July 2021)
			completed realister of collaboration meetings with CAWD		Community Planning		Carmel-by-the-Sea Vulnerability Assessment (July 2021)  Suggested by Climate Committee Members Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of, Adaptation Strategies and Actions
resilience to sea level rise and stronger storms. Maintain staff/council personnel as liaisons to CAWD.  Policy 3.2. Incorporate climate change adaptation into relevant plans and standards.  Action 3.2.1. Development Standards. Evaluate City's development standards for consistency with best practices for reducing climate change risk (e.g., wildfire risk) for both new and existing development, including but not limited to incorporating defensible space design in landscaping guidelines and permitting the use of fire-resistant building materials that may conflict with currel Design	Sea Level Rise, Stronger Storms	Infrastructure, Seawall and Revetments	completed recompleted collaboration meetings with CAWD regarding facility's	Near-term (by 2024) and Ongoing	Community Planning & Building and Public		Suggested by Climate Committee Members Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of
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City of Carmel-by-the-Sea	

City of Carmel-by-the-Sea Near-Term/Ongoing Adaptation Strate	gies				Implementation				
Goal J. A. Healthy. Safe, and Resilient Community	Climate Hazard	Asset	Metric	Timeframe	tead	Cost	Source	Status Notes	
Policy 1.1. Provide effective emergency preparedness and response in anticipation of potential climate-related disasters				Near-term (1-2 years); Mid-term (3- 5 years); Long-term (5-10 years)		\$-Low (<\$50K); \$\$- Medium (\$50K - \$100K); \$\$\$-High (>\$100K)	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies		
Action 1.1. Maintain and Update Execution Plan. Maintain and update an Evacuation Plan every 8 years at a minimum to account for all types of emergencies. The plan should flour on the most uninvasible groups including the elderly community and parsons self-disabilities.	a h	Elderly Population and People with Disabilities, Residents, Service Industry Workers	Evacuation Plan updated every 8 years, with the first update by 2023	Near-term (by 2024) and Ongoing	Police & Fire	s	Suggested by Climate Committee Members		
Action 1.1.2 Update Emergency Preparedness. Incorporate climate change risk and impact considerations into Carmel-by-the-Sas CERT programming and materials is to promote emergency proparedness at an enighborhood block by-block scale. CERT to promote block-by-block scale emergency preparedness by organising CEy by blocks and recruiting Block Captains.	All	Residents, Local Businesses, Second Homes	update by 2023 Number of block captains formed, climate change risk incorporated into	Near-term (bv 2024)		s	Adapted from the Southern California Adaptation Planning Guide, Appendix & Matrix of, Adaptation Strategies and Actions		
Action 1.13. Collaborate with Monterey five. Collaborate with Monterey Five on its inspection and outreach efforts to reduce five risks. Confine to coordinate with the CRET program and reach out to new powlational outready partners used as local business, community groups, and utilities to help distribute information to increase resident and homeowner awareness and knowledge of how to prepare for emergencies.		Residents, Local Businesses, Second	held with Monterey Fire and CERT program; educational						
Action 1.1.4. Publisher Local Evacuation Routes. Publisher both City and Monterey Country evacuation routes for the community on the City's website, and in the newsletter and brochures. Target additional outreach to the most vulnerable such as the elderly and social with disabilities in the event of a wildfire or other disability. Performance of the property of th	Wildfire	Homes  Elderly Population and People with  Disabilities. Residents	Educational	d Near-term (by 2024)		s	Carmel-by-the-Sea Vulnerability Assessment (July 2021)  Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
							Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies		
Action 1.1. Creation's Resilience with. Formula' designates a physical resilience halb, clean is No Throit Center or Public Liberay, and make it available design decreame hast or works, port or supplies, overweather overs, and other highly assisted conditions for each port of the following caserated resources in the resilience hub(s) hashin programming and resources, food, origination, changing actions, sizes: medical supplies, and other energogines, projection. External features and colong part and undergranted, and other energogines and colong part and undergranted and other parts		Elderly Population and People with Disabilities, Residents, Service Industry Workers	Resilience Hub established; Existing facilities upgraded to provid all essential resources	e Near-term (by 2024)	Public Works / Police & Fire / Library	\$5	Adapted from the Southern California Adaptation Planning Guide. Appendix 8 Matrix of. Adaptation Strikegies and Actions		
Action 1.2.1. Engage the Community, Develop educational materials notifying the community about the recilience hold and how to access it by sharing updates across capt and community familes. Partner with the CERT program and both captains, and community density. Partner with the CERT program and both captains, and community groups, to prioritize disadvanta.god/margnalized communities including the elderly and individuals with disabilities.	y Ali	Elderly Population and People with Disabilities, Residents, Service Industry Workers	Community engagement plan developed	Near-term (by 2024)	Library / City Hall / Police Department	s	Adapted from the Southern California Adaptation Planning Guide, Appendix & Matrix of Adaptation Strategies and Actions		
Policy 1.3. Minimize health impacts of climate change.  Action 1.3.1. Partner with Monterey County Health Department. Coordinate with Monterey County Health Department to develop							Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies		
and enhance disaster and emergency early warring systems to incorporate objective data and information for potential health threats such as head-liness, and libroses complicated by low air quality due to climate change hazards. Include information on early warring systems and other resilience efforts on the City's virtual resilience hub (Action 1.2.1.)	All	Elderly Population and People with Disabilities, Residents, Local Businesses, Service Industry Workers	Emergency early warning systems updated	Near-term (by 2024)	Police & Fire	s	Adapted from the Southern California Adaptation Planning Guide, Appendix & Matrix of Adaptation Strategies and Actions		
Action 1.1.6. Promote Funding Opportunities. Work with partners like 3CE and PG&E to identify and promote potential resilience opportunities and accessible funding and financing mechanisms to pay for building electrification, weatherization, and battery backups.	All		Funding identified and promoted to community; Numbe	ır	Community Planning and Building/Police				
Policy 1.4. Increase economic resilience.		Elderly Population and People with Disabilities, Residents, Local Businesses	of projects initiated with incentives	Near-term (by 2024)	and Fire/Public Works	s	Inspired by the City of Pacifica All-Electric Reach Code Adapted from the Southern California Adaptation Planning Guide, Appendix 8 Matrix of		
Action 1.4.1. Develop Partnerhsips to Provide Support to Displaced Workers. Work in partnership with the Monterey County			Commitment from				Adaptation Strategies and Actions		
Worlforce Development Board and the Carmid Chamber of Commerce to develop a plan to provide support for displaced workers that establishes doubtion and training partnerships for workers displaced or workers negatively impacted by climate change or climate adaptation policies.		Service Industry Workers, Local	business communit to develop a plan to support displaced		Community Planning & Building / City Hall		Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies		
Action 1.4.3. Business Resilience Outreach Program. Collaborate with businesses in the city to better understand shared climate risk and identify opportunities to advance shared climate resilience priorities. Partner with the Carmal Chamber of Commerce and Visit	All IS	Businesses	workers Toolkit of intervention	Near-term (by 2024)	& Building / City Hall	35	Plan and Local Coastal Plan Model Policies		
Carmel to pilot and implement a local business resilience initiative to build small business capacity before a time of crisis by increasing the awareness of, and preparedness for, business continuity risks faceb by the Crys focal businesses, providing a toolkit of instruention to help local businesses manage risks and enhance business retiliance, and conducting outwark campaigns to			developed to help support local businesses manage						
or not retained for most be business, government, and community sectors to enhance preparedness for economic resilience.  Action 1.4.4. Hire a Grant Writer/Climate Coordinator. Here a grant writer/Climate coordinator to pursue available grants to fund	All	Service Industry Workers, Local Businesses	risks and enhance resilience	Near-term (by 2024)	Community Planning & Building / City Hall	55	Adapted from Gateway Cities Climate Adaptation Model General Plan Language (December 2018)		
climate adaptation implementation and track progress.	All	All	Grant writer/climat coordinator hired	e Near-term (by 2024)	City Hall	555	Suggested at the 11/18/2021 public meeting		
Goal 2. A Natural Environment Resilient to Climate Hazards Policy 2.1. Protect and restore climate-vulnerable habitat and ecosystems.							Adapted from the Southern California Adaptation Planning Guide, Appendix & Matrix of		
Action 2.1.1. Increase Funding for Citmate Adaptation. Earman't Capital Improvement Program (CIP) Funding for design, permitting, and in Palameter of Adaptation projects and strategies, such as those in the 2022 Multi-burisdictional Hazard Mitigation Plan (Mathelf) and indeparted Regional Watershed Management Program (WMMP).	All	Urban Forest, Mission Trail Nature Preserve, North Dunes, Carmel Beach, Water Surelly	Number of adaptation projects	Near-term (by 2024)	Public Works	ss	Carmel-by-the-Sea Vidnerability Assessment Buly 2001		
Action 1.1. Increase Urban Forest Resilience. Update and implement the Forest Management Fran to:  1. Review and consider modifications the preferred urbanized tree species that would result in improved resilience in the context of the expected climate of the second half of the century, reduce wideline hazard, and that takes into account assistance shall be accounted as the preferred to exclude the properties of the second half of the century, reduce wideline hazard, and that takes into account assistance is not account as extended and the preferred to exclude the preferred to						-			
European species).  2. Briddeel plainting and maintenance guidefines to improve tree health, particularly in the public right of-way  3. Briddeel plainting and maintenance guidefines to improve tree health, particularly in the public right of-way  4. Bridden of the could be compared be compared to the public registration of the public right registration of the public registration of t					Public Works				
5. Brhance carbon sequestration potential Update of the Wise Householders, such as the Monterey Pine Forest Watch, California State University, Monterey all by, and vulnerable communities. Action 2.1.A. Increase Resilience of the North Dunes. Continue to fund maintenance and monitoring at the North Dunes to	Drought, Increased Temp, Wildfire	Urban Forest	Forest Managemen Plan Updated	t Near-term (by 2024) and Ongoing	Forestry Division / Forest and Beach	SS	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
determine how the changing climate will affect dune habitats. Implement erhancement efforts to improve resilience of the North Dunes.	All	North Dunes	Regular maintenant and monitoring occurring at North Dunes	Onapine	Community Planning & Building and Public Works	SS	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
Action 2.1.5. Increase Resilience to Stronger Storms. When designing projects in the city, including those recommended in the Mission Trail Storms Sability Study, size improvements to handle larger storms consistent with best available climate change projections.			Number of projects sizing improvement to handle larger						
Action 2.1.6. Beach Sand Monitoring Program. Reinstate beach sand monitoring program described in the Shoreline Management	Stronger Storms	Mission Trail Nature Preserve	storms. Active beach sand monitoring program	Near-term (by 2024)	Public Works	SS	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
Goal 3. Resilient Infrastructure and Built Environment	Sea Level Rise	Carmel Beach	in place	Near-term (by 2024)	Public Works	SS	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
Policy 3.1. Support greater resilience, redundancy, and reliability of local and regional infrastructure and the built environment.  Action 3.1.1. Underground Utilities in Fire Hazard Zones. Determine the feasibility of, and community support for, undergrounding							Adapted from the Southern California Adaptation Planning Guide. Appendix & Matrix of Adaptation Strategies and Actions		
power lines in the Mission Trail Nature Preserve, designated evacuation routes, and in other high priority areas in the Very High Frie Hazard Severity Zone. Develop a plan for undergrounding utilities based on results from the feasibility study and begin implementation in the most vulnerable communities.		Water Supply, Sanitary Sewer System, Power Grid, Overhead Communication, PGSE/Communication Underground Lin	Feasibility Study completed; Plan developed based or Feasibility Study; es- Number of utilities	1	Community Planning & Building and Public				
Action 1.1.2. Increase Green Infrastructure. Modify Capital Improvement Program (CPP) project design to consistently evaluate the potential for green infrastructure to be incorporated in CPP projects in the public right-of-way and on public lands, identify and develop a green infrastructure (bit project) that will return runfl violume and register and infiltrast entermaker, based on	Wildfire Stronger Storms,	gas, cable	moved undergroun	d Near-term (by 2024)	Works	555	Carmel-by-the-Sea Vulnerability Assessment Usiv 2021)		
projected changes in precipitation amounts due to climate change, and incorporates tree and shrub planting to increase carbon sequestration in the city.  Action 3.1.4. Storm Dra'n Repair Funding and improvements. Earmair Capital Improvement Program (CIP) funding for design, permitting and implementation of storm drain respairs. Include strategies in the 2021 Multi-indictional Hazard Mitigation Plan	Increased Temp, Wildfire	Urban Forest, Storm Drain System	impervious surface coverage.	Near-term (by 2024)	Public Works	SS	Adapted from the Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
(MitMel) for potential regional funding, Uppins Storm Drain Master Fins (DMP) improvements, especially when making repairs in the lower reachest, of waterheids, its handla larger storm. Action 1.1.5. Retrolft Existing Critical Buildings and Ruisted Infrastructure. Conduct an evaluation of all first-responder and municipal facilities to determine retrolls that may be needed for long-term resilience to climate change hazards including use-level	Stroneer Storms	Storm Drain System  Emergency Response Facilities – Fire	List of critical	Near-term (by 2024)	Public Works	555	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
rise related flooding and ensisten, increased wind/storm events, an increase in high heat days, and/or widtfire depending upon location and risk factors. Develop a budget and schedule for retrofils based on the findings of the municipal facilities. Retrofit existing critical buddings as detailed in the program schedule. Action 3.1.8. Water Conservation. Partner with the Montreyr Preiriscula Water Management District to reduce water demand and	All	station, EOC, PD, PW, City Hall, etc., Hospital and Emergency Medical Care Facilities	buildings and relate infrastructure requiring retrofits Water demand	Near-term (by 2024)	Public Works	sss	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General, Plan and Local Coastal Plan Model Policies		
increase water recycling, such as stormwater capture and gray water resus, through education and outwach. Provide information and incentives for residential water use reduction, focusing engagement on vulnerable communities first.	Drought	Water Supply	Water demand reduced, incentives for grey water reus developed and shared	e Near-term (bv 2024)	Community Planning & Building and Public Works	s	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
Action 1.1.5. See Level Niac Cassal Viberability Study. His constall regimer with respirate in planning for dimine change to the Central Cassal Action of the Central Cassal Cass	J. Committee	WHITE JALLEY		100 2004	***************************************				
(Piecadero Camyon area).  3. Bulautes the use of threshods for phasing adaptation projects based on changing coastal conditions. Consider applying an adaptive pathways approach which establishes trigger thresholds for different adaptive measures based on the severity of the impact from flooding and erosion associated with sea-level rise.			Sea-level rise						
Action 1.1.9. Wastewater Treatment. Collaborate with the Carmel Area Wastewater District (CAWD) to increase the facility's resilience to sea level rise and stronger storms. Maintain staff/council personnel as failsons to CAWD.	Sea Level Rise	Carmel Beach, Shoreline Access Infrastructure, Seawall and Revelments	vulnerability study completed collaboration meetings with CAW	Near-term (by 2024)	Community Planning	555	Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
	Sea Level Rise, Stronger Storms	Water Supply, Storm Drain System	regarding facility's resilience	Near-term (by 2024) and Ongoing	& Building and Public Works	\$	Suggested by Climate Committee Members		
Policy 3.2. Incorporate climate change adaptation into relevant plans and standards.  Action 3.2.2. Update City Planning Guidelines. Update the City's municipal code to maintain consistency with current California			City municipal code				Adapted from the Southern California Adaptation Planning Guide. Appendix & Matrix of Adaptation Strategies and Actions		
codes (California Building Code Chapter 7 and California Residential Code R337) throughout the City.  Action 125. Multi-furidictional Hazard Mitgation Plan. Maintain a comprehensive list of projects, based on existing plans and gap	Wildfire, Stronger Storms, Wildfire	Residents, Local Businesses, Second Homes	consistent with current California codes	Near-term (by 2024)	Community Planning and Building	55	Carmel Joy-the-Sea Volnerability Assessment (sub-2001)		
identified in the Vulnerability Assessment, to provide to Monterey County during updates to the Monterey County Multi- Jurisdictional Hazard Militation Plan in 2022 and beyond.			Number of adaptation projects included in the Mul Jurisdictional Hazar	d	Community Planning & Building, Police,				
	All	All	Mitigation Plan	Near-term (by 2024)	and Public Works	\$	Carmel-by-the-Sea Volnerability Assessment (July 2021)		

#### City of Carmel-by-the-Sea Mid-Term Adaptation Strategies

City of Carmel-by-the-Sea Mid-Term Adaptation Strategies										
Goal/Policy/Action	Climate Hazard	Acces	Metric	Timeframe	Implementation Lead	Cost	Source	Status	Notes	
Goal 1. A Healthy. Safe, and Resilient Community	- The state of									
Policy 1.1. Provide effective emergency preparedness and response in anticipation of potential climate-related disasters				Near-term (1-2		\$-Low (<\$50K); \$\$-				
				years); Mid-term (3- 5 years): Lone-term		Medium (\$50K - \$100K); \$\$\$-High	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General			
				(S-10 years)		(>\$100K)	Plan and Local Coastal Plan Model Policies			
Action 1.1.5. Evaluate Evacuation Route Capacity. Evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios and identify and implement mitigating actions in 2022, in accordance with Assembly Bill 747.		Elderly Population and People with	Analysis evaluating							
emergency scenarios and identify and implement mitigating actions in 2022, in accordance with Assembly Bill 747.		Disabilities, Residents, Service Industry	Analysis evaluating evacuation route							
	All	Workers	capacity completed	Mid-term (by 2027)	Police & Fire	SS	Assembly Bill 747 Requirement			
Action 1.1.6. Evacuation Alternatives and Access. Identify neighborhoods that have single ingress/egress, pursuant to Senate Bill 99, and develop and employ evacuation alternatives, such as a gathering facility, and/or alternative emergency access routes in those			Analysis identifying neighborhoods that							
neighborhoods. Evaluate potential congestion issues in the event of an evacuation and develop and maintain a list of residents who			have single ingress/							
may have difficulty evacuating. Evaluate options to provide evacuation, such as a shuttle service, for residents with mobility			egress and							
challenges.			evacuation alternatives							
			completed;							
		Elderly Population and People with Disabilities, Residents, Service Industry	List of limited- mobility residents							
	ΔII	Disabilities, Residents, Service Industry Workers	mobility residents developed	Mid-term (by 2027)	Police & Fire	44	Senate Bill 99 Requirement			
Action 1.1.7. Develop Local Partnerships to Increase Resistance to Wildfire Structural Damage. Work with local community groups to						-				
publicize the Firewise Community Certification program (e.g., on the City website and in the newsletter and brochures) and encourage resident involvement.			Number of meetings held to publicize							
encourage resident involvement.			Firewise Community							
	Wildfire	Residents, Second Homes	Certification	Mid-term (by 2027)	Police & Fire	\$	Carmel-by-the-Sea Vulnerability Assessment (July 2021)			
Policy 1.2. Focus adaptation efforts and engagement on the most vulnerable populations.							Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies			
Action 1.2.2. Limit the Impacts of Climate Change on the Most Vulnerable Populations. Develop a framework to define equity in		Elderly Population and People with	Carmel-by-the-Sea				FIRE WAS ASSESSED FOR MODEL POLICES			
Carmel-by-the-Sea and develop adaptation approaches that are equitably implemented.	ΔII	Disabilities, Residents, Service Industry Workers	Equity Framework	Mid-term (by 2027)	Community Planning		Inspired by the City of Rerioley Existing Ruikling Flortrification Strategy			
Action 1.2.4. Social Support Network. Collaborate with the Carmel Foundation and other community-based organizations (e.g.,	All	Workers	Social support	Mid-term (by 2027)	& Building	5	Inspired by the City of Berkeley Existing Building Electrification Strategy			
Carmel Residents Association) to develop an inventory of locations with isolated elderly residents and people with disabilities and			network created;		Police Department /					
develop a plan for a social support network to increase resilience to climate change, for example by promoting home electrification.	ΔII	Elderly Population and People with Disabilities	Inventory of		CERT / Community Planning & Building		Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Artines			
Policy 1.3. Minimize health impacts of climate change.	All	Disabilities	locations created	Mid-term (by 2027)	Manning & Building	5	Adaptation Strategies and Actions  Adaptation Planning Guide, Appendix F - General			
							Plan and Local Coastal Plan Model Policies			
Action 1.3.2. Initiate a Heat Pump Retrofit Program. Create a program to help fund property owners to convert HVAC units to heat pumps, which provide water heating and space heating in addition to cooling and can improve indoor air quality and community.			Number of heat							
adaptation to extreme heat. Include a microgrid energy storage component to increase power reliability. Prioritize at-risk		Elderly Population and People with	Number of heat							
populations for retrofit incentives.	Wildfire, Increased Temperature	Disabilities, Residents, Local Businesses, Service Industry Workers	pumps serving at risk residents	Mid-term (by 2027)	Community Planning	44	Inspired by the City of Barkeley Fricting Building Flortrification Strategy			
Action 1.3.3. Invest in Improving Resilience in Critical Facilities. Invest in sustainable backup power sources to provide redundancy	Temperature	Service Industry Workers	Number of critical	Mid-term (by 2027)	& Building	33	Inspired by the City of Berkeley Existing Building Electrification Strategy			
and continued services for critical facilities, including City Hall, Carmel Police Department, Carmel Fire Department, the Libraries, and			facilities with							
assisted living facilities, in the event of a power outage triggered by a climate event.	All	Elderly Population and People with Disabilities. Residents	sustainable backup power sources.	Mid-term (by2027)	D. D.C. March	SSS	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions			
Action 1.3.4. Conduct a Feasibility Study for Existing Building Electrification and Back-up Power. Perform an electrification feasibility	All	Distriction, residence	Feasibility Study for	MID-MINITEDEZOZZI	FUUIL WULL	222	Addition of the second			
study/existing building analysis in order to understand the potential for, and associated costs of, electrification retrofitting, including heat pumps, along with on-site energy generation and battery storage to provide a more resilient back-up power supply. Establish a			Existing Building							
plan for reducing or eliminating natural gas from existing buildings, potentially through a reach code, and building resilience to	Wildfire, Increased	Elderly Population and People with	Electrification and Back-up Power							
potential electrical grid shutoffs.	Temp	Disabilities, Residents	completed	Mid-term (by 2027)	Public Works	SS	Inspired by the City of Berkeley Existing Building Electrification Strategy			
Policy 1.4. Increase economic resilience.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of			
Action 1.4.2. Establish Partnerships to Develop a Resilient Economy. Partner with the County of Monterey Economic Development							Adaptation Strategies and Actions			
Department, Carmel Chamber of Commerce, and the Monterey County Workforce Development Board, to develop more integrated			Number of meetings							
strategies for protection of jobs, economic sustemance, and for the protection of vulnerable populations more at-risk of temporary or permanent job dislocation due to climate change.			held to develop							
or permanent jud disocatori due di cimate change.	All	Service Industry Workers, Local Businesses	strategies for job protection	Mid-term (by 2027)	Community Planning & Building / City Hall		Adapted from the Southern California Adaptation Planning Guide, Appendix F - General, Plan and Local Coastal Plan Model Policies			
Goal 2. A Natural Environment Resilient to Climate Hazards										
Policy 2.1. Protect and restore climate-vulnerable habitat and ecosystems.							Adapted from the Southern California Adaptation Planning Guide, Appendix 8 Matrix of Adaptation Strategies and Actions			
Action 2.1.3. Increase Resilience of the Mission Trail Nature Preserve. Update and implement the Mission Trail Nature Preserve							A STATE OF THE PARTY OF THE PAR			
Master Plan to consider the potential impacts of climate change and to reduce wildfire risk for neighboring private properties.  Coordinate with CAL FIRE and the Monterey Fire Departments to incorporate Best Practices into an annual maintenance plan,			Mission Trail Nature	Mid town (by 2027)	Community Planning & Building and Public					
including cost estimates for implementation and revenue sources for implementation.	All	Mission Trail Nature Preserve	updated	and Oneoine	Works	ss	Carmel-by-the-Sea Vulnerability Assessment (July 2021)			
Goal 3. Resilient Infrastructure and Built Environment							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of			
Policy 3.1. Support greater resilience, redundancy, and reliability of local and regional infrastructure and the built environment.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions			
Action 3.1.7. Bluff Structural Monitoring Program. Implement bluff structural monitoring program and do follow-up monitoring post										
storm to identify additional footing stability issues.			Bluff structural monitoring program							
	Sea Level Rise	Carmel Beach	implemented	Mid-term (by 2027)	Public Works	SS	Carmel-by-the-Sea Vulnerability Assessment (July 2021)			
Policy 3.2. Incorporate climate change adaptation into relevant plans and standards.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions			
			implementing				nuequeuvii se megyés atto ALDOTS			
			adaptation							
Action 3.2.1. Development Standards. Evaluate City's development standards for consistency with best practices for reducing climate change risk (e.g., wildfire risk) for both new and existing development, including but not limited to incorporating defensible			measures, City development							
climate change risk (e.g., writtine risk) for both new and existing development, including but not limited to incorporating defensible space design in landscaping guidelines and permitting the use of fire-resistant building materials that may conflict with current			development standards consistent							
Design Guidelines. Develop a project checklist for building and site adaptation measures. The checklist, included with permit			with best practices							
applications, should serve to provide education to permit applicants on modifications to site plans and structures that can improve a project's resilience to existing and potential future dimate change hazards.	All	Residents, Local Businesses, Second Homes	for reducing wildfire risk	Mid-term (by 2027)	Community Planning and Building	ss	Carmel-by-the-Sea Vulnerability Assessment (July 2021)			
Action 3.2.3. Incorporate Climate Change Adaptation into Local Plans. Prioritize the update of local plans, including the Climate			Number plans							
Change Vulnerability Assessment, Local Coastal Program, General Plan, Mission Trails Nature Reserve Master Plan, Del Mar Master Plan, Shoreline Management Plan, and drought planning to promote climate change resilience as new information is available.			updated to incorporate		Community Planning & Building / Public		Adapted from the Southern California Adaptation Planning Guide, Appendix F - General			
	All	All	adaptation	Mid-term (by 2027)		SS	Plan and Local Coastal Plan Model Policies			

City of Carmel-by-the-Sea Long-Term Adaptation Strategies

pal/Policy/Action									
	Climate Hazard	Asset	Metric	Timeframe	Implementation Lead Co	est.	Source	Status	Notes
oal 1. A Healthy. Safe, and Resilient Community									
olicy 1.2. Focus adaptation efforts and engagement on the most vulnerable populations.							Adapted from the Southern California Adaptation Planning Guide. Appendix F - General Plan		
							and Local Coastal Plan Model Policies		
ction 1.2.5. Back-up Power for Vulnerable Populations. Coordinate with 3CE, PG&E, and emergency management services to establish			Number of						
ackup power and emergency grid shutdown protocols that protect the most vulnerable populations.			households with						
		Elderly Population and People with	backup power		Police & Fire / Public		Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of		
	All	Disabilities	established	Long-term (by 2032)	Works \$\$	is	Adaptation Strategies and Actions		
olicy 1.3. Minimize health impacts of climate change.							Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan		
							and Local Coastal Plan Model Policies		
	All	Elderly Population and People with	Nubmer of retrofitted		Community Planning		Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan		
sidential and commercial buildings that addresses severe weather protection, energy efficiency, indoor air quality improvements, and		Disabilities, Residents	structures		& Building		and Local Coastal Plan Model Policies (City of Placentia policy)		
ther housing improvements. Include an outreach campaign as part of this program to advertise the benefits of weatherizing and				Long-term (by 2032)	55		Passive House Principles		
oal 2. A Natural Environment Resilient to Climate Hazards									
plicy 2.1. Protect and restore climate-vulnerable habitat and ecosystems.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of		
							Adaptation Strategies and Actions		
ction 2.1.7. Carmel Cove Sand Supply. Partner with local researchers (e.g., California State University Monterey Bay) or other sources									
conduct Carmel Cove sand supply dynamics analysis.			Carmel Cove sand		Community Planning				
			supply dynamics		& Building and Public				
	Sea Level Rise	Carmel Beach	analysis completed	Lone-term (by 2032)	Works \$5		Carmel-by-the-Sea Vulnerability Assessment (July 2021)		
oal 3. Resilient Infrastructure and Built Environment									
olicy 3.1. Support greater resilience, redundancy, and reliability of local and regional infrastructure and the built environment.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of		
							Adaptation Strategies and Actions		
ction 3.1.3. Reduce Stormwater Runoff. Reduce stormwater runoff through implementation of stormwater diversion and infiltration									
rojects that reduce pollution problems caused by more frequent and intense storms and more extreme flooding events.			Stormwater diversion						
	Stronger Storms	Storm Drain System, Carmel Beach	project implemented	Long-term (by 2032)	Public Works \$5	is	Suggested by Climate Committee Members		
olicy 3.2. Incorporate climate change adaptation into relevant plans and standards.							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of		
							Adaptation Strategies and Actions		
ction 3.2.4. Update Shoreline Management Plan. Update Shoreline Management Plan and Local Coastal Program based on results of			Shareline						
sa-level Rise Vulnerability Study.			Management Plan		Community Planning				
			and Local Coastal		& Building and Public				
	Sea Level Rise	Carmel Beach	Program undated	Lone-term (by 2032)	Works SS		Carmal Jrv. the Sea Vidnarshillin Assessment (Info 2021)		

# Appendix E Implementation Case Studies

# Implementation Case Studies

This appendix illustrates adaptation examples that align with a selection of adaptation actions and show how adaptation policies and actions can be effectively implemented.

#### West Oakland Resilience Hubs



Photo: West Oakland Resilience Hub Planning Meeting https://norcalresilience.org/case-study-west-oakland-resiliency-hub/

Location: West Oakland, CA

The City of Oakland identified three facilities owned and operated by the City that were in need of physical infrastructure upgrades which could serve as climate resilience hubs: West Oakland Senior Center, West Oakland Branch of the Oakland Public Library, and the DeFremery Recreation Center and Park. The facilities were upgraded to offer the following services: cooling, warming, sanitation, communication, transportation, medical area, filtered indoor spaces during forest fires and high air pollution times, and renewable and non-polluting energy sources, including solar energy, and back-up power to run critical

operations when the power grid is down. The upgrades involved partnerships between the City, PG&E, and the Bay Area Air Quality Management District. Design phase costs are estimated to be \$500,000 and initial known implementation estimates amount to approximately \$1.6 million. Funding was provided by a combination of stakeholder financing, funding through California Air Resources Board, and the City of Oaklands Capital Improvement Plan.

Related Action 1.2.1. Establish a Resilience Hub. Formally designate a physical resilience hub, such as the Youth Center or Public Library, and make it available during extreme heat events, poor air quality, severe weather events, and other highly hazardous conditions for use by the community. Provide the following essential resources in the resilience hub(s): health programming and resources, food, refrigeration, charging stations, basic medical supplies, and other emergency supplies. Electrified heating and cooling paired with backup power sources like battery storage provides redundancy and continues services in the event of a power outage. Designate a virtual resilience hub on the City website where residents can access information about the physical resilience hub and resilience efforts.

# Berkeley Existing Buildings Electrification Strategy

Location: Berkeley, CA

Berkeley's Existing Buildings Electrification Strategy analyzes the existing building stock of the City, with a focus on low-rise residential, and identifies a pathway for an equitable transition to all-electric buildings. To model electrification costs for Berkeley's existing homes, the project team estimated Berkeley's building stock, using Alameda County Assessor data, to better understand the distribution of building types and existing conditions. The analysis was followed by research into electrification measures and costs and the data was used to model different retrofit packages to identify the most cost-effective options. To ensure Berkeley's pathway to allelectric buildings avoids negative impacts to equity and improves current conditions, the City developed an Equity Framework called Equity Guardrails with stakeholder and community feedback. The Equity Guardrails reflected



Photo: Existing Buildings Electrification Strategy https://www.cityofberkeley.info/uploadedFiles/Planning\_and \_Development/Level\_3\_-

\_Energy\_and\_Sustainable\_Development/Draft\_Berkeley\_E xisting\_Bldg\_Electrification\_Strategy\_20210415.pdf

priorities and concerns of marginalized communities, highlighting the need to protect people against potential unintended consequences of building electrification like gentrification and displacement. The City developed four equity guardrails that each potential policy was assessed against and will be used in the future as new policies are developed. The four equity guardrails are:

- Access to health and safety benefits
- Access to economic benefits
- Maximize ease of installation
- Promote housing affordability & anti-displacement.

Related Action 1.3.4. Conduct a Feasibility Study for Existing Building Electrification and Back-up Power. Perform an electrification feasibility study/existing building analysis in order to understand the potential for, and associated costs of, electrification retrofitting, including heat pumps, along with on-site energy generation and battery storage to provide a more resilient back-up power supply. Establish a plan for reducing or eliminating natural gas from existing buildings, potentially through a reach code, and building resilience to potential electrical grid shutoffs.

Related Action 1.2.2. Limit the Impacts of Climate Change on the Most Vulnerable Populations. Develop a framework to define equity in Carmel-by-the-Sea and develop adaptation approaches that are equitably implemented

# 2500 R Midtown Development



Photo: Rooftop solar panels at the 2500 R Street Community Development. Sunverge Energy https://cdn.cleanegroup.org/wp-content/uploads/2500R-solar-on-roof-900x675.jpeg

Location: Sacramento, CA

Sacramento Municipal Utility District (SMUD) partnered with Sunverge Energy, and Pacific Housing to create a net zero energy (ZNE) community within a single-family home affordable housing development. The incorporation of solar PV as well as battery storage demonstrates the feasibility of microgrid level projects in using alternative energy while still ensuring power reliability. The project was funding through the US Department of Energy ARRA, Solar SMART program, California SGIP incentives, and private capital leveraging special financial structures that take advantage of Pacific Housing's non-profit status.

Related Action 1.3.2. Initiate a Heat Pump

Retrofit Program. Create a program to help fund property owners to convert HVAC units to heat pumps, which provide water heating and space heating in addition to cooling and can improve indoor air quality and community adaptation to extreme heat. Include a microgrid energy storage component to increase power reliability.

Related Action 1.3.4. Conduct a Feasibility Study for Existing Building Electrification and Back-up Power. Perform an electrification feasibility study/existing building analysis in order to understand the potential for, and associated costs of, electrification retrofitting, including heat pumps, along with on-site energy generation and battery storage to provide a more resilient back-up power supply. Establish a plan for reducing or eliminating natural gas from existing buildings, potentially through a reach code, and building resilience to potential electrical grid shutoffs.

<sup>&</sup>lt;sup>1</sup> California Energy Commission. Microgrid Analysis and Case Studies Report California, North America, and Global Case Studies: Page 19-23. 2018. Available: <a href="https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2018-022.pdf">https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2018-022.pdf</a>. Accessed February 4, 2022

#### Marina Dune Preserve Restoration

Location: Marina, CA

The Marina Dunes encompass part of the Monterey Bay dune complex spanning Moss Landing to Seaside California. This dune restoration project was a collaborative effort between project partners of the Monterey Peninsula Regional Parks District, Return of the Natives, Burleson Consulting Inc/Terracon, and Native Solutions.<sup>2</sup> Restoration activities included control and eradication of nonnative species, sand stabilization, and re-vegetation efforts. Re-vegetation of native species included the collection of site-specific seed, broadcast seeding, hydroseeding, and the out planting of propagated seedlings. Restoration through the



Photo: Monterey Peninsula Regional Park District, Marina Dunes Preserve https://www.mprpd.org/marinadunes-preserve

eradication of non-natives and re-vegetation of native species increases dune resilience to climate stress.<sup>3</sup> Structural improvement activities included delineation of pathways and fences to protect restoration areas as well as signage to educate the community on dune habitat restoration.

Related Action 2.1.4. Increase Resilience of the North Dunes. Continue to fund maintenance and monitoring at the North Dunes to determine how the changing climate will affect dune habitats. Implement enhancement efforts to improve resilience of the North Dunes.

<sup>&</sup>lt;sup>2</sup>California Coastal Dune Science Network. Marina Dune Preserve Restoration. 2021. Available: <a href="https://www.resilientcoastlines.com/projects/marina-dune-preserve-restoration">https://www.resilientcoastlines.com/projects/marina-dune-preserve-restoration</a>>. Accessed February 4, 2022

<sup>&</sup>lt;sup>3</sup> National Oceanic and Atmospheric Administration (NOAA). Office for Coastal Management. Peer-to-Peer Case Study: Dune Restoration Increases Flood Protection and Access for Community. Available: < https://coast.noaa.gov/digitalcoast/training/cardiff-state-beach.html >. Accessed February 8, 2022.

San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook



Photo: San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook https://nnala.com/san-mateo-countysustainable-green-streets-and-parking-lots-design-guidebook/

Location: San Mateo County, CA

The county of San Mateo created a guidebook to address green infrastructure and stormwater management.<sup>4</sup> With a specific focus on green streets and parking lots, the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook was developed with input from the City/County Association of Governments of San Mateo County, the Program's New Development Subcommittee, and the City/County Engineers' Association of San Mateo County. The recommended actions include site layout strategies, stormwater facility strategies, pervious

pavements, and urban tree canopy additions.<sup>5</sup> The final chapter of the guidebook is dedicated to implementation considerations. The topics covered include reducing project costs, changing municipal code/policy, and public education and outreach. Additionally, there are four example projects listed to demonstrate feasibility. The main takeaway for implementation was to bundle stormwater management solutions with general street improvements. Funding was sourced by vehicle registration fees collected in San Mateo County for congestion and stormwater management authorized by California Assembly Bill 1546 and California Senate Bill 348.

Related Action 3.1.2. Increase Green Infrastructure. Modify Capital Improvement Program (CIP) project design to consistently evaluate the potential for green infrastructure to be incorporated in CIP projects in the public right-of-way and on public lands. Identify and develop a green infrastructure pilot project that will reduce runoff volume and capture and infiltrate stormwater, based on projected changes in precipitation amounts due to climate change, and incorporates tree and shrub planting to increase carbon sequestration in the city.

Related Action 3.1.3. Reduce Stormwater Runoff. Reduce stormwater runoff through implementation of stormwater diversion and infiltration projects that reduce pollution problems caused by more frequent and intense storms and more extreme flooding events.

Related Action 3.1.4. Earmark Capital Improvement Program (CIP) funding for design, permitting and implementation of storm drain repairs. Include strategies in the 2021 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) for potential regional funding. Upsize Storm Drain Master Plan (SDMP) improvements, especially when making repairs in the lower reaches of watersheds, to handle larger storms.

<sup>&</sup>lt;sup>4</sup> American Society of Landscape Architects. Green Infrastructure and Stormwater Management Case Study. 2009. Available: <a href="https://www.asla.org/uploadedFiles/CMS/Advocacy/Federal\_Government\_Affairs/Stormwater\_Case\_Studies/Stormwater%20Case%20081%20San%20Mateo%20County%20Sustainable%20Green%20Streets,%20San%20Mateo,%20CA.pdf>. Accessed February 2, 2022

<sup>&</sup>lt;sup>5</sup> San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook. Available: <a href="https://www.flowstobay.org/documents/municipalities/sustainable%20streets/San%20Mateo%20Guidebook.pdf">https://www.flowstobay.org/documents/municipalities/sustainable%20streets/San%20Mateo%20Guidebook.pdf</a>. Accessed February 2, 2022

# Pajaro Dunes Geologic Hazards Abatement District

Location: Santa Cruz County, CA

The Pajaro Dunes Geologic Hazards
Abatement District (GHAD) is one example of an abatement district formed to mitigate sea level rise and storm impacts. The Pajaro Dunes community includes private single-family residences as well as townhouses and condominiums. These residences were built along a narrow strip of land bounded by the Pacific Ocean on the southwest and by the Pajaro River on the northeast and southeast. The development is protected by an approximately 6,000-foot-long seawall constructed of large riprap along the ocean-side of the development and a steel sheet



Photo: Pajaro Dunes. https://www.resortsandlodges.com/lodging/usa/california/central-coast/pajaro-dunes-resort.html

wall along the inland Pajaro River side of the development. The rock revetment has been repeatedly damaged by coastal erosion, occurring during server winter storms.<sup>6</sup> The GHAD is working to fund repairs to the seawall.

Related to funding and financing mechanisms.

<sup>6</sup> Pajaro Dunes Geologic Hazard Abatement District. N.d. 2020 Grading Overview Document. Available: <a href="https://pdghad.org/bg\_pdghad.org/reports/">https://pdghad.org/bg\_pdghad.org/reports/</a>. Accessed February 11, 2022.