SAN JUAN METROPOLITAN AREA, PUERTO RICO (BACK BAY)

COASTAL STORM RISK MANAGEMENT STUDY

DRAFT INTEGRATED FEASIBILITY STUDY & ENVIRONMENTAL ASSESSMENT

Presented by:
Team
U.S. Army Corps of Engineers
Jacksonville District
August 18, 2020

US Army Corps of Engineers®

TODAY'S WEBINAR

- Presentation
  - Federal Interest
  - What this study is about
  - Corps study processes and considerations to get to a proposed project
  - What the proposed project is
- Audience will be on global mute
- Audience may write comments in the chat box
- Team will answer verbal and chat questions at end of presentation
- Other questions – will be compiled with answers and posted on website
- Other opportunities to submit comments

FEASIBILITY STUDY OVERVIEW

STUDY AUTHORITY & FUNDING
Section 204 of the Flood Control Act of 1970, Public Law 91-611; Bipartisan Budget Act of 2018

OVERARCHING STUDY OBJECTIVE
To reduce damages to infrastructure as a result of coastal flooding from storm surge, tide and waves and sea level change as a result of coastal storms and hurricanes

NON-FEDERAL SPONSOR
The Puerto Rico Department of Natural & Environmental Resources (DNER)

3 YEAR SCHEDULE, STUDY FUNDING = $3M

December 2018

December 2018 To June 2020

June 16, 2020

July 28, 2020

STUDY IS HERE

October 2020

June 2021

September 2021

*2022 through 2029

*Contingent on authorization and appropriations

FEDERAL INTEREST/PARTICIPATION

- Plans recommending Federal participation should represent an alternative that achieves the greatest net benefits for damage reduction consistent with protecting the environment.
- Benefits = reduction in coastal flooding damages to infrastructure and vehicles
- Called the National Economic Development (NED) Plan.
- NED becomes the Tentatively Selected Plan (TSP).
- Project becomes eligible for Federal cost sharing:
  - Federal government: 65% of the project cost
  - Non-federal sponsor: 35% of the project cost

NATIONAL ECONOMIC DEVELOPMENT

ENVIRONMENTAL QUALITY

OTHER SOCIAL EFFECTS

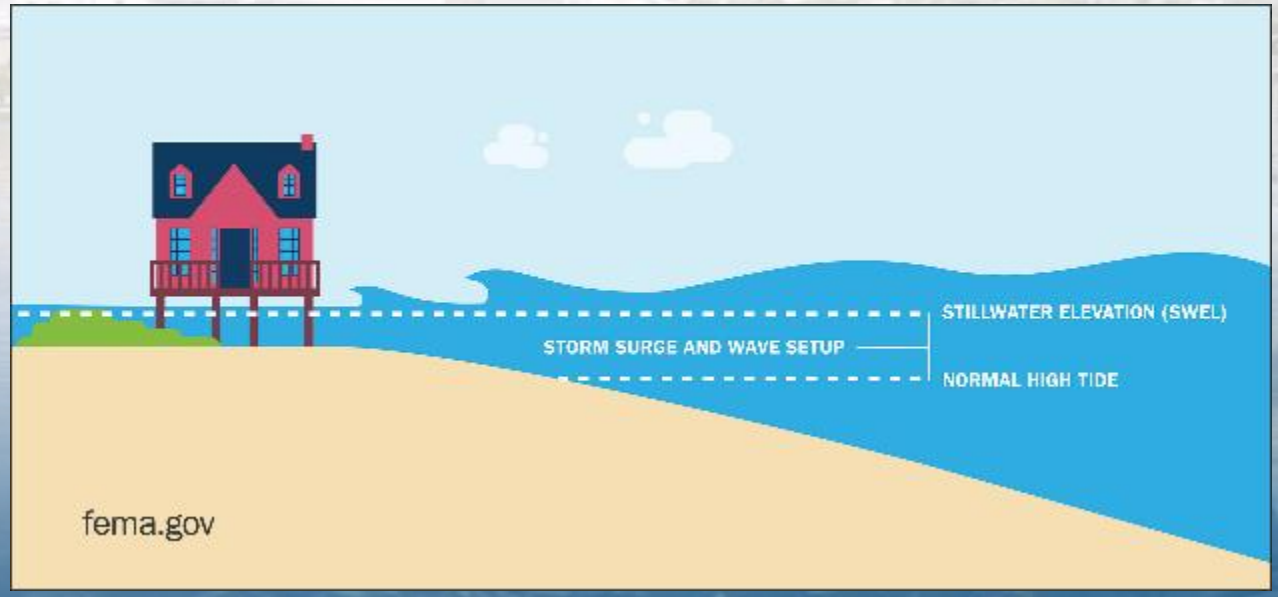
REGIONAL ECONOMIC DEVELOPMENT

WHAT IS COASTAL FLOODING?

- Coastal flooding
  - ***Is*** flooding as a result of storm surge, tide, and wave contributions during coastal storms and hurricanes
  - ***Is not*** inland flooding or flooding as a result of inland runoff from.

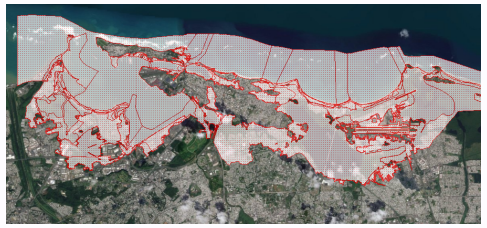
- This results in
  - damages to critical infrastructure, residential, commercial structures and vehicles
  - adverse environmental and social effects;
  - losses to the regional and national economy;
  - lack of resilience for affected communities.

- These effects will likely be exacerbated under future sea level rise scenarios



STUDY SCOPING

1. Flood Risk Zones

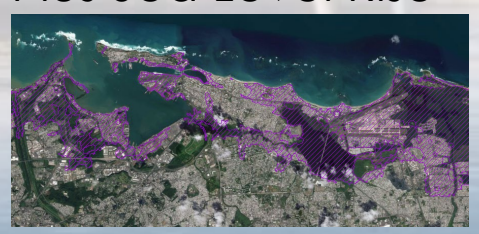


FEMA 2018 Advisory: 0.2% VE & AE Flood

2. Sea Level Rise Forecasts

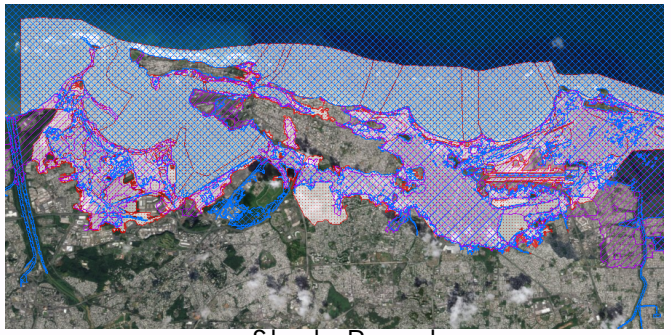
NOAA SLR Viewer: 6ft above MHHW

3. Category 5 Hurricane Plus Sea Level Rise



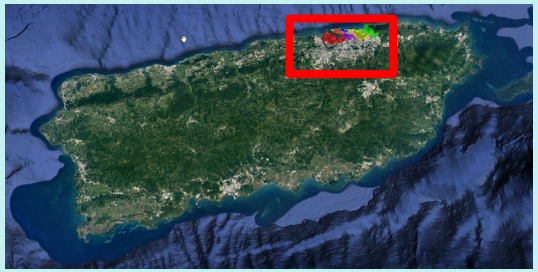
Flooding ADCIRC + SWAN: Cat 5 Mom 3 feet SLR

All three overlayed



Study Reach Delineation

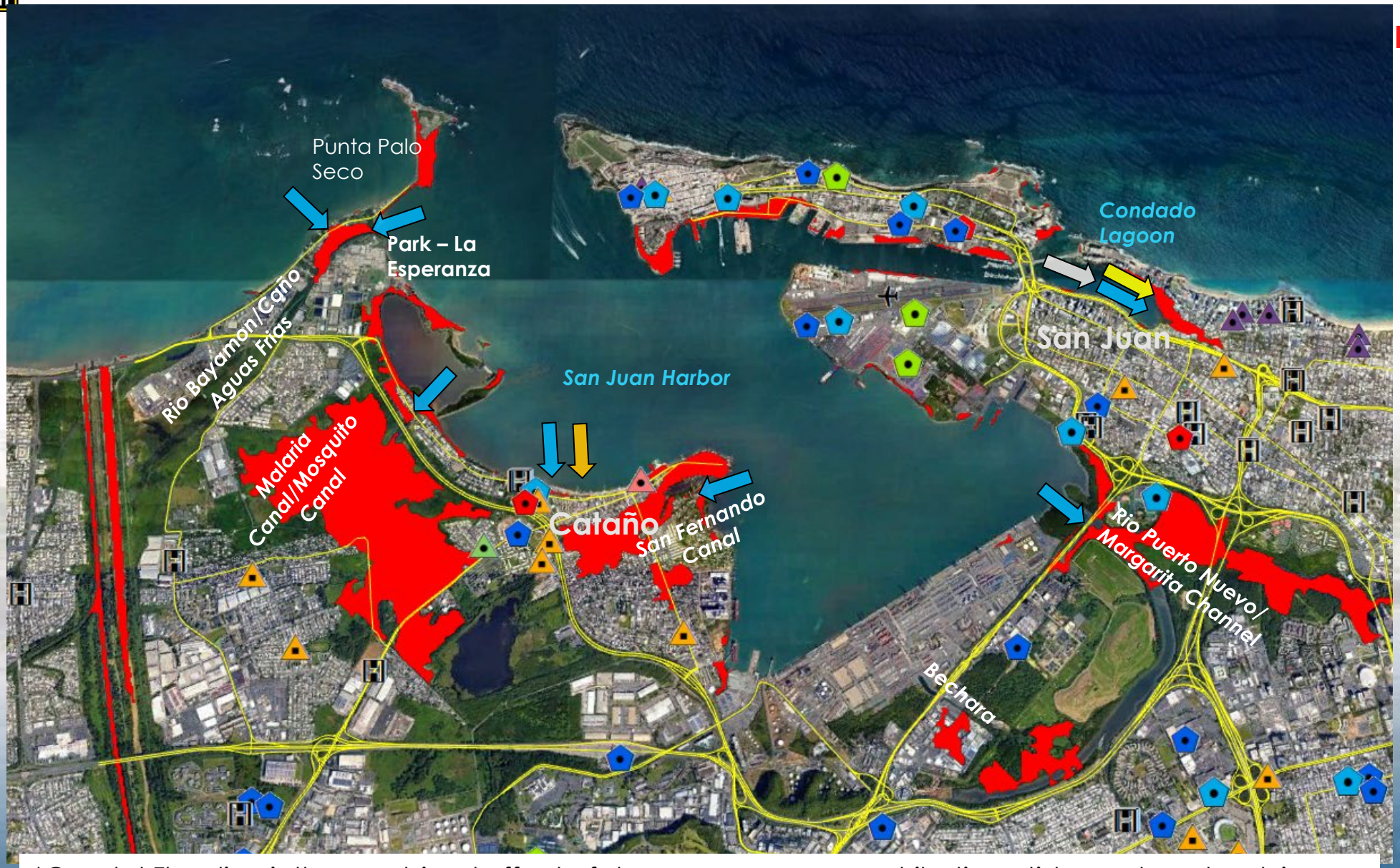
West San Juan Bay | East San Juan Bay | Condado Lagoon | Martin Peña Canal Area | Los Corozos & San Jose Lagoons | Torrecilla Lagoon



VICINTY MAP

WHERE ARE THE KEY PROBLEMS?

INFRASTRUCTURE & WATER



Cat 1 storm, showing storm surge entering in low lying elevations (FEMA)

- **Primary Problems:**
  - **Coastal Flooding***
- **Incidental Problems:**
  - **Wave attack**
  - **Tidal flooding**
  - **Health/Safety water quality**

Critical Infrastructure Key

- Shelters
- EM Office
- Airports
- Armory
- Fire Departments
- Hospitals/Health Care Facilities
- Municipal Police Departments
- State Police Departments
- Transitional Shelters
- Puerto Rico Convention Center
- Hurricane/Tsunami Evacuation Route

*Coastal Flooding is the combined effect of storm surge, wave contributions, tide, and sea level rise.

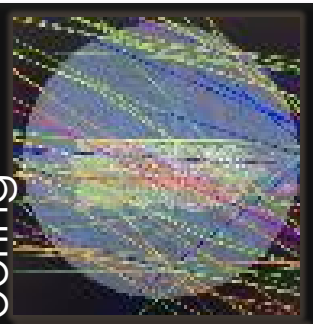
HOW WAS THE TENTATIVELY SELECTED PLAN (TSP) CHOSEN?

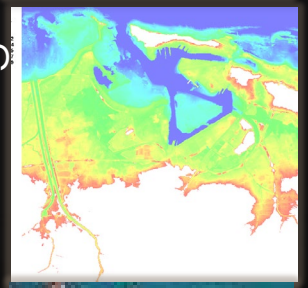
- USACE 6 step planning process
- 6 planning reaches
- Study analyzed 32 measures, resulting in a focused array of 23 alternatives
- Alts were then evaluated and compared according to USACE planning principles and planning criteria.
- Existing conditions modeled
- Alternatives modeled and compared to existing conditions
- TSP is the alternative that reasonably maximizes net benefits, consistent with protecting environment

STRUCTURAL	NON-STRUCTURAL	NATURAL AND NATURE-BASED FEATURES (NNBF)
▪ Seawalls ▪ Levees ▪ Storm surge barriers ▪ Sluice gates/storm surge gate ▪ Pumps	▪ Relocation of critical infrastructure & infrastructure ▪ Elevation of critical infrastructure & infrastructure ▪ Floodproofing (wet/dry) ▪ Acquisition	▪ Greenways ▪ Mangrove Fringe ▪ Elevated Living Shoreline ▪ Horizontal "Tiered" Levee ▪ Breakwaters

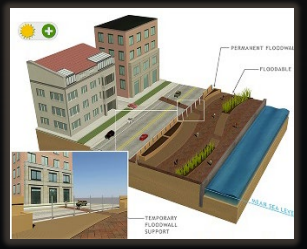
WHAT INFORMATION WAS USED IN THE ANALYSIS?

Engineering





Economic



Database of storms, along with tide, waves, and sea level change

Elevations of ground and infrastructure (first floor elevations)

Infrastructure and vehicles (GIS and structure values)

Array of Proposed Alternatives

Probabilistic Life-cycle Model

Economic damages
- Without-project alternative
- With-project alternatives

Final Array of Alternatives

Tentatively Selected Plan

TENTATIVELY SELECTED PLAN

KEY FEATURES

- Structural
  - Levees = 2.0 miles
  - Seawall = 6.7 miles
  - 1 sluice gate
- Natural & Nature Based
  - Elevated living shoreline= 2.3 miles
  - Breakwater = 0.7 miles
- Recreation features
- Habitat Creation
- Mitigation

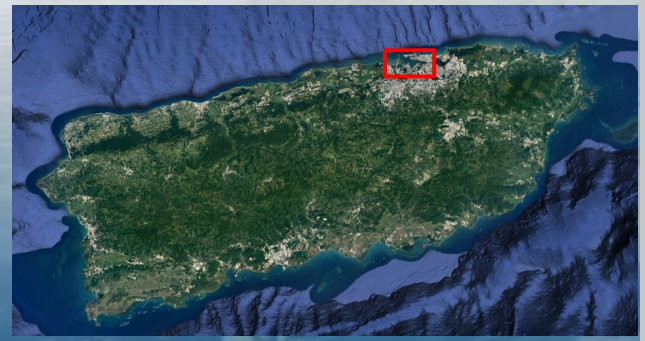
Structural Measures

- Seawall
- Levee (traditional)
- Sluice gate

Natural/Nature Based Features (NNBF)

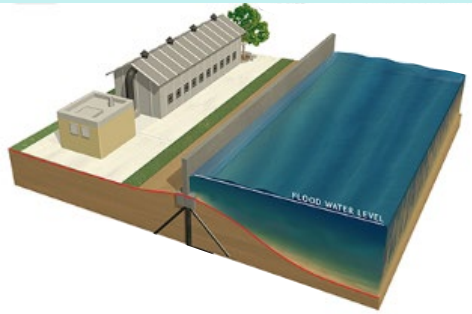
- Elevated living shoreline
- Breakwaters

VICNITY MAP



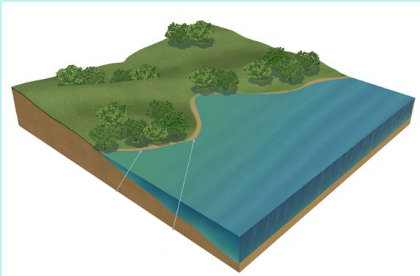
TENTATIVELY SELECTED PLAN
Reach "WSJB-1b" – Near Palo Seco

Height = 7-9 feet (PRVD02)



SEAWALL
Length = 1 miles
Width = 10 feet

LEVEE
Length = 1 mile,
Width = 50 feet

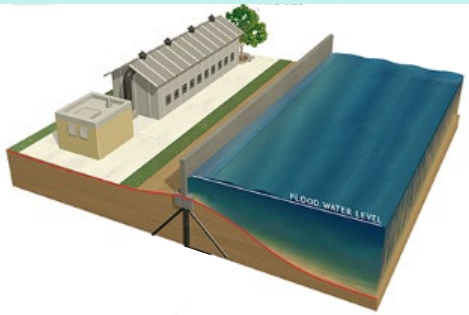


ELEVATED LIVING SHORELINE
Length = 0.7 mile,
Width = 80 feet

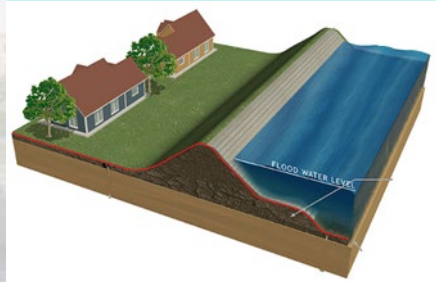
SEAWALL + LEVEE + ELEVATED LIVING SHORELINE

TENTATIVELY SELECTED PLAN
Reach "WSJB-2"

Height = 7-9 feet (PRVD02)



SEAWALL
Length = .2 miles
Width = 10 feet



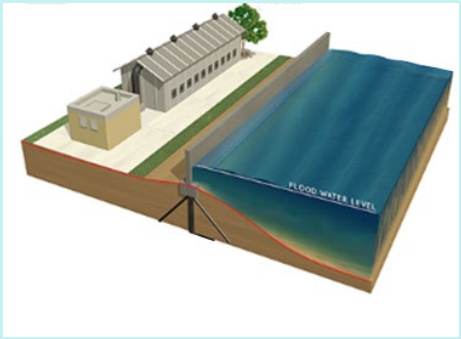
LEVEE
Length = .6 mile
Width = 50 feet

SLUICE GATE
Length = 0.01 mile
Width = 20 feet

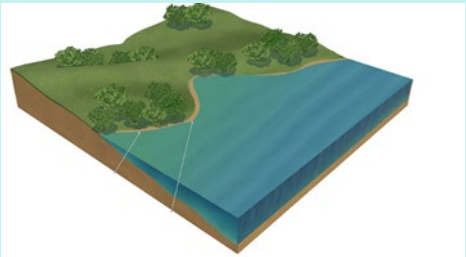
STORM GATE + LEVEE + SEAWALL

TENTATIVELY SELECTED PLAN
Reach "WSJB-3" -Cataño

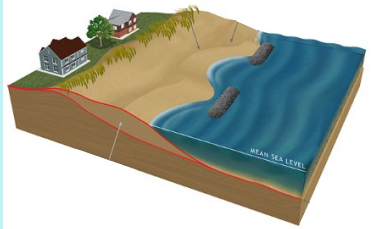
Height = 6.5 to 8.5 feet (PRVD02)



SEAWALL
Length = 4 miles
Width = 20 feet



ELEVATED LIVING SHORELINE
Length = 0.4 mile
Width = 80 feet



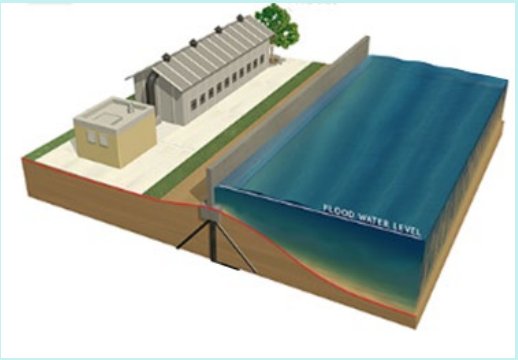
BREAKWATER
Length = 0.7 mile
Width = 82 feet
Height =6 feet

SEAWALL + ELEVATED LIVING SHORELINE + BREAKWATER

TENTATIVELY SELECTED PLAN
Reach "WSJB-4"

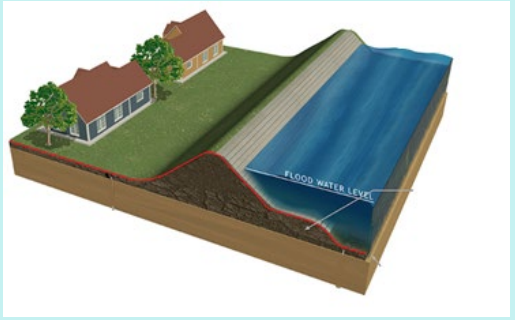
LEVEE + SEAWALL

Height = 8 to 10 feet (PRVD02)



SEAWALL

Length = 4 miles
Width = 20 feet

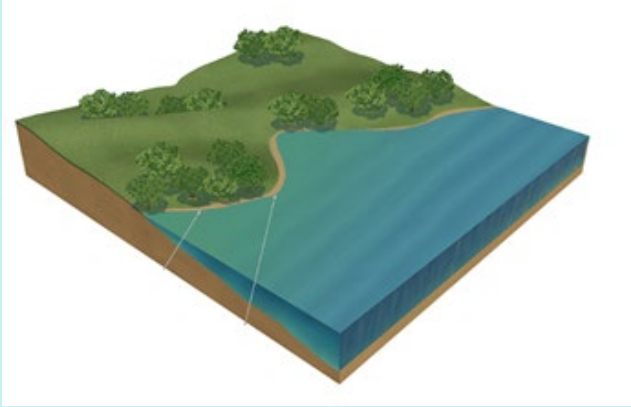


LEVEE

Length = .3 mile
Width = 50 feet

TENTATIVELY SELECTED PLAN
Reach "CL" – Condado Lagoon

Height = 7 to 9 feet (PRVD02)



ELEVATED LIVING SHORELINE

- Length = 1.26 miles
- Width = 80 feet
- Main berm w/ 2 smaller berms w/ native vegetation suitable for brackish water

ELEVATED LIVING SHORELINE

WHAT ARE THE ECONOMIC BENEFITS & HOW MUCH DOES IT COST?

Economic Benefits:

- Average Annual Net Benefits*: $ 64M
- Benefit to Cost Ratio: 5.2 at Federal Discount rate 2.75%

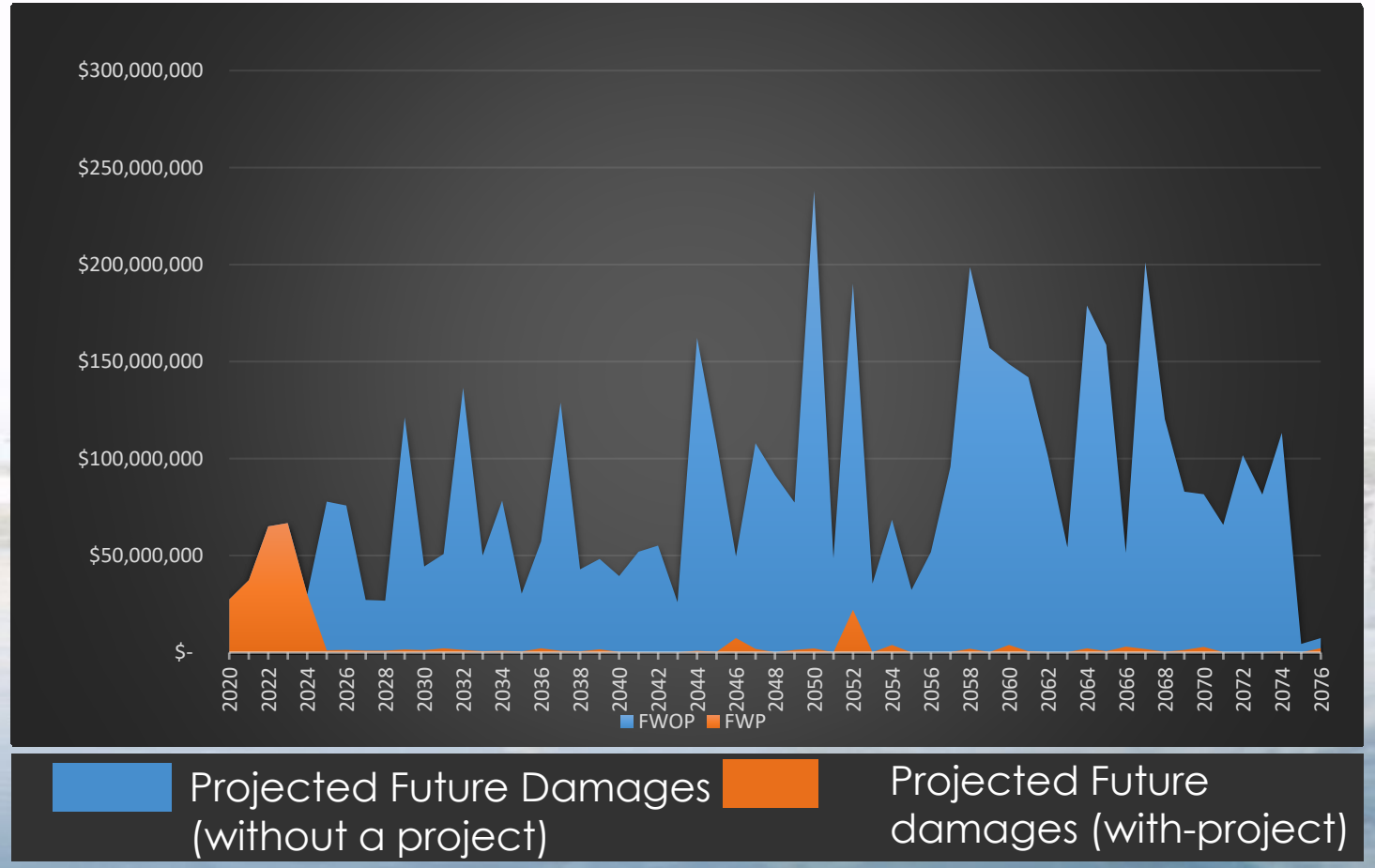
Cost:

- Project First Cost**: $ 331.6M
- Federal Cost (65%): $214M
- Non-Federal Cost (35%): $117.6M

Construction:

- Could begin in 2024
- Anticipated approximately 5 years to complete

Projected Damages over 50 years – Without and With a Project



*Annualized over a period of 50 years
**Cost is at current year

WHAT ELSE DO I NEED TO KNOW?

NATIONAL ECONOMIC DEVELOPMENT

- 85%-92% reduction in damages
- Risk reduction to Hurricane and Tsunami Emergency evacuation route

ENVIRONMENTAL QUALITY

- 2.36 miles of elevated living shoreline will create habitat
- Mitigation is anticipated
- Mitigation can be constructed close by

OTHER SOCIAL EFFECTS

- Reduces nuisance tidal flooding (Condado Lagoon)
- Reduces risk of damages associated with sea level rise
- Most features contribute to recreation
- Viewsheds affected; opportunities to view water from top of features in most cases

REGIONAL ECONOMIC DEVELOPMENT

- Some features advance tourism
- Features work together to strengthen economy of the metro area

COMMENT OPPORTUNITIES

- Public Comment Period on the Draft Report/EA is: July 28 to August 26, 2020
- Ways to Comment
  - Public Comment Session
  - Email us at: **SJMBackBay@usace.army.mil**
- For links to the report and this presentation, visit our website: www.saj.usace.army.mil/SanJuanMetro

*Contingent on authorization and appropriations