

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 is in the process of developing a Climate Action and Adaptation Plan (CAAP). In September 2019, a Climate Committee was convened to develop and guide the preparation of the CAAP. 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 in Carmel-by-the-Sea, describes the community's major climate vulnerabilities, and identifies work that has already been done by the City to improve resilience.

The purpose of this workbook is to identify potential climate adaptation goals, policies, and actions that the City can take to improve the resilience of its community members, natural environment, and infrastructure and built environment. The potential adaptation goals, policies, and actions were developed based on the results of the City's Vulnerability Assessment, including the opportunities identified to build on existing adaptation strategies.

Considerations for Selecting Adaptation Goals, Policies, and Actions

When developing adaptation goals, policies, and actions, it is Rincon Consultants' experience that selecting actions that address the following six principles leads to implementable adaptation policies that increases a community's resilience.

1. Actions that result in **measurable increase in resilience** and reduction in climate change risks while also responding to continual changes in climate, ecology, and economics using adaptive management that incorporates regular monitoring.
2. Establish policies, institutional **structures**, and monitoring processes to implement adaptation actions.
3. Identify needed **funding**, establish needed funding mechanisms, and allocate adequate funding to support adaptation policy development and implementation.
4. Ensure meaningful and active **engagement** with the most impacted communities.
5. Employ adaptive and flexible governance approaches by utilizing collaborative **partnership** across scales and between sectors to accelerate effective problem solving.
6. Prioritize actions that promote **equity**, foster community resilience, and protect the City's most vulnerable populations including the elderly. Explicitly prioritize communities that are disproportionately vulnerable to climate impacts.

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.

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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 emergency preparedness and response following a climate-related disaster							
Adapted from the Southern California Adaptation Planning Guide, Appendix F - 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 programming and materials, to promote emergency preparedness at a neighborhood block-by-block scale.	All	Residents, Local Businesses, Second Homes	# of block captains formed	TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions
Action 1.1.2. Collaborate with Monterey Fire. 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 prepare for emergencies.	Wildfire	Residents, Local Businesses, Second Homes		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 1.1.3. Maintain and Publicize Local Evacuation Plans. Review the city evacuation plan and publicize both the city evacuation plan and the Monterey County evacuation plan for the community, especially among the most vulnerable, in the event of a wildfire or other disaster.	All	Elderly Population and People with Disabilities, Residents		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 1.1.4. Evacuation Access. Develop and maintain a list of residents who may have difficulty evacuating and provide evacuation options for residents with mobility challenges.	All	Elderly Population and People with Disabilities, Residents		TBD	TBD	TBD	Adapted from Safeguarding California Plan: 2018 Update (page 108)
Action 1.1.5. Update City Planning Guidelines in the VHFHSZ. Update City Planning guidelines to reflect and/or not conflict with current California codes (California Building Code Chapter 7 and California Residential Code R337) in the Very High Fire Hazard Severity Zone (VHFHSZ).	Wildfire	Residents, Local Businesses, Second Homes		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 1.1.6. Defensible Space. Incorporate defensible space design in landscaping guidelines.	Wildfire	Residents, Local Businesses, Second Homes		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 1.1.7. Increase Resistance to Wildfire Structural Damage. Evaluate the feasibility of gaining Firewise Community Certification in Carmel-by-the-Sea.	Wildfire	Residents, Second Homes		TBD	TBD	TBD	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 1.2.1. Establish a Resilience Hub. Ensure that a resilience hub, such as the Public Library, is available during extreme heat events, poor air quality, severe weather events, and other highly hazardous conditions. The resilience hub should have essential resources such as 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.	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers		TBD	TBD	TBD	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 ensure adaptation approaches are equitably developed and implemented.	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers		TBD	TBD	TBD	Inspired by the City of Berkeley Existing Building Electrification Strategy
Action 1.2.3. Educate 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 to prioritize disadvantaged/marginalized communities including the elderly and individuals with disabilities.	All	Elderly Population and People with Disabilities, Residents, Service Industry Workers		TBD	TBD	TBD	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.	All	Elderly Population and People with Disabilities, Residents, Local Businesses, Service Industry Workers		TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions
Action 1.3.2. Initiate a Heat Pump Retrofit Program. Create a program to aid homeowners in converting to heat pumps, which provide cooling in addition to heating and can improve indoor air quality.	Wildfire, Increased Temperature	Elderly Population and People with Disabilities, Residents, Local Businesses, Service Industry Workers	# of heat pumps installed	TBD	TBD	TBD	Inspired by the City of Berkeley Existing Building Electrification Strategy
Action 1.3.3. Improve Resilience in Critical Facilities. Invest in sustainable backup 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	# critical facilities with sustainable backup power	TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions

Goal/Policy/Action	Climate Hazard	Asset	Potential Metric	Timeframe	Potential Lead	Cost	Source
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 eliminating natural gas from existing buildings and building resilience to potential electrical grid shutoffs.	Wildfire, Increased Temp	Elderly Population and People with Disabilities, Residents		TBD	TBD	TBD	Inspired by the City of Berkeley Existing Building Electrification Strategy
Action 1.3.5. Improve Resilience in Housing Stock. Develop a program for identifying funding and incentives to weatherize homes that addresses severe weather protection, energy efficiency, indoor air quality improvements, and other housing improvements.	All	Elderly Population and People with Disabilities, Residents		TBD	TBD	TBD	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
Action 1.3.6. Electrify Fireplaces. Explore the feasibility of incentivizing electric fire places for existing and new development. Develop outreach materials explaining the health, environmental, and potential cost benefits of switching to an electric fireplace.	All	Elderly Population and People with Disabilities, Residents, Second Homes		TBD	TBD	TBD	Inspired by the City of Pacifica All-Electric Reach Code
Action 1.3.7. Identify Funding and Financing. Work with partners like 3CE and PG&E to identify and promote accessible funding and financing mechanisms to pay for home electrification, weatherization, and battery backups.	All	Elderly Population and People with Disabilities, Residents, Local Businesses		TBD	TBD	TBD	N/A - added to increase feasibility of above actions.
Policy 1.4. Increase Economic Resilience							Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions
Action 1.4.1. Support Displaced Workers. Work in partnership with the Monterey County Workforce Development Board to establish education and training partnerships for workers displaced or negatively impacted by climate change or climate adaptation policies.	All	Service Industry Workers, Local Businesses		TBD	TBD - Monterey County Workforce	TBD	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 for temporary or permanent job dislocation due to climate change hazards.	All	Service Industry Workers, Local Businesses		TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
Action 1.4.1. 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. 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 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.	All	Service Industry Workers, Local Businesses		TBD	TBD - Chamber of Commerce and/or Visit Carmel	TBD	Adapted from Gateway Cities Climate Adaptation Model General Plan Language (December 2018)
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 Adaptation Strategies and Actions
Action 2.1.1. Increase Resilience to Stronger Storms. When designing projects recommended in the Mission Trail Stream Stability Study, size improvements to handle larger storms consistent with best available climate change projections.	Stronger Storms	Mission Trail Nature Preserve	# of projects sizing improvements to handle	TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 2.1.2. Increase Forest Resilience. 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 2. Include planting 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	Drought, Increased Temp, Wildfire	Urban Forest		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 2.1.3. Increase Funding for Climate Adaptation. Earmark Capital Improvement Program (CIP) funding for design, permitting, and implementation of stream stability study projects. Include strategies in the 2021 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) and Integrated Regional Watershed Management Program (IRWMP) for potential regional funding.	All	Urban Forest		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)

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Action 2.1.4. 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 wildfire risk for neighboring private properties. Coordinate with the Carmel and Monterey Fire Departments to incorporate Best Practices into an annual maintenance plan, including cost estimates for implementation and revenue sources for implementation.	All	Mission Trail Nature Preserve		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 2.1.5. Increase Resilience of the North Dunes. Continue 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	North Dunes		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Goal 3. Resilient Infrastructure and Built Environment							
Policy 3.1. Protect and enhance reliability of utility infrastructure. Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions							
Action 3.1.1. Encourage Energy Generation. Ensure reliability of essential facilities, such as first-responder buildings, by developing alternative power supplies for the Fire Department, Police Department, and City buildings. Work to implement on-site generation through photovoltaic systems and battery storage.	Increased Temp, Wildfire	Emergency Response Facilities – Fire station, EOC, PD, PW, City Hall, etc.	# of facilities with photovoltaic systems and # of facilities	TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
Action 3.1.2. Increase Resilience of Utilities in the Fire Hazard Zones. Consider updating the General Plan's Safety Element policy P8-17 to include "move or remedy existing" utilities in high severity fire hazard zones.	Wildfire	Water Supply, Sanitary Sewer System, Power Grid, Overhead Communication, PG&E/Communication Underground Lines- gas, cable		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.1.3. CIP Funding for Carmel Projects in the IRWMP. Incorporate the Carmel projects included in the Integrated Regional Water Management Plan (IRWMP) into the City's 5-year Capital Improvement Program (CIP). Seek potential regional or State funding for projects.	Drought	Water Supply		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.1.4. Undergrounding Power Lines. Determine the feasibility of undergrounding power lines in the Mission Trail Nature Preserve and in priority transportation corridors in the VHFHSZ.	Wildfire	Power Grid		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Policy 3.2. Support greater resilience, redundancy, and reliability of local and regional infrastructure. Adapted from the Southern California Adaptation Planning Guide, Appendix B Matrix of Adaptation Strategies and Actions							
Action 3.2.1. Stormwater Infiltration. Encourage stormwater infiltration features as part of street Capital Improvement Program (CIP) projects to reduce runoff volume and increase groundwater infiltration, based on projected changes in precipitation amounts due to climate change.	Stronger Storms	Strom Drainage System	projects using infiltration features.	TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.2. 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 capture and infiltrate stormwater and incorporates tree and shrub planting to increase carbon sequestration in the city.	Stronger Storms, Increased Temp	Urban Forest, Storm Drain System	Change in impervious surface coverage.	TBD	TBD	TBD	Adapted from the Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.3. Storm Drain Repair Funding. 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.	Stronger Storms	Storm Drain System		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.4. Storm Drain Improvements. Upsize Storm Drain Master Plan (SDMP) improvements, especially when making repairs in the lower reaches of watersheds, to handle larger storms.	Stronger Storms	Storm Drain System		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.5. Develop a Guidance Project Checklist. Develop a guidance project checklist for building and site adaptation measures. The checklist, included with permit 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 climate change hazards.	All	Residents, Local Businesses, Second Homes	# of projects implementing adaptation measures.	TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
Action 3.2.6. Retrofit Existing Critical Buildings and Related Infrastructure. Require 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.	All	Emergency Response Facilities – Fire station, EOC, PD, PW, City Hall, etc., Hospital and Emergency Medical Care Facilities		TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies
Action 3.2.7. Incorporate Climate Change Adaptation into Local Plans. Prioritize the update of local plans, including the Climate Change Vulnerability Assessment, Local Coastal Program, General Plan, Mission Trails Nature Reserve Master Plan, Del Mar Master Plan, and Shoreline Management Plan, to promote climate change resilience as new information is available.	All	All		TBD	TBD	TBD	Adapted from the Southern California Adaptation Planning Guide, Appendix F - General Plan and Local Coastal Plan Model Policies

Goal/Policy/Action	Climate Hazard	Asset	Potential Metric	Timeframe	Potential Lead	Cost	Source
Action 3.2.8. Water Conservation. Partner with the Monterey Peninsula Water Management District to reduce water demand and increase water recycling, such as stormwater capture and grey water reuse, through education and outreach. Provide information and incentives for residential water use reduction.	Drought	Water Supply		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.9. Beach Sand Monitoring Program. Reinstate beach sand monitoring program described in the Shoreline Management Plan.	Sea Level Rise	Carmel Beach		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.10. Bluff Structural Monitoring Program. Implement bluff structural monitoring program and do follow-up monitoring post-storm to identify additional footing stability issues.	Sea Level Rise	Carmel Beach		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.11. 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.	Sea Level Rise	Carmel Beach		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.12. 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 our 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. 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). 3. 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 different adaptive measure.	Sea Level Rise	Carmel Beach, Shoreline Access Infrastructure, Seawall and Revetments		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.13. Update Shoreline Management Plan. Update Shoreline Management Plan and Local Coastal Program based on results of coastal engineering analysis.	Sea Level Rise	Carmel Beach		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)
Action 3.2.14. Multi-Jurisdictional Hazard Mitigation Plan. Maintain a comprehensive list of projects, based on existing plans and gaps identified in the Vulnerability Assessment, to provide to Monterey County during updates to the Monterey County Multi-Jurisdictional Hazard Mitigation Plan in 2021 and beyond.	All	All		TBD	TBD	TBD	Carmel-by-the-Sea Vulnerability Assessment (July 2021)