Puerto Rico Coastal Study

INTRODUCTION

BACKGROUND

The initial areas of interest include the municipalities of San Juan, Carolina, Vega Baja, Arecibo, Aguadilla, Aguada, Rincon, Añasco, Mayagüez, Cabo Rojo, Loiza, Luquillo, and Humacao. After scoping process and plan formulation phase, the project area for Federal recommendation is within the municipalities of San Juan and Rincon. This area has approximately 800 structures, including critical infrastructure, with a combined estimated value of approximately $2.9 billion. It is expected that storm-induced erosion, wave attack and flooding will continue damaging properties and infrastructure as well as reducing beach habitat during the 50-year period of analysis which will be further exacerbated by sea level rise.

STUDY AUTHORIZATION AND PROCESS

Authority for the Puerto Rico Coastal Storm Risk Management (CSRM) study is granted under Section 204 of the Flood Control Act of 1970, Public Law 91-611. Study funds were appropriated under Bipartisan Budget Act of 2018 Public Law 115-123. The study will examine alternatives and will recommend one plan that meets Corps criteria to be the Tentatively Selected Plan. If the plan is supported by Corps decision makers, it will receive an approved Chief's Report recommending it for authorization. The plan will then need to received appropriations for construction, which would be cost shared as appropriate between USACE and DNER.

PLAN FORMULATION

PROBLEMS IN THE STUDY AREA

Coastal storm damages to property and infrastructure due to wave attack, inundation, and erosion. These problems from storms and hurricanes have been increasingly evident in Puerto Rico over the recent past, with special attention on the storm season in 2017 which left severe destruction from Hurricane Irma and Maria, followed by winter storm Riley in 2018.

STUDY OPPORTUNITIES

- Maintain recreation: Area depends heavily on tourism, as well as aesthetic quality for community
- Maintain or enhance beach habitat/environmental resources

STUDY OBJECTIVES

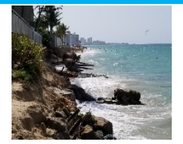
Main Objective:
- Manage the risk of damages from wave attack, flooding, and erosion caused by coastal storms

Secondary Objectives:
- Maintain environmental quality
- Maintain recreation

STUDY CONSTRAINTS

- Avoid or minimize impacts to cultural resources, reef resources, submerged vegetation and critical infrastructure






Plan formulation is the process of developing alternative plans to address a given problem. The Corps uses a 6-step planning process:

1. Problem Identification
2. Inventory Existing Conditions and Forecast Future Conditions
3. Formulate Alternatives
4. Evaluate Alternatives
5. Compare Alternatives
6. Select a Plan

In order to formulate alternative plans the team identified preliminary management measures. A management measure is a structural or nonstructural action that can be implemented at a specific geographic site to address one or more planning objectives. Measures are then screened against planning criteria, including objectives and constraints, and are combined into alternative plans.

GENERAL SUITE OF ALTERNATIVES

- **Alt-1** No Action
- **Alt-2** Revetment
- **Alt-3** Beach nourishment
- **Alt-4** Breakwaters
- **Alt-5** Beach nourishment + Breakwaters

ECONOMICS – The National Economic Development Plan (NED)

The NED should represent the alternative that achieves the greatest net benefits consistent with protecting the environment.

PRIMARY BENEFITS
Storm damage reduction

INCIDENTAL BENEFITS
Recreation

COSTS
Cost of alternative plan over a 50-year period of Federal participation

PRIMARY (CSRM) BENEFITS = **ESTIMATED $ DAMAGES WITHOUT PROJECT** - **ESTIMATED $ DAMAGES WITH PROJECT**

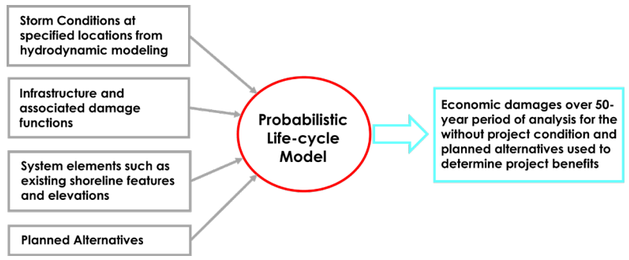
$$\text{Benefit to Cost Ratio} = \frac{\text{TOTAL BENEFITS}}{\text{COSTS}}$$

In addition, plans must have a benefit to cost ratio > 1

ENVIRONMENTAL & CULTURAL RESOURCES

The National Environmental Policy Act (NEPA) is a federal law enacted in 1969. As required by NEPA, the Corps will assess potential environmental effects of alternatives, to include cultural resources and the human environment. The findings will be explained in a NEPA document, which will be integrated into the Draft and Final feasibility Report. The NEPA document will be available for public review and comment before any decisions are made or actions are taken. Your input helps the Corps in identifying key environmental issues that may need to be evaluated.

ENGINEERING & ECONOMICS MODELING



The engineering analysis for this study considers the existing shoreline conditions and natural coastal processes in the study area, as well as sea level rise scenarios. Beach-fx model is then used to estimate the future damages to property and infrastructure resulting from hurricanes and coastal storms. The future without-project damages (FWOP) are used as the base condition against which potential alternatives will be compared. The difference between FWOP and Future with-Project (FWP) damages are used to determine primary CSRM benefits.

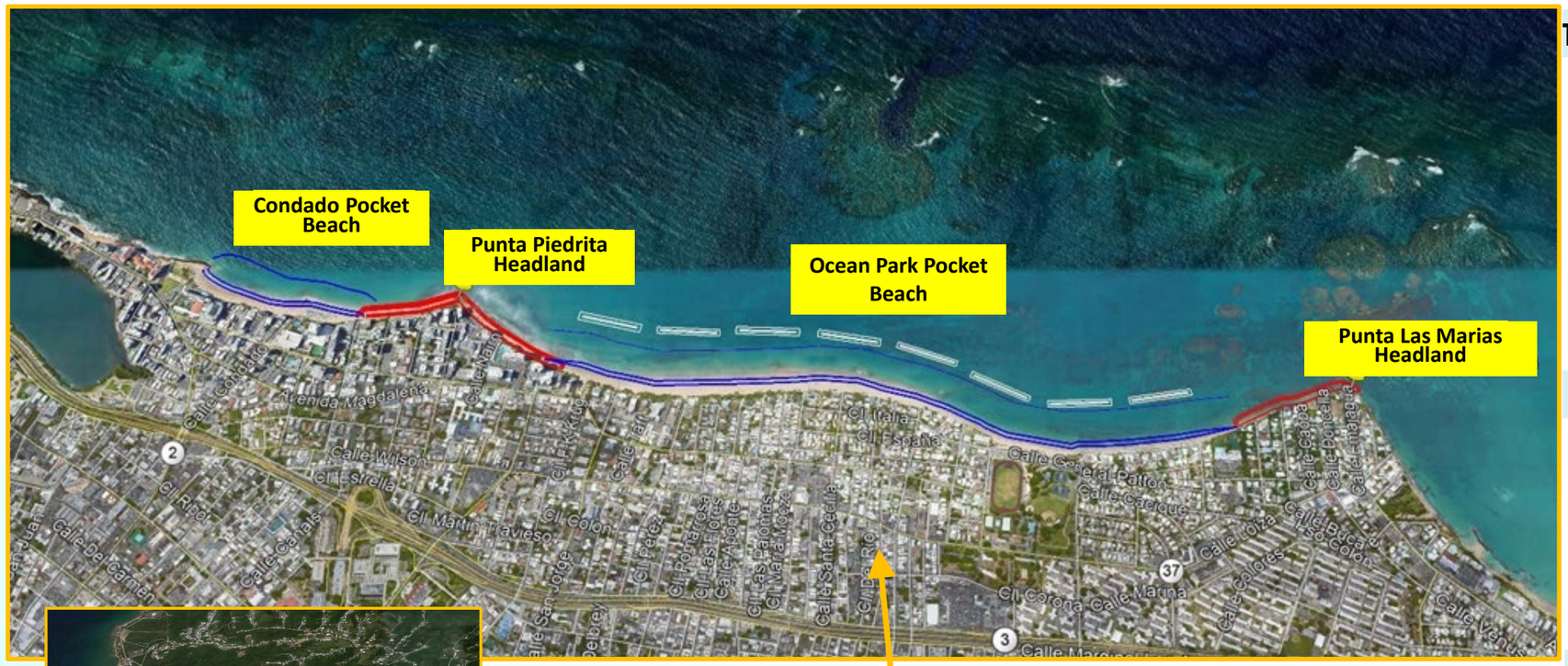
TENTATIVELY SELECTED PLAN

The four Planning and Guidance accounts NED, Regional Economic Development (RED), Environmental Quality (EQ) and Other Social Effects (OSE) are used as criteria in formulation and selection of the TSP. This study has identified viable alternatives to manage the risk of damages to property and infrastructure in the Condado pocket beach, Punta Piedrita headland, Ocean Park pocket beach, Punta Las Marias headland (west side), and Rincon B planning reaches. Though quantification of all the NED and RED benefits is still ongoing, the TSP is considered to be a robust and effective proposal for risk reduction. The TSP is effective, efficient, acceptable and complete. It provides enhanced life safety and positive economic benefits to the nation. The study team will continue to optimize the proposed solutions in order to provide the public with the best available alternative.

ESTIMATED STUDY SCHEDULE

*Contingent on authorization and appropriations

THE TENTATIVELY SELECTED PLAN



Structural Measures

- Revetment
- Nourishment
- Breakwaters

TSP KEY FEATURES

* Beach nourishment (1,910 ft) along Condado Pocket Beach shoreline;
* Stone revetment on Punta Piedrita headland (2,450 ft);
* A breakwater field in combination with beach nourishment protecting 6,810 ft along the Ocean Park Pocket Beach shoreline;
* Stone revetment on west side of Punta Las Marias headland (1,400 ft); and
* Stone revetment (5,650 ft) along the Rincon shoreline.

TOTAL PROJECT FIRST COST** (FY21): $203 M

Federal Cost: $122 M
(62% Initial construction and 48% periodic nourishment)
Non-Federal Cost: $81M
(38% Initial construction and 52% periodic nourishment)

**Includes 40% Contingency. Based on Class 4 cost and Abbreviated Risk Assessment

ESTIMATED MITIGATION

Total Mitigation by Habitat (acres):
Colonized Bedrock: 6.09
Scattered Coral-Rock: 6.04
Patch Reef/Aggregated: 2.55
Colonized pavement: 0.10

Total Mitigation by Planning Reach (acres):
Condado pocket beach: 3.75
Punta Piedrita headland : 2.53
Ocean Park pocket beach: 5.52
Punta Las Marias headland: 2.13
Rincon : 0.82
TOTAL: 14.8

COMPENSATORY MITIGATION

- A **functional assessment** will be included in the final report using worst case scenario/ largest potential CSRM measure footprints.
- Updated **resource surveys** will be completed in PED and the functional assessment updated at that time to reflect the final mitigation numbers.

PUBLIC ENGAGEMENT

Release of Integrated IFR/EA: 11/20/2020
Public Meetings (2): 12/10/2020
Participating Agencies: DNER, NMFS and USFWS