

Appendix B

Preliminary Concept Design

City of Carpinteria

Dune and Shoreline Management Plan

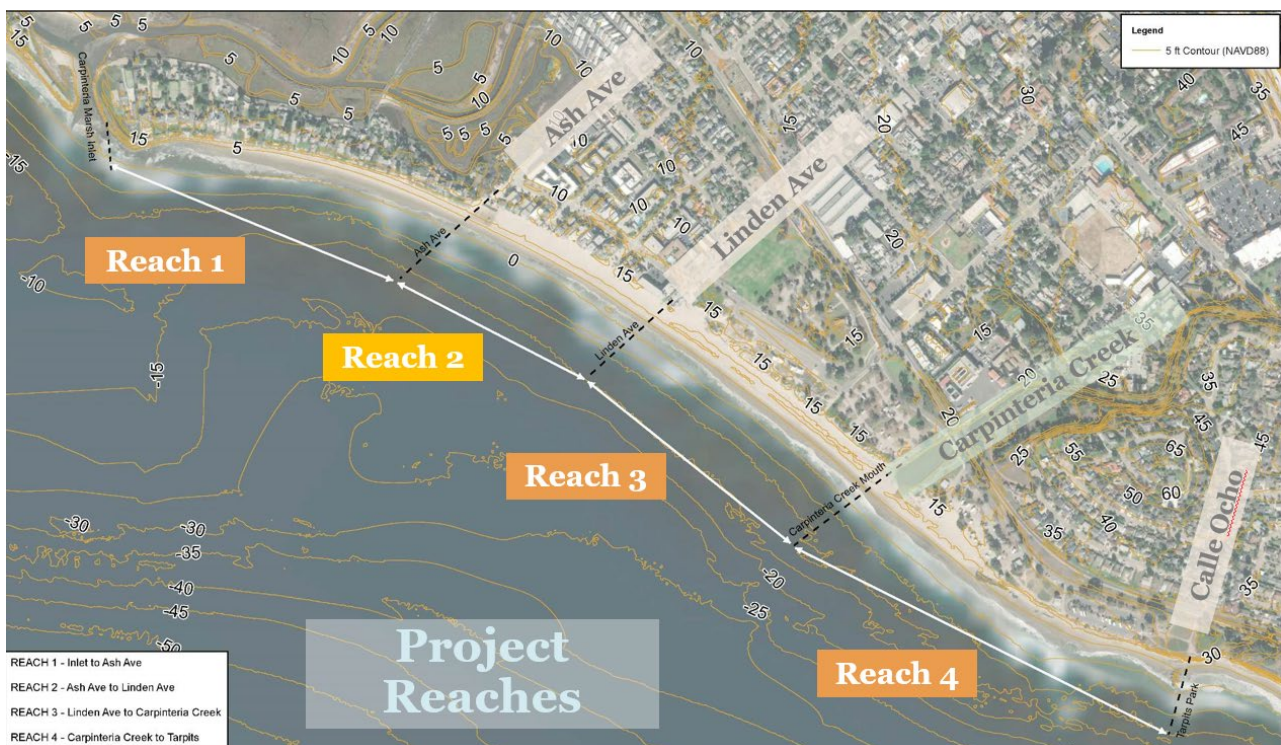
Preliminary Concept Design - Summary

Background

The Dune and Shoreline Management Plan (Project) will provide the conceptual design and feasibility analysis for a living shoreline to address sea level rise impacts in vulnerable areas within the boundaries of the City of Carpinteria (City). The goal of the Project is to protect vulnerable resources including Carpinteria State Beach, Beach Neighborhood, affordable housing, and critical public infrastructure. This Project was identified within the City's Sea Level Rise Vulnerability Assessment and Adaptation Plan (SLRVAAP) as a potential adaptation strategy and will be integrated into the City's Coastal Land Use Plan/ General Plan (CLUP/GP) which is currently being updated.

For the purposes of modeling, a Preliminary Design has been created based on input from the City, stakeholders, public input, agency coordination, and background research. The following discussion details its creation, including strategies that used in modeling and those omitted from further consideration.

There are 4 reaches being considered for technical understanding. The reach in which the City has the most control is within Reach 2 between Ash Avenue and Linden Avenue, as it owns the full extent of this area. Reach 1 lies within the County, Reach 3 is owned by State Parks, and the majority of Reach 4 is also owned by State Parks. Nevertheless, continued discussions are underway with the County and State Parks to discuss how to most effectively address sea level rise and the protection of coastal assets in these areas.



Summary of Options

Five primary strategy options are considered for the Project's Preliminary Design, as follows. The strategy options were presented to the public at workshops, and the preferred strategies were subsequently incorporated into the Preliminary Design. Each design option was presented first as a concept, and then second with associated mapping and design options. A final Preliminary Design was then approved through the public and set forward for modeling analysis.

Strategy Options (each described in detail following the "Preliminary Design" summary)

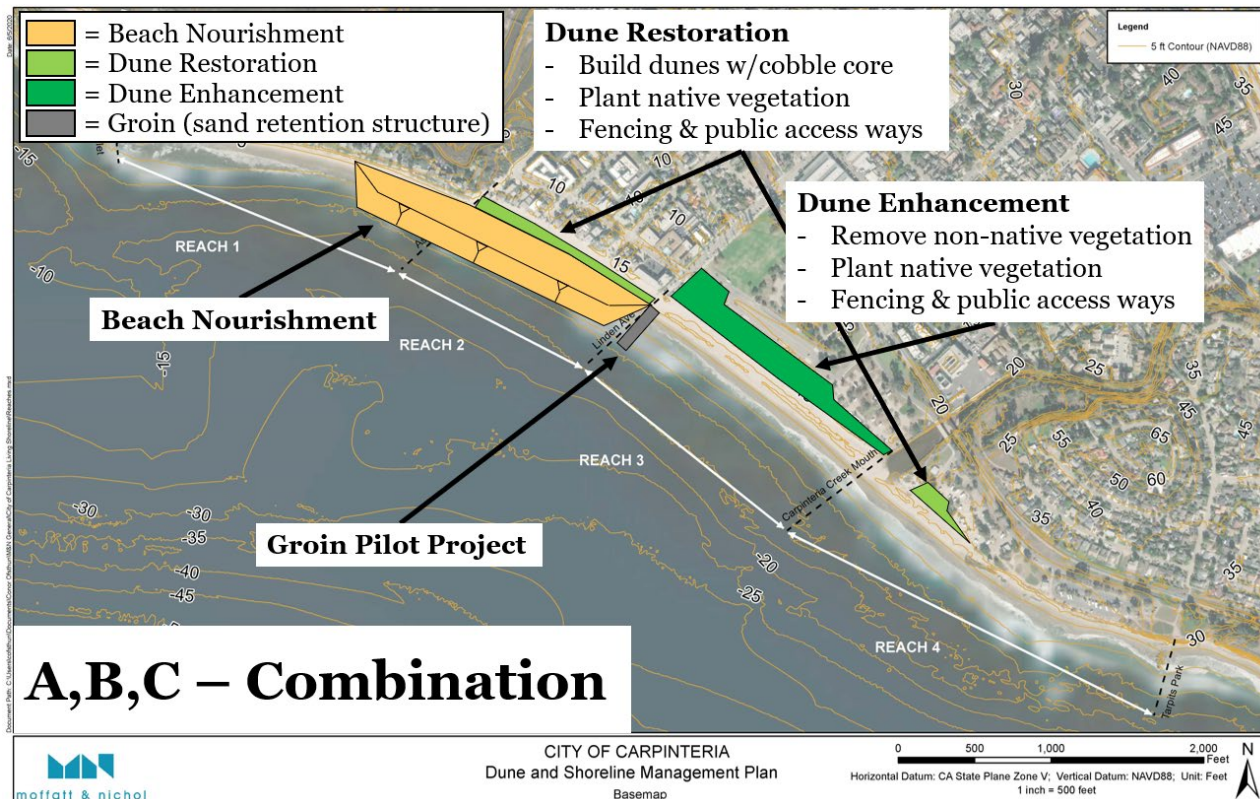
- A. Dune Restoration and/or Enhancement (Living Shoreline)
- B. Beach Nourishment
- C. Groin
- D. Breakwater or Artificial Reef
- E. Artificial Headland



Preliminary Design

A, B, & C. Combination Option: The Preliminary Design for the Carpinteria shoreline consists of a combination of three design options, including (1) construction of a living shoreline, (2) continued beach nourishment, and (3) a groin extending off the end of Linden Avenue.

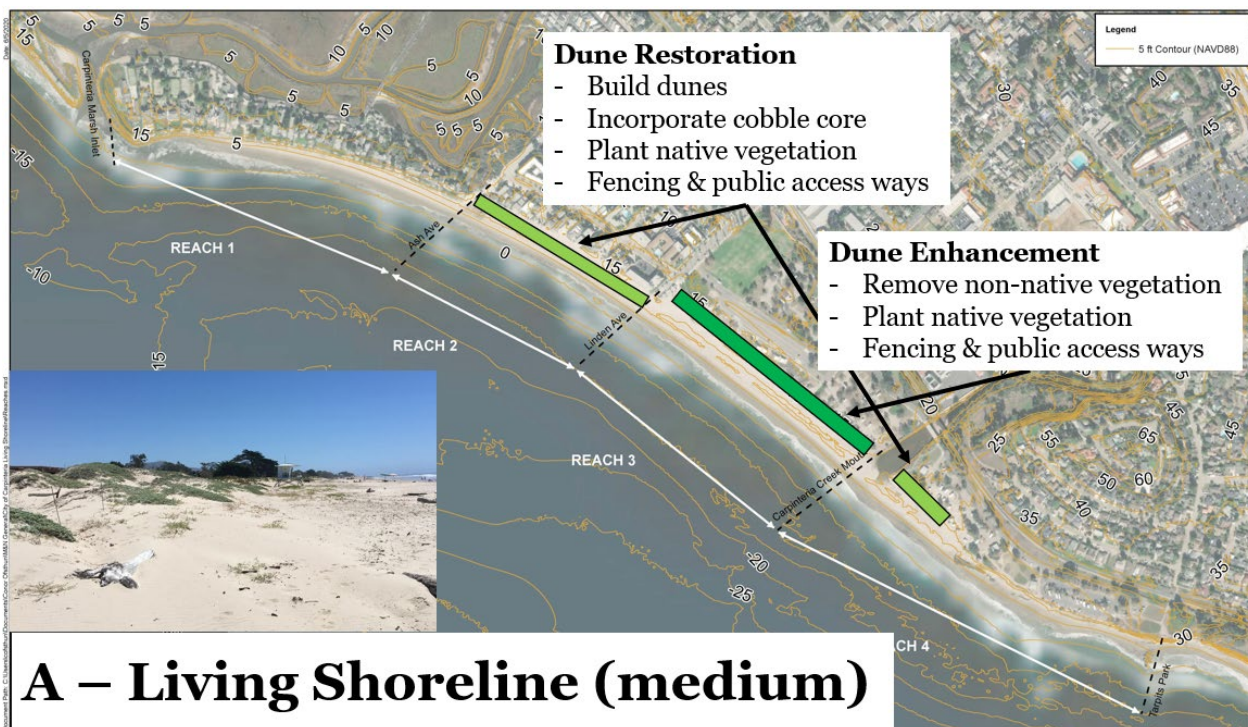
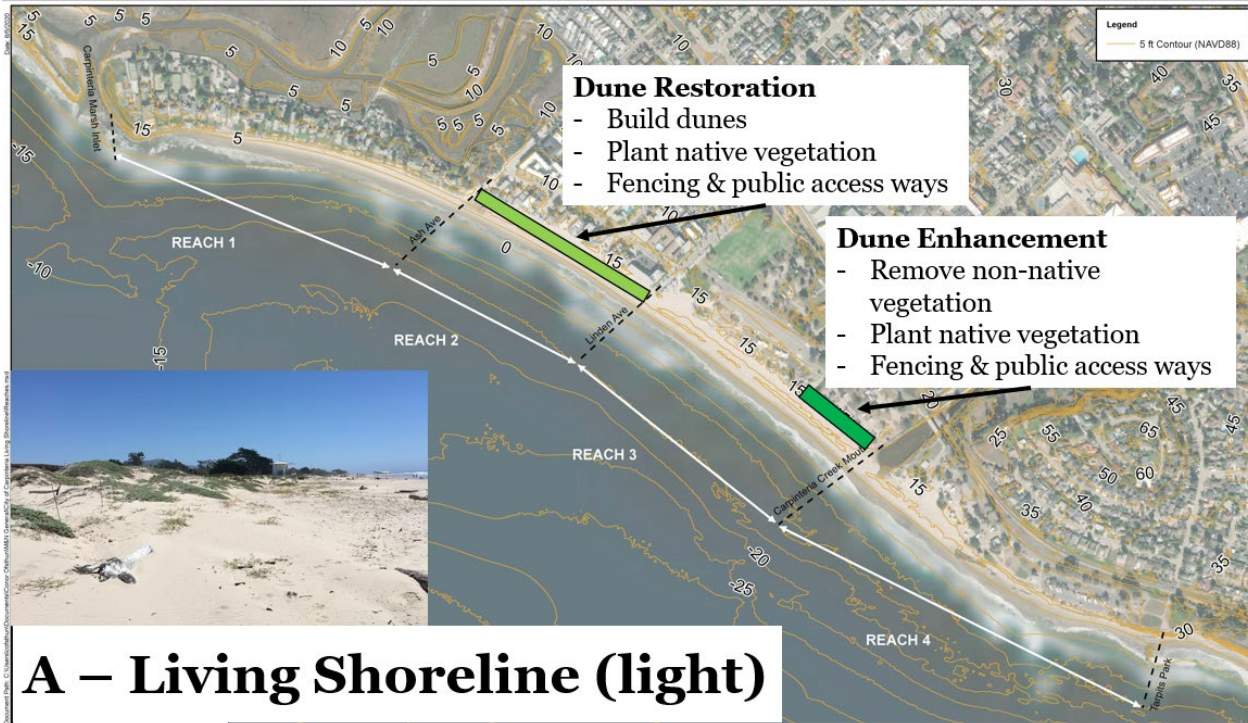
Specifically, beach nourishment would be implemented at the southern portion of Reach 1 extending through the entirety of Reach 2. A groin pilot project would be implemented to both retain the beach nourishment activities and practically confirm biological impacts long-term before dedicating a permanent structure. A “living shoreline” would be also be constructed within the confines of Reach 2 and northern portion of Reach 4, built with a cobble core base, sand and sediment structure, and native vegetation to assure stability. Within Reach 3, the existing dunes would be enhanced via the removal of non-native vegetation, planting of native vegetation, and installation of established public access ways to prevent dune disturbance.



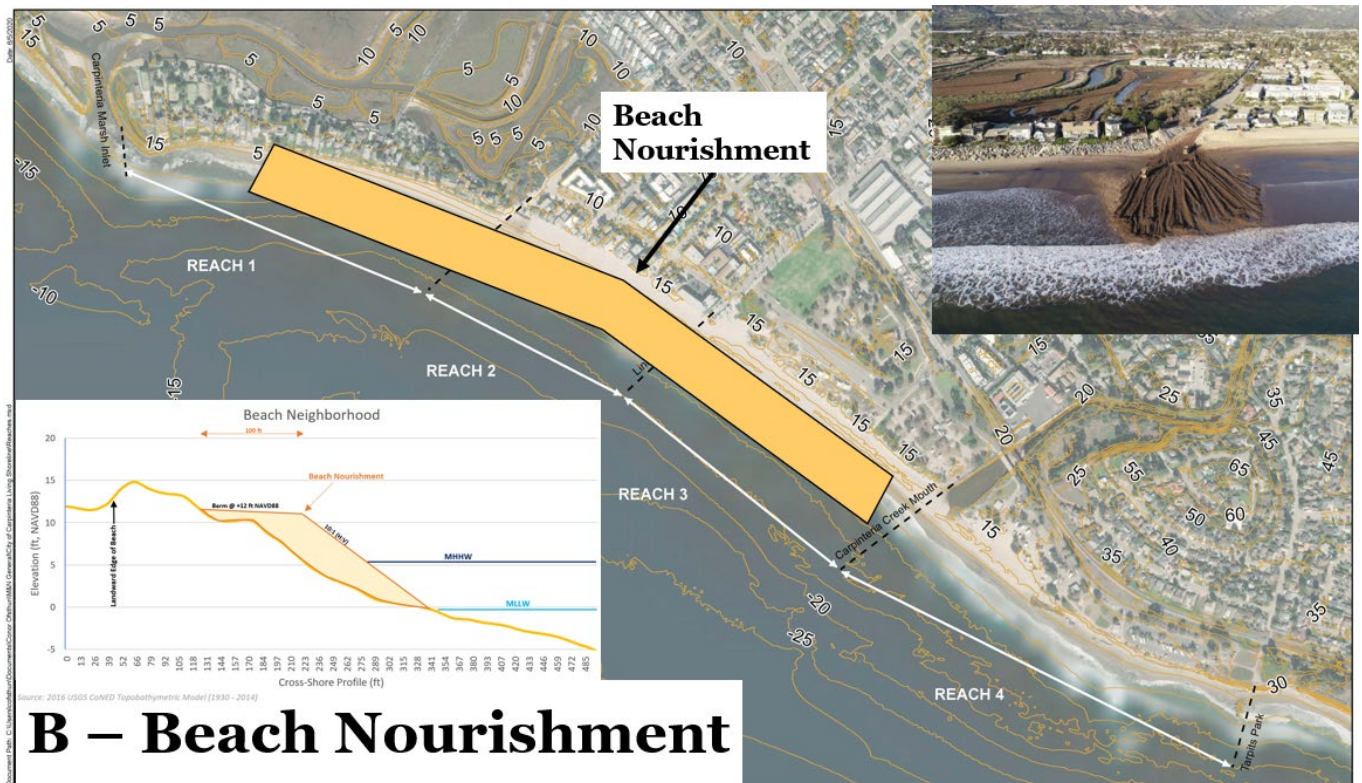
Strategy Toolbox and Strategy Options

Project strategies discussed to-date with stakeholders and under consideration are summarized below.

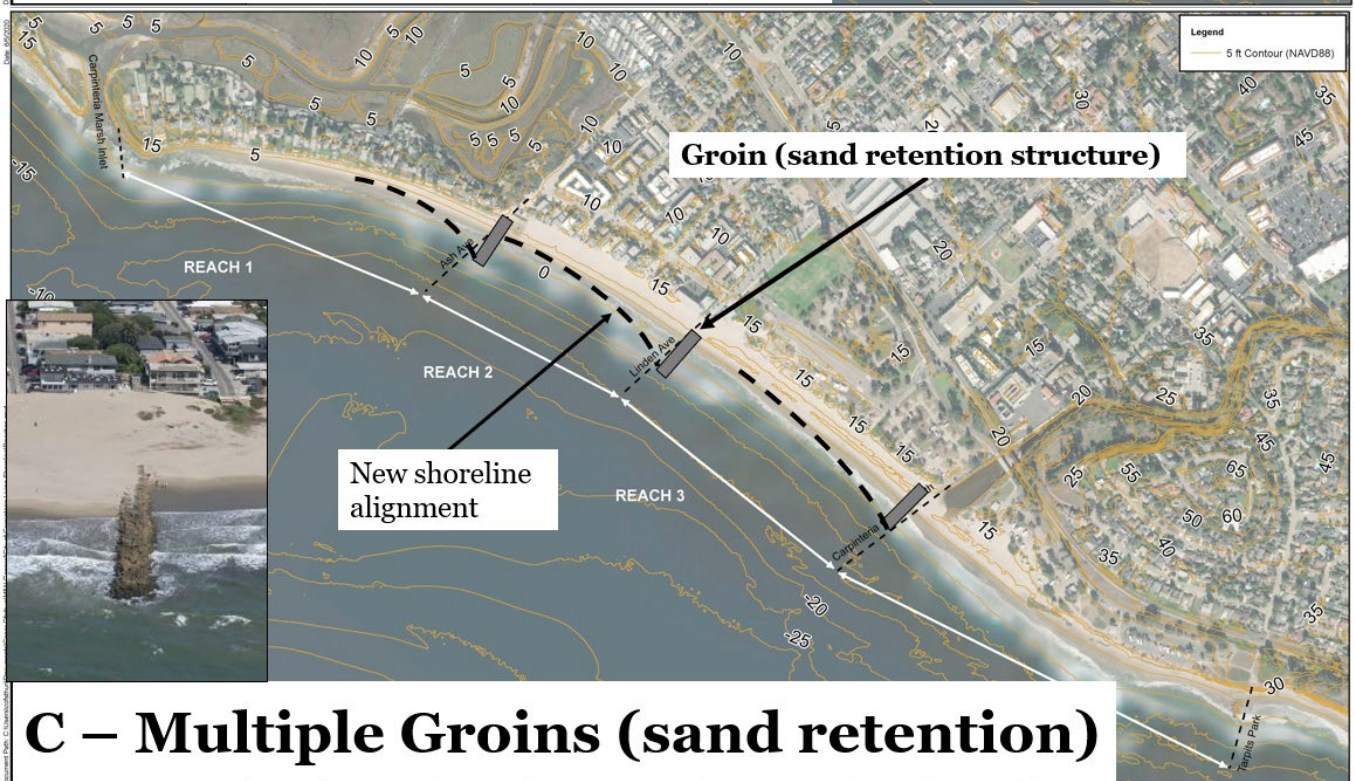
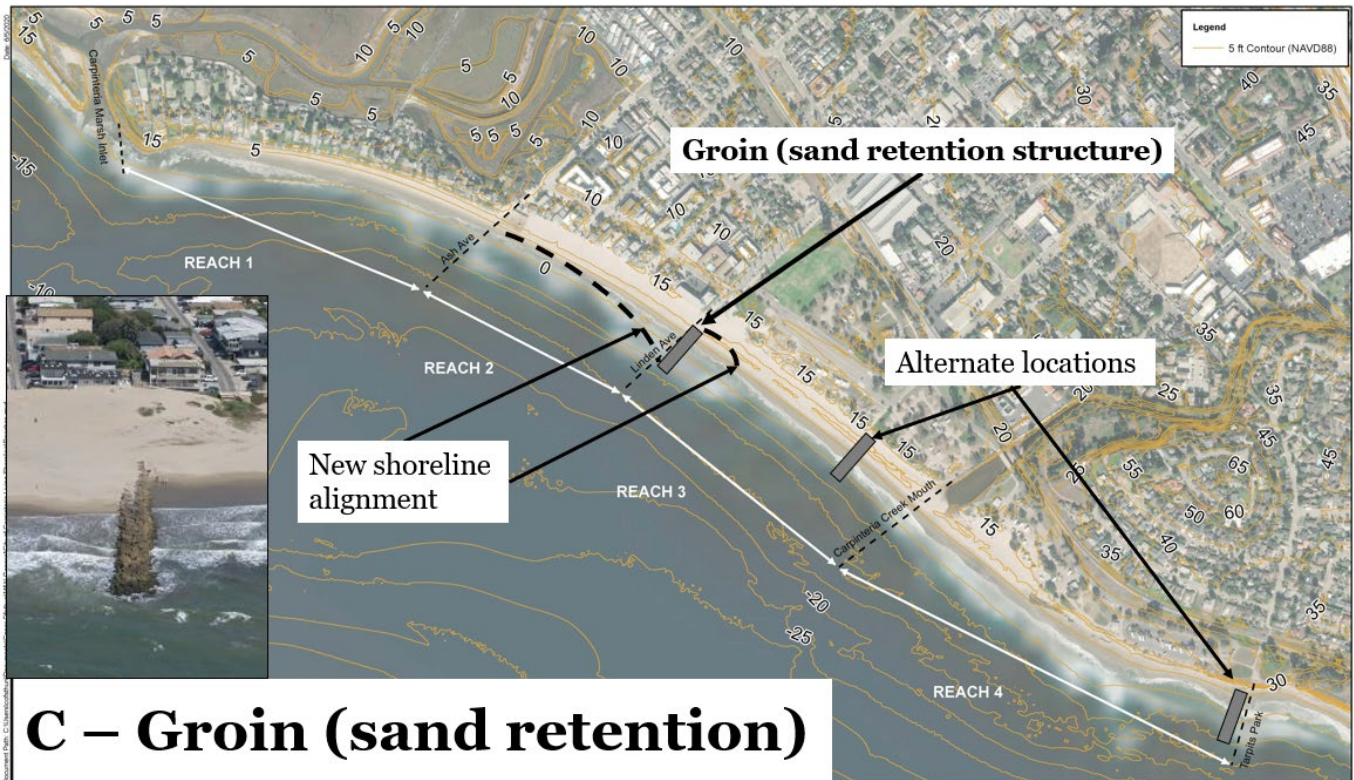
Strategy Option A. Dune Restoration and/or Enhancement (Living Shoreline) – Restoration would create new dune systems through grading and manmade mounds; enhancement would improve existing dunes through dune nourishment and removal of non-natives, along with the planting of native vegetation. Additionally, the Project will evaluate a dune system with a cobble foundation as well as potential cobble placement within splash zone to protect dunes, with consideration for tradeoffs to other project benefits (e.g. beach recreation), with cobble sources considered such as from the Carpinteria Salt Marsh and/or Santa Barbara Debris Basins.



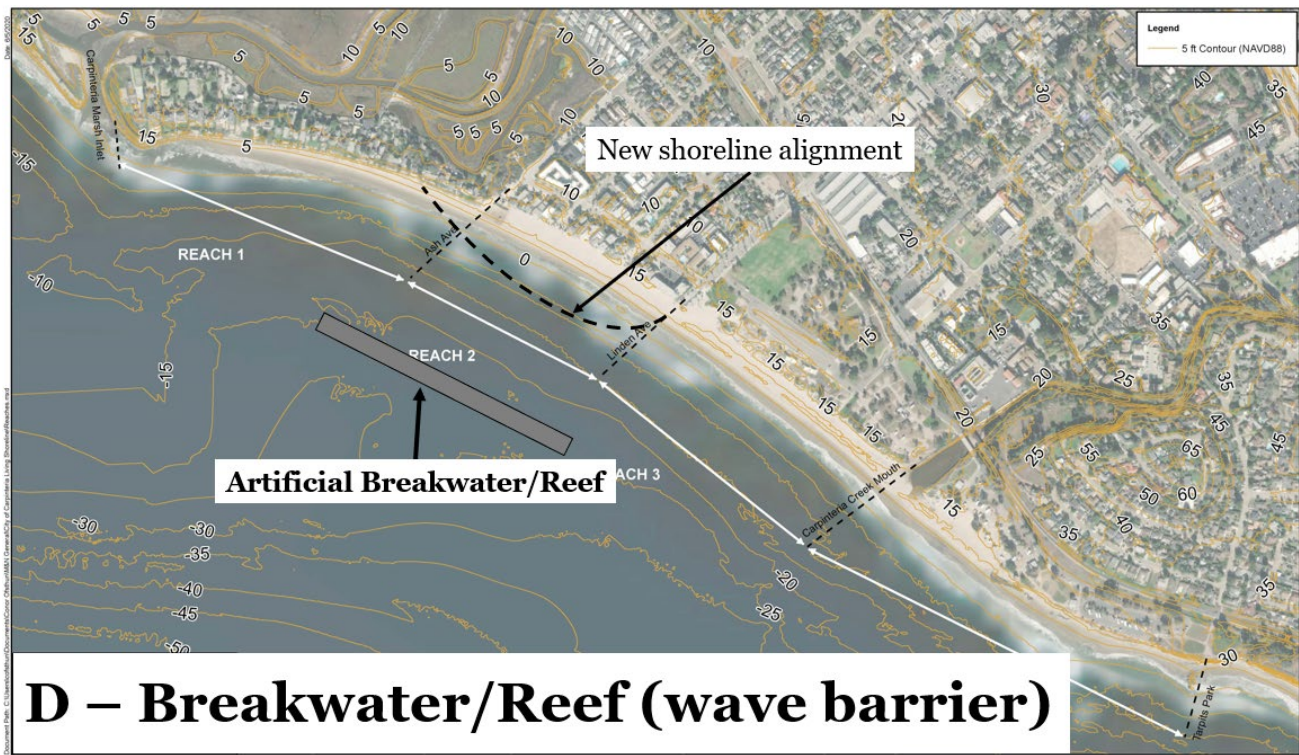
Strategy Option B. Beach Nourishment – As under existing conditions, opportunistic beach nourishment is key to longevity and success of the Project; nourishment sources will continue to be evaluated and investigated, however sources would likely be opportunistic and not necessarily scheduled. Competition for beach compatible sediment (quality, size, non-polluted) are all challenges. The full extent of nourishment could range from Reach 1 through 3, or confined to Reach 2 (see below images).



Strategy Option C. Groin – For successful beach nourishment, sand retention is a critical factor to consider. A groin, potentially at Linden Avenue, would retain sand to greater extent. The Plan and associated modeling will evaluate the option of establishing multiple smaller groins throughout the reaches, or one larger design groin (see below images).



Strategy Option D. Breakwater or Artificial Reef – A breakwater would be made of rock or potentially other sources (e.g. geotubes) to protect the beach and sand would deposit off of the shoreline increasing overall beach width (see below image). Challenges are the initial cost (however no maintenance costs) and lack of recent permits for breakwaters in CA (none approved by CCC since 1960s).



Strategy Option E. Artificial Headland – An artificial headland created at the southernmost end of Reach 4 could be constructed, increasing the sand retention northward of the headland and creating a extended new shoreline alignment (see below image). This option has not been selected for further evaluation due to cost and biological resource concerns.

