FINAL

City of Carpinteria

Sea Level Rise Vulnerability Assessment and Adaptation Project

Photo courtesy of California Coastal Records

City of Carpinteria
5775 Carpinteria Avenue
Carpinteria, CA 93013

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Definitions, Acronyms, & Abbreviations

Definitions

Definitions below are based upon the California Coastal Act and California Coastal Commission (CCC) *Sea Level Rise Policy Guidance* document; however, where appropriate, definitions have been refined to more accurately reflect the methodologies used in this investigation and related modeling (e.g., "Coastal Erosion" as defined below does not include wind and current attributes as project modeling did not have these factors).

1 percent Annual Chance Storm: A single storm wave event with a 1 percent annual chance of occurring in any given year based on extreme value analysis of historic storms (also referred to as a 100-Year storm event). A storm event of this magnitude on one day does not change the probability of another 1 percent annual chance event occurring in the same year.

100-Year/500-Year FEMA Flood Event: A fluvial flooding event based on extreme value analysis of historic storms with a 1 percent (100-Year)/0.2 percent (500-Year) chance of occurring in a given year; or a 1 in 100/1 in 500 chance of occurring in a given year. A storm event of this magnitude on one day does not change the probability of another 1 percent annual chance event occurring in the same year.

Active Cleanup Program Sites: State program that includes all non-federally owned sites currently undergoing active cleanup from an unauthorized release of toxic material.

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which minimizes harm or takes advantage of beneficial opportunities.

Coastal Confluence: The combination of fluvial flooding and high tides elevated by sea level that expands creek flooding extents.

Coastal Erosion: Loss of sand, sediment, vegetation, or soil in the beaches, dunes, bluffs, or cliffs along the coast caused by wave attack and bluff retreat.

Coastal Flooding: Flooding caused by wave run-up that occurs during high tide during a large 1 percent annual chance storm. The wave run-up typically has a velocity that can cause damage. While smaller magnitude storms could also cause damages, these were not considered in this report.

Coastal Zone: A regulatory zone established by State Legislature and shown on maps prepared by the California Coastal Commission, and for which the California Coastal Act establishes policies and regulations. The entire extent of the City of Carpinteria is within the Coastal Zone.

Climate Change: A shift from the normal climate weather patterns associated with a place, whether due to natural causes or as a result of human activity, such as the burning of fossil fuels and the release of greenhouse gases (GHGs).

Dwelling: Any residential structure or an apartment or condominium unit within a structure that is used for habitation and contains a kitchen. This does not include hotel/motel rooms or long-term communal or transitory type accommodation. This includes vacation rental units within defined residential zoning districts. There can be more than one dwelling within a building; these include multi-family, apartment, or condominium residential land uses.

Economic Benefits: Can be measured in two ways – market and non-market benefits. Market benefits are measured using market values. For example, to value a private residence one would use the market price of the home. Many of the benefits in this Report are non-market benefits. Economists have developed several techniques to measure benefits when the price is set at zero. For example, beaches are free in California, but numerous studies indicate that visitors are willing to pay to go to the beach. This willingness to pay is non-market value. This Report incorporates the literature on non-market valuation to measure these changes. In addition to these direct economic impacts, beach recreation also has several indirect impacts on local spending, sales and transient occupancy tax revenues, etc. There are, however, no reliable means by which these indirect costs and benefits could be quantified without additional substantive work.

Economic Costs: Costs are measured similarly to economic benefits and can be measured as either market or non-market costs. In many cases in this Report, market costs are measured as replacement or repair costs. For example, this Report measured the costs of roads at replacement cost.

Economic Impacts: Measure of spending and economic activity resulting from a physical change to the landscape or a policy change.

Electronic Submittal of Information (ESI) Sites: Hazardous waste sites that are required to report regularly to the State Water Resources Control Board (SWRCB) for soil, vapor, underground storage, or land disposal activities.

Environmentally Sensitive Habitat Areas (ESHA): Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

Estuarine: Habitats where fresh water from creeks mixes with salty ocean water.

Extreme Monthly High Water: Highest tide elevation based on the average elevation of the highest monthly high tide for a 19-year tidal epoch period. This level would be expected to be inundated once a month.

Fiscal Impacts: Measure of not only tax revenue impacts, but also changes in costs to a city from a policy change. For example, if increased beach recreation requires increased spending for public safety or number of lifeguards, a fiscal impact analysis would also incorporate these changes.

Fluvial Flooding: Fluvial, or creek flooding, occurs when excessive rainfall over an extended period of time causes a river/stream/creek to exceed its channel capacity. The fluvial flood is usually described by the volume of streamflow. Actual flood extents can also be influenced by sedimentation, material obstruction of a water corridor (e.g., debris blocking culverts), and extreme high tides, but these are not typically included in the fluvial flood mapping.

King Tide: A non-scientific term for an extreme high spring tide that occurs when the Moon is the closest to Earth in its elliptical orbit. These typically occur three to four times per year.

Large Quantity Generators: EPA-administered program for sites that generate 1,000 kilograms per month or more of hazardous waste, or more than one kilogram per month of acutely hazardous waste. Examples may include larger industries, pharmacies, and large service stations.

Leaking Underground Storage Tanks: Includes underground storage tanks or underground piping connected to a tank that have had an unauthorized release (leak or spill) of a hazardous substance. Examples of these incidents include leaks at underground fuel tanks associated with gas stations or large fleet operators such as government facilities.

Maladaptation: An adaptation strategy which may protect a single sector but reduces the incentive to implementing additional adaptation measures while diminishing the long-term capacity to adapt in the future.

Net Benefits: Estimates the economic benefits minus the economic costs. Typically, these net benefits are discounted over time, making later generations less important than the current generation. However, in the economic analyses within this Report, discount rates were not used and everything is reported in 2017 dollars.

Open Space: A land use designation within the City of Carpinteria General Plan.

Planning Horizon: Within this Report, the span of time outward to the future when sea level rise or other climate-based impacts are projected to occur. This plan cycle is often defined by an agency to analyze and prepare for potential vulnerabilities, define a planning

framework with policies focused on physical development of the land, and to manage community services and resources.

Sandshed: A system of sand supply and transport pathways that contain both watershed delivery and transport along the coastal littoral cell.

Sea Level Rise: Relative average rise in mean sea level. Global sea level rise, driven by the expansion of ocean waters as they warm, the addition of freshwater to the ocean from melting land-based ice sheets and glaciers, and extractions from groundwater. However regional and local factors such as techtonics and ocean and atmospheric circulation patterns result in relative sea level rise rates that may be higher or lower than the global average.

Sector: A category of natural or built resources, such as building structures, wastewater infrastructure, beach access, and ESHA.

Sector Profile: A summary or description of existing sector resources that may be impacted by future sea level rise and coastal hazards.

Small Quantity Generators: EPA-administered program for sites that generate more than 100 kilograms per month, but less than 1,000 kilograms of hazardous waste per month. Examples may include: small service stations, dry cleaners, medical facilities, or a small wastewater treatment facility.

Tax Revenue Impact: Measures the changes in taxes as a result of a physical or policy change. This Report estimates changes in sales taxes and transient occupancy taxes (TOTs) resulting from changes in beach tourism/recreation caused by potential vulnerabilities to coastal hazards and sea level rise. In addition, the loss in property taxes from coastal erosion for 2018 and 2030 are estimated.

Tidal Inundation: Flooding caused during predictable monthly high tides that occur at least once a month.

Toxics Release Inventory: EPA-administered program that monitors industries that work with certain toxic chemicals that may pose a risk to human health and the environment. These facilities are typically larger industries that are involved in manufacturing, mining, power generation, or waste treatment.

Trigger: A measureable indicator that catalysts or "triggers" the start of a planning, permitting, and/or implementation process.

Vulnerability Assessment: Within this Report, the process of identifying, quantifying, and prioritizing (or ranking) potential exposures, threats, and values (intrinsic and economic) of resources and infrastructure in an area or a system.

Acronyms and Abbreviations

°F	Fahrenheit
ADT	average daily trips
BAU	Business as Usual
BEACON	Beach Erosion Authority for Clean Oceans and Nourishment
BFE	Base Floor Elevation
Cal OES	California Governor's Office of Emergency Services
Caltrans	California Department of Transportation
CCAMP	California Coastal Analysis and Mapping Project
CCC	California Coastal Commission
CCT	California Coastal Trail
CDP	Coastal Development Permits
CEC	California Energy Commission
CEVA	Coastal Ecosystem Vulnerability Assessment
CHAD	Coastal Hazard Abatement Districts
CIRGIS	Channel Islands Regional Geographic Information System
City	City of Carpinteria
CoSMoS	Coastal Storm Modeling System
County	County of Santa Barbara
CP	Coastal Plan
CRSMP	Coastal Regional Sediment Master Plan
CSBAT	California Sediment Benefits Analysis Tool
CSD	Carpinteria Sanitary District
CSLC	California State Lands Commission
CUPA	Certified Unified Program Agency
CVWD	Carpinteria Valley Water District
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DTSC	Department of Toxic Substances Control
EFGS	Ecological Functions Goods and Services
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMHW	Extreme Monthly High Water
EPA	U.S. Environmental Protection Agency
ESA	Environmental Science Associates
ESH	Environmentally Sensitive Habitat
ESHA	Environmentally Sensitive Habitat Areas
ESI	Electronic Submittal of Information
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GCM	Global Climate Model
GHAD	Geologic Hazard and Abatement District
GHG	Greenhouse Gas
GIS	Geographic Information System
GP	General Plan

GSW	General Steel Works
HMBP	Hazardous Materials Business Plan
HMP	Hazard Mitigation Plan
HPI	Housing Price Index
IPCC	Intergovernmental Panel on Climate Change
JPA	Joint Powers Agency
LCP	Local Coastal Plan
LHMP	Local Hazard Mitigation Plan
LiDAR	Light Detection and Ranging
LPT	Local Planning Team
LQG	Large Quantity Generators
LUP	Land Use Plan
LUST	Leaking Underground Storage Tank
MHW	Mean High Water
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MLLW	Mean Lower Low Water
mm/year	millimeters per year (mm/year
MSL	Mean Sea Level
MTD	Metropolitan Transit District
NAVD	North American Vertical Datum of 1988
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Council
OPC	Ocean Protection Council
OSPR	Office of Spill Prevention and Response
PDO	Pacific Decadal Oscillation
RCP	Relative Concentration Pathways
Report	2018 Coastal Resiliency, Vulnerability Assessment, and Adaptation Project
SBA	Santa Barbara Area
SCC	California State Coastal Conservancy
SCE	Southern California Edison
SLR	Sea Level Rise
SMR	Salt Marsh Reserve
SQG	Small Quantity Generator
State Parks	California Department of Parks and Recreation
SWRCB	California State Water Resources Control Board
TOT	Transient Occupancy Tax
TRI	Toxics Release Inventory
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WWTP	Wastewater Treatment Plant

Report, Map, & Data Disclaimer

This research is intended to help individuals and communities appreciate the vulnerabilities of the City of Carpinteria's resources to sea level rise based on the current available science. This Report is advisory and does not describe regulatory or legal actions that the City of Carpinteria or the California Coastal Commission may take to address sea level rise. This Report is part of an ongoing process to understand and prepare for future coastal hazards as a result of climate change. Substantial uncertainties exist with modeling and projecting future hazards and their potential impacts to the City of Carpinteria.

The data utilized for purposes of this Report were collected from various sources and are not detailed to the parcel-scale and should not be used for navigation, permitting, regulatory or other legal uses. Users of the information displayed in maps are strongly cautioned to verify all information. Although the authors strive to review all resource sector and infrastructure data received, we cannot verify the completeness or accuracy of all spatial data. For this reason, Revell Coastal LLC, Wood PLC, and the City of Carpinteria are not responsible for any errors, omissions, or positional inaccuracy contained in this Report.

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