

SAN JUAN METRO AREA, PUERTO RICO

COASTAL STORM RISK MANAGEMENT STUDY DRAFT INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

JULY 2020

APPENDIX G: ENVIRONMENTAL

ATTACHMENT 1 – 404(b)1 ATTACHMENT 2- COASTAL ZONE CONSISTENCY ATTACHMENT 3 – ENVIRONMENTAL JUSTICE ATTACHMENT 4 – PRELIMINARY MITIGATION PLAN



SAN JUAN METRO AREA, PUERTO RICO

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APPENDIX G: ENVIRONMENTAL

ATTACHMENT 1 - 404(b)1

SECTION 404(b) EVALUATION

SAN JUAN METROPOLITAN AREA, PUERTO RICO

I. Project Description

a. <u>Location</u>. The San Juan Metro Area is located in the northeastern portion of Puerto Rico (PR). The proposed work in the San Juan Metro Area would be performed the municipalities of San Juan, Cataño and Guaynabo (Map 1).

b. <u>General Description</u>. The U.S. Army Corps of Engineers, Jacksonville District (Corps), is proposing measures for the reduction of damages to infrastructure as a result of coastal flooding from storm surge and waves as a result of coastal storms and hurricanes along the San Juan back bay shoreline and adjacent municipalities. The measures proposed for this project include structural measures and Natural and Nature-Based Features (NNBF). The proposed structural measures include the construction of approximately 6.7 miles of seawalls/floodwalls, 2.0 miles of levees and 1 storm surge gate. The NNBF measures include 2.3 miles of elevated living shorelines and 0.7 miles of breakwaters and include recreational components.

c. <u>Authority and Purpose</u>. Authority for the San Juan Metro coastal storm risk management (CSRM) study was granted under Section 204 of the Flood Control Act of 1970, Public Law 91-611. The purpose of the study was to determine if there is Federal interest in a Federal plan to reduce damages to infrastructure as a result of coastal flooding from storm surge, tide and waves (rather than inland rainfall and stormwater runoff) during coastal storms and hurricanes along the back bay areas in the municipality of San Juan and adjacent municipality communities.

d. <u>Public Interest Factors</u>. While USACE does not process and issue permits for its own activities, pursuant to 33 CFR 336.1, USACE authorizes its own discharges of dredged or fill material by applying all applicable substantive legal requirements, including public notice, opportunity for public hearing, and application of the section 404(b)(1) guidelines. As part of its review, the Corps evaluates the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. All factors which may be relevant to the proposal must be considered including the cumulative effects thereof. These factors may include:

- Conservation
- Economics
- Aesthetics
- General Environmental Concerns
- Wetlands
- Historic Properties
- Fish and Wildlife Values
- Flood Hazards
- Flood Plain Values
- Land Use

- Navigation
- Shore Erosion and Accretion
- Recreation
- Water Supply and Conservation
- Water Quality
- Energy Needs
- Safety
- Food and Fiber Production
- Mineral Needs
- Consideration of Property Ownership
- Needs and Welfare of the People

As discussed in Sections 4.5 of the draft report, the proposed activity would use key structural, non-structural and natural and nature based features in strategic locations designed to appropriate elevations to work together to effectively and efficiently reduce the risk of damages due to coastal flooding in the San Juan Metro Area. In addition, while the proposed activity is expected to directly impact wetlands and benthic habitat, the nature based CSRM measures would provide wetland and benthic habitat functions. It is anticipated that the project would result in no net loss of habitat function. Finally, several of the measures (living shorelines, breakwaters) include recreational elements which could be used by the local communities as well as potentially support tourism. For these reasons, the Corps concludes that the proposed activity is clearly in the public interest.

e. General Description of Dredged or Fill Material.

- (1) <u>General Characteristics of Material.</u> No dredging activities are to take place as part of the construction actions in the San Juan Metro Area CSRM. Placement of the appropriate clean fill material type will be used in the construction of the elevated living shorelines and levees. Clean rocks, free of contaminants and foreign particles, or clean fill surrounded by rock revetment will be used in the construction of the breakwaters.
- (2) <u>Quantity of Material.</u> The quantity of fill material for the breakwaters, solely rocks or including fill, will be calculated with further development of the construction design considering the local wave and sediment transport characteristics. The quantity of fill material required for the living shorelines will also be calculated with further development of the construction design.
- (3) <u>Source of Material.</u> The source of material will be determined following project award.

f. Description of the Proposed Discharge Site(s).

(1) <u>Location</u>. The identified elevated living shoreline area on reach WSJB-1 is located in the municipality of Cataño. The identified elevated living shoreline and breakwater areas on reach WSJB-3 are located in the municipality of Cataño.

Lastly, the identified elevated living shoreline area on reach CL-1 located in the municipality of San Juan (see Map 1).

(2) <u>Size</u>. The elevated living shoreline area in reach WSJB-1 is estimated to be 6.8 acres. The elevated living shoreline and breakwater areas in reach WSJB-3 are estimated to be 3.9 acres and 7.0 acres, respectively. The elevated living shoreline area in reach CL-1 is estimated to be 12.8 acres.

(3) <u>Type of Site.</u> In WSJB-1 and WSJB-3 the living shoreline will be constructed adjacent to La Esperanza Park, which contains an embayment with perimeter vegetation (generally mangroves and exotic species) and sandy beaches with vegetation in some locations on the north side. In CL-1 the living shoreline will be constructed in the Condado Lagoon's shoreline which consists primarily of vegetation (red and black mangroves), concrete seawalls, and nearshore submerged aquatic vegetation including sea grass. The area identified in WSJB-3 for the breakwaters is characterized by unconsolidated sediments and lack of hard substrate.

(4) <u>Type(s) of Habitat</u>. Coastal mangrove wetland habitat and Submerged Aquatic Vegetation (SAV) can be found in the areas were the living shoreline features in WSJB-1, WSJB-3 and CL-1 will be constructed. (See San Juan Metro Feasibility Study and Environmental Assessment Report, Sections 2.2.2 and 2.2.3.) Efforts will be made to avoid adverse impacts and for the excepted impacts on SAV and wetlands a mitigation plan is being developed (Appendix G - Environmental, Attachment – Environmental Mitigation Plan).

(5) <u>Timing and Duration of Discharge.</u> The timing and duration of discharge of fill material will be restricted to the construction period for that feature using heavy equipment and the period necessary for all features to be constructed. Discharge activities of fill material will be managed to control turbidity increases and maintain environmentally acceptable conditions.

g. <u>Description of Disposal Method</u>. No disposal material is expected from the construction activities.



Map 1. Location of San Juan Metro Area, Reaches and Features.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) <u>Substrate Elevation and Slope.</u> At the levee locations, it is assumed that a slope of 1V:3.5H will be used, as demonstrated in the successful design of other projects in PR. For the elevated living shoreline, it is assumed sandy sediments are present at the locations and a slope of 1V:4H will be used for both the landward and seaward sides. The breakwaters will have an approximate slope of 1V:2H (See Appendix A - Engineering).

(2) <u>Sediment Type</u>. Existing sediments are anticipated to consist of consolidated wetland soils and unconsolidated nearshore sediments (breakwaters). The exact sediment type won't be known until further development of the construction design, and the local conditions are considered.

(3) <u>Dredged/Fill Material Movement</u>. Fill material will be mobilized with heavy equipment such as cranes, barges and trucks.

(4) <u>Physical Effects on Benthos.</u> Due to the removal of SAV and wetland habitat there is the potential of injury or mortality of benthic species as well as a direct effect in foraging and refuge habitat. There could also be indirect effects in foraging behavior and movements in the immediate area and adjacent areas to the construction activity. These potential effects would be limited to the spatial area of current construction, as all construction activities won't be taking place simultaneously. All these potential effects on benthic species would be temporary in nature and limited to the time period necessary to construct that specific feature (See San Juan Metro Feasibility Study and Environmental Assessment Report, Section 5.2). There is also the potential of long-lasting benefits to benthic species from the construction of the breakwater and living shoreline features that would create foraging habitat and refuge for benthic organisms.

(5) <u>Actions to minimize impacts</u>. In order to minimize environmental impacts, construction in the areas identified were limited to the minimum required to meet the project's purpose. During construction developed recommendations would be implemented to avoid or minimize impacts. Although the construction activities will be performed in a manner so as to avoid or minimize environmental impacts, they are expected to occur, specifically to wetlands and SAV, as such a mitigation plan is being developed (Appendix G-Environmental, Attachment - Environmental Mitigation Plan). All in-water operations would be monitored to ensure turbidity levels are within Water Quality Certificate (WQC) parameters. If at any point turbidity standards are exceeded, those activities causing the violation would cease.

b. Water Circulation. Fluctuation and Salinity Determinations.

(1) Water Column Effects.

- (a) Salinity: No significant effect.
- (b) Water Chemistry: No significant effect.
- (c) Clarity: Turbidity would temporarily decrease clarity.
- (d) Color: No significant effect.
- (e) Odor: No significant effect.
- (f) Taste: No significant effect.
- (g) Dissolved Gas Levels: No significant effect.
- (h) Nutrients: No significant effect.

(2) Current Patterns and Circulation.

(a) Current Patterns and Flow: Currents in the project area are primarily tidal and wind driven. The western bay is shallow with areas of limited circulation, such as La Esperanza, where sediment transport is limited.

(b) Velocity: Breakwaters would attenuate wave energy and could slow water velocities.

(c) Stratification: No significant effect.

(d) Hydrologic Regime: No significant effect.

(3) <u>Normal Water Level Fluctuations</u>. Tides in the project area are microtidal (< 2m). The project would not affect normal water level fluctuations.

(4) <u>Salinity Gradients</u>. The project would not affect salinity gradients.

(5) <u>Actions to minimize impacts.</u> The project would not affect water levels. Turbidity would be monitored per the water quality certificate (WQC) requirements. If at any point turbidity standards are exceeded, those activities causing the violation would cease.

c. Suspended Particulate/Turbidity Determinations.

(1) <u>Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity</u> <u>of Disposal Site</u>. There will be an increase in suspended particulates and turbidity levels in the vicinity of the features being constructed.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water <u>Column</u>.

(a) <u>Light Penetration</u>: Light penetration would decrease temporarily during construction.

(b) <u>Dissolved Oxygen</u>: Dissolved oxygen levels would not be significantly altered by this project.

(c) <u>Toxic Metals and Organics</u>: No Hazardous or Toxic materials, or Radioactive Waste (HTRW) have been identified within the project area. Sediments from the San Juan Bay typically have traces of heavy metals, Polychlorinated biphenyls (PCBs), pesticides, Polycyclic Aromatic Hydrocarbons (PAHs), and petroleum products at low levels that do not affect the sediment quality or the water quality of the bay. No HTRW would be released in the project area during or after construction and therefore no impact to the existing sediment conditions is expected. (See San Juan Metro Feasibility Study and Environmental Assessment Report, Section 2.2.8 and 5.1.10). This project would not cause any significant release of toxic metals or organics.

(d) <u>Pathogens:</u> This project would not cause any release of pathogens.

(e) <u>Aesthetics</u>: Turbidity would temporarily impact aesthetic quality of the water in the vicinity of the construction area.

(3) Effects on Biota.

(a) <u>Primary Production, Photosynthesis:</u> Suspended particulate and turbidity would be temporarily and would not have a significant impact on primary production or photosynthesis. The removal of some scattered locations of primary production and photosynthesis (SAV locations) due to construction activities is expected and a mitigation plan is being developed.
(b) <u>Suspension/Filter Feeders:</u> Turbidity would affect suspension/filter feeders, but the effects would not be significant and only temporarily.
(c) <u>Sight Feeders:</u> Sight feeders would be affected by turbidity, but the effects would not be significant and only temporarily.

(4) <u>Actions to minimize impacts</u>. Turbidity would be monitored per the water quality certificate requirements. If at any point turbidity standards are exceeded, those activities causing the violation would cease.

d. <u>Contaminant Determinations</u>. Levels of contaminants are not expected to have a significant impact on plankton, benthos, nekton, or the aquatic food web. Re-suspension of sediment within the construction areas is expected to have minimal impact on these organisms.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton: Significant effects on plankton are not anticipated.

(2) <u>Effects on Benthos:</u> Benthos would be impacted by the project during construction activities, but benthic organisms would be expected to begin recovery once construction operations have finished.

(3) Effects on Nekton: Significant effects on nekton are not anticipated.

(4) <u>Effects on Aquatic Food Web:</u> Benthos would be impacted, but additional significant effects on the food web are not anticipated.

(5) Effects on Special Aquatic Sites:

(a) <u>Sanctuaries and Refuges:</u> No sanctuaries or refuges are present in the projects construction areas, or adjacent to. Construction of approximately 12.8 acres of living shoreline, a Natural and Nature-Based Feature (NNBF), will take place in the Condado Lagoon Natural Estuarine Reserve. Construction of such feature is estimated to have a direct impact on 4.65 acres of SAV and 3.47 acres of mangrove habitat. A mitigation plan is being developed to address these environmental impacts.

(b) <u>Wetlands</u>: The proposed work is estimated to have a direct impact on 11.3 acres of mangrove and 3.5 acres of freshwater wetlands. A mitigation plan is included in Appendix G Attachment 3 to address these effects.

(c) <u>Mud Flats:</u> Mudflats are present in some areas of the San Juan Bay. The proposed work does not anticipate any significant affect to mudflats.

(d) <u>Vegetated Shallows:</u> The proposed work is estimated to have a direct impact on 11.8 acres of SAV. A mitigation plan is being developed to address these environmental impacts.

(e) <u>Coral Reefs</u>: The proposed work footprint has been limited so as to not impact directly or indirectly the coral reefs adjacent to the seaward entrance of the San Juan Bay and the Condado Lagoon. In addition, turbidity monitoring will be conducted in accordance with a developed monitoring plan prior to construction to insure avoidance and minimization of effects to hardbottom habitat.

(f) <u>Riffle and Pool Complexes:</u> There are no riffle and pool complexes in the project area.

f. <u>Threatened and Endangered Species</u>. USACE determined that the proposed work will have "no effect" (NE) on Nassau grouper, Scalloped hammerhead shark, Giant manta ray, Elkhorn coral, Staghorn coral, Pillar coral, Lobed star coral, Mountainous star coral, Boulder star coral and Rough cactus coral. It "may affect, but is not likely to adversely affect" (MANLAA), Antillean manatee, Loggerhead sea turtle, Hawksbill sea turtle, Leatherback sea turtles, Green sea turtle and Puerto Rican Boa. The project is also "not likely to adversely modify" (NLAM) critical habitat for Acroporid corals. Project designs will be refined to minimize potential effects to the extent feasible. Also, the implementation of identified standard protection measures would avoid or minimize adverse impacts to threatened and endangered species.

2020 SAN JUAN METRO BACKBAY CSRM STUDY ESA TABLE					
Common Name Scientific Name		Status	Determination		
Marine Mammals					
Antillean manatee	Trichechus manatus	Т	MANLAA		
Sea Turtles					
Loggerhead sea turtle	Caretta caretta	Т	MANLAA		
NW Atlantic DPS					
Hawksbill sea turtle	Eretmochelys imbricata	Е	MANLAA		
Leatherback sea turtle	Dermochelys coriacea	Е	MANLAA		
Green sea turtle	Chalania mudaa	т	MANLAA		
South Atlantic DPS	Chelonia myaas	1			
Fish					

Nassau grouper	Epinephelus striatus	Т	NE	
Scalloped hammerhead shark	Sphyrna lewinii	Е	NE	
Giant manta ray	Manta birostris	Т	NE	
Invertebrates				
Elkhorn coral	Acropora palmata	Т	NE	
Staghorn coral	Acropora cervicornis	Т	NE	
Acroporid Coral Designated Critical Habitat			NLAM	
Pillar coral	Dendrogyra cylindrus	Т	NE	
Lobed star coral	Orbicella annularis	Т	NE	
Mountainous star coral	Orbicella faveolata	Т	NE	
Boulder star coral	Orbicella franksi	Т	NE	
Rough cactus coralMycetophyllia ferox		Т	NE	
Terrestrial Reptiles				
Puerto Rican Boa	Epicrates inornatus	E	MANLAA	

g. <u>Other Wildlife</u>. Construction of the proposed work would potentially displace wildlife in their respective areas temporarily. USACE will request U.S. Fish and Wildlife Services to provide technical assistance regarding possible impacts to fish and wildlife resources.

h. <u>Actions to Minimize Impacts</u>. Measures shall be taken, as well as recommendations and guidelines implemented to avoid and minimize impacts to threatened and endangered species as well as other wildlife.

i. <u>Proposed Disposal Site Determinations</u>

(1) <u>Mixing Zone Determination</u>. This determination will be in accordance with the project's WQC which would be requested from the Commonwealth of Puerto Rico during the PED phase.

(2) <u>Determination of Compliance with Applicable Water Quality Standards.</u> The work would be conducted in accordance with the project's WQC which would be obtained during the PED phase. As discussed in Section 5.1.2 and table 5-4 of the draft report, construction is anticipated to result in short-term minor impacts to local water quality. Turbidity would be monitored and construction conducted in compliance with Puerto Rico water quality standards.

(3) Potential Effects on Human Use Characteristic.

(a) <u>Municipal and Private Water Supply:</u> No effects are anticipated.

(b) <u>Recreational and Commercial Fisheries</u>: Impacts to fisheries would not be significant (See Sections 2.2.1-2.2.4 and 5.1-5.5).

(c) <u>Water Related Recreation</u>: Construction activities would temporarily disrupt water related recreation, while improving recreational opportunities. As a public safety measure, boating would be prohibited near the operating construction equipment (See Section 5.1.14).

(d) <u>Aesthetics</u>: Construction would temporarily impact aesthetics (See Section 5.1.14).

(e) <u>Parks, National and Historical Monuments, National Seashores,</u> <u>Wilderness Areas, Research Sites, and Similar Preserves:</u> The proposed work would temporarily disrupt some recreational activities associated with the Condado Lagoon Natural Estuarine Reserve, Jaime Benítez (Condado Lagoon) National Park and La Esperanza Park, while improving the recreational opportunities in those areas in the long term. Also, work would be conducted in compliance with the project's WQC.

j. <u>Determination of Cumulative Effects on the Aquatic Ecosystem</u>. Potential cumulative impacts on many resources were considered as part of this study and the majority of these resources were determined to have little risk of being cumulatively impacted (See San Juan Metro Feasibility Study and Environmental Assessment Report, Section 5.2).

k. Determination of Secondary Effects on the Aquatic Ecosystem. None.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

a. <u>Adaptation of the Section 404(b)(1)</u> <u>Guidelines to this Evaluation</u>: No significant adaptations of the guidelines were made relative to this evaluation.

b. <u>Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site</u> <u>Which Would Have Less Adverse Impact on the Aquatic Ecosystem:</u> As discussed in Sections 3.4.3.1, 3.8.3 and 6.6.20, no practical alternative exists to meet the project objectives that do not involve discharge of fill material into waters of the United States.

c. <u>Compliance with Applicable State Water Quality Standards</u>: All construction activities will be performed in compliance with the WQC issued by the PR's Department of Natural and Environmental Resources (DNER).

d. <u>Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307</u> of the Clean Water Act: The proposed work operations would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

e. <u>Compliance with Endangered Species Act of 1973</u>: The proposed project would not jeopardize the continued existence of any species listed as threatened or endangered or result in the destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973.

f. <u>Compliance with Specified Protection Measures for Marine Sanctuaries Designated by</u> <u>the Marine Protection, Research, and Sanctuaries Act of 1972</u>: This act does not apply to this project.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

(a) Municipal and Private Water Supplies: No effect.

(b) <u>Recreation and Commercial Fisheries</u>: No significant adverse impacts are anticipated.

(c) <u>Plankton</u>: No substantial adverse impacts are anticipated.

(d) Fish: No substantial adverse impacts are anticipated.

(e) Shellfish: No substantial adverse impacts are anticipated.

(f) <u>Wildlife</u>: The proposed project would potentially displace wildlife in their respective construction areas temporarily.

(g) <u>Special Aquatic Sites:</u> The proposed work is expected to have a direct impact on SAV and wetland habitats. A mitigation plan is being developed to address these environmental impacts.

(2) <u>Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife</u> <u>Dependent on Aquatic Ecosystems:</u> Essential Fish Habitat (EFH) includes all waters and substrates, including corals, SAV, intertidal vegetation and wetlands that are necessary for the reproduction, growth, and feeding of marine species. In the Future Without Project/no-action alternative there could be degradation of water quality from erosion and sedimentation due to SLR and storm events. This could result to impacts to EFH. Construction could also affect EFH including SAV, estuarine water column, estuarine scrub shrub (mangroves), and palustrine emergent wetlands. However, the proposed work is not anticipated to significantly adversely affect managed species or EFH (See San Juan Metro Feasibility Study and Environmental Assessment Report, Sections 5.1.3 and 5.1.5). Construction of NNBF measures would potentially create new habitat areas and for the impacts on SAV and wetlands a mitigation plan is being developed (See Appendix G -Environmental, Attachment – Environmental Mitigation Plan).

(3) <u>Significant Adverse Effects on Aquatic Ecosystem Diversity</u>, <u>Productivity and</u> <u>Stability</u>: No significant adverse effects are anticipated.

(4) <u>Significant Adverse Effects on Recreational, Aesthetic, and Economic Values:</u> Temporary impacts to recreational activities during construction and a temporary reduction in the aesthetic appeal during construction are expected. No significant adverse effects on recreational, aesthetic, and economic values are anticipated.

h. <u>Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem:</u> All appropriate and practicable measures shall be taken to minimize impacts.

i. On the basis of the guidelines, the proposed work is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

FINDING OF COMPLIANCE FOR SAN JUAN METROPOLITAN AREA, PUERTO RICO

1. No significant adaptations of the guidelines were made relative to this evaluation.

2. All construction activities will be performed in compliance with the WQC issued by the PR's Department of Natural and Environmental Resources (DNER).

3. The discharge of fill material for construction of the proposed features will involve the use of heavy equipment such as cranes, barges and trucks. These discharge activities of fill material will be managed to control turbidity increases and maintain environmentally acceptable conditions. All appropriate steps shall be taken to minimize potential adverse impacts of the fill material discharge on aquatic systems.

4. In order to minimize environmental impacts, construction in the areas identified were limited to the minimum required to meet the project's purpose. During construction developed recommendations would be implemented to avoid or minimize impacts. However, impacts are expected to occur, specifically to wetlands and SAV, as such a mitigation plan is being developed. All in-water operations would be monitored to ensure turbidity levels are within WQC parameters. If at any point turbidity standards are exceeded, those activities causing the violation would cease.

5. No Hazardous or Toxic materials, or Radioactive Waste (HTRW) have been identified within the project area. No HTRW would be released in the project area during or after construction. No significant impact on plankton, benthos, nekton, or the aquatic food web are expected. Sediments from the San Juan Bay typically have traces of heavy metals, Polychlorinated biphenyls (PCBs), pesticides, Polycyclic Aromatic Hydrocarbons (PAHs), and petroleum products at low levels that do not affect the sediment quality or the water quality of the bay. The re-suspension of sediment within the construction areas is expected to have minimal impact on these organisms. The construction operations will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

6. The proposed project would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended. Consultation with the U.S. Fish and Wildlife Service will be completed.

7. The proposed disposal of dredged material will not result in significant long-term adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. No significant adverse effects on life stages of aquatic life and other wildlife, aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values are expected. 8. Potential cumulative impacts on threatened or endangered species, other fish and wildlife, managed fishes, the estuarine water column, certain water quality parameters (turbidity and hazardous and toxic constituents), sediments (hazardous and toxic constituents), coastal barrier resources, aesthetics, and recreation, among others were considered as part of this proposed project and the majority of these resources were determined to have little risk of being cumulatively impacted.

9. On the basis of the guidelines, the proposed work is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.



SAN JUAN METRO AREA, PUERTO RICO

COASTAL STORM RISK MANAGEMENT STUDY DRAFT INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

JULY 2020

APPENDIX G: ENVIRONMENTAL

ATTACHMENT 2- COASTAL ZONE CONSISTENCY

COASTAL ZONE MANAGEMENT PROGRAM FEDERAL CONSISTENCY EVALUATION PROCEDURES

SAN JUAN METROPOLITAN AREA, SAN JUAN, PUERTO RICO

Applicability of the Coastal Zone Management Act.

The following table summarizes the process and procedures under the Coastal Zone Management Act for Federal Actions and for non-Federal Applicants*.

Item	Non-Federal Applicant (15 CFR 930,	Federal Action (15 CFR	
	subpart D)	930, subpart C)	
Enforceable Policies	Reviewed and approved by NOAA	Same	
Effects Test	Direct, Indirect (cumulative, secondary),	Same	
	adverse or beneficial		
Review Time	6 months from state receipt of Consistency	60 Days, extendable	
	Certification (30-days for completeness	(or contractible) by	
	between	mutual agreement	
	State and applicant		
Consistency	Must be Fully Consistent	To Maximum Extent	
		Practicable	
Procedure Initiation	Applicant provides Consistency Certification to	Federal Agency provides	
	State	"Consistency Statement"	
		10	
		State	
Appealable	Yes, applicant can appeal to Secretary (NOAA)	No (NOAA can "mediate")	
Activities	Listed activities with their geographic location	Listed or Unlisted Activities	
	(State can request additional listing within 30	in State Program	
	days)		
Activities in Another	Must have approval for interstate reviews from	Interstate review approval	
State	NOAA	NOT required	
Activities in Federal	Yes, if activity affects state waters	Same	
Waters			

* There are separate requirements for activities on the Outer Continental Shelf (subpart E) and for "assistance to an applicant agency" (subpart F).



DEPARTMENT OF THE ARMY JACKSONVILLE DISTRICT CORPS OF ENGINEERS P.O. BOX 4970 JACKSONVILLE, FLORIDA 32232-0019

Planning Division Environmental Branch

Ms. Rose Ortiz Coastal Zone Management Consistency Office Puerto Rico Planning Board P.O. Box 41119, Minillas Station San Juan, Puerto Rico 00940

Dear Ms. Ortiz:

I have enclosed seven copies of an application for Certification of Consistency with the Puerto Rico Coastal Management Program for the San Juan Metropolitan Area (Back Bay) Project in Cataño, Guaynabo and San Juan, Puerto Rico. This project involves reducing damages to infrastructure as a result of coastal flooding from storm surge and waves as a result of coastal storms and hurricanes. The project consists of flooding and waves action reducing alternative features for 5 planning reaches, WSJB-1B, WSJB-2, WSJB-3, WSJB-4 and CL-1. Those alternative features are comprised of structural, Natural and Nature-Bases Features (NNBF). These features, along these 5 reaches, will consist of approximately 2.0 miles of levees, 6.7 miles of seawall/floodwall and 1 storm surge/sluice gate for structural features, approximately 2.3 miles of elevated living shoreline and 0.7 miles of breakwaters for NNBFs. Upon final design, functional lift provided from the construction of these features would be incorporated into functional assessments and mitigation plan. The final determinations in terms of the quantity and siting of any onsite compensatory mitigation would be conducted during the water quality certification (WQC) process in the PED Phase of the project when site-specific survey data and the final designs are available.

The following additional information on this project is available on the internet http://www.saj.usace.army.mil/About/DivisionsOffices/Planning/EnvironmentalBranch/Environmen

- 1. The Notice of Availability of the Draft Finding of NoSignificant Impact
- 2. The Draft Integrated Feasibility Report and Environmental Assessment
- 3. Maps, drawings, and other information

If you have any questions, please contact Paul DeMarco at 904-232-1897 (paul.m.demarco@usace.army.mil).

Sincerely,

Commonwealth of Puerto Rico Office of the Governor

Puerto Rico Planning Board Physical Planning Area Land Use Planning Bureau

Application for Certification of Consistency with the Puerto Rico Coastal Management Program

General Instructions:

- B. Attach a 1:20,000 scale, U.S. Geological Survey topographic quadrangular base map of the site.
- C. Attach a reasonably scaled plan or schematic design of the proposed object, indicating the following:
 - 1. Peripheral areas
 - 2. Bodies of water, tidal limit and natural systems.
- D. You may attach any further information you consider necessary for proper evaluation of the proposal.
- E. If any information requested in the questionnaire does not apply in your case, indicate by writing "N/A"(not applicable).
- F. Submit a minimum of seven (7) copies of this application.

	DO NOT WRITE IN THIS BOX				
Тур	be of application: Application Number:				
Da	te received: Date of Certification:				
Eva	aluation result: Objection Acceptance Negotiation				
Тес	chnician: Supervisor:				
1.	Name of Federal Agency: U.S. Army Corps of Engineers, Jacksonville District				
2. Co	Federal Program Catalog Number: <u>12.106 Flood Control Projects CFDA</u> mments:				
3.	Type of Action:				
	X Federal Activity License or permit Federal Assistance				
4.	4. Name of Applicant: <u>Angela E. Dunn, Environmental Branch Chief for US Army Corps of Engineers</u>				
Postal Address: 701 San Marco Blvd. Jacksonville, FL 32207-8175					
Telephone: <u>904-232-2336</u> Fax: <u>904-232-3442</u>					
5.	5. Project name: <u>San Juan Metro Area, PR (Back Bay) Coastal Storm Risk Management</u>				
6. Physical Description of Project Location (area, facilities such as vehicular access, drainage,					
	storm and sanitary sewer placement, etc.): <u>The project will cover locations in the periphery of the San</u>				
	Juan Bay, like Palmas (WSJB-2), Vista del Morro, Marina Bahía (WSJB-1B), Bahía, Cataño Pueblo and La				
	Puntilla in Cataño, Vietnam y Sabana in Guaynabo (WSJB-3) to Puerto Nuevo (WSJB-4) and the Condado				

Lambert Coordinates:

X = <u>3124481.54 meters</u>

Y = <u>1762201.13 meters</u>

7. Type of construction or other work proposed:

drainage	channeling	landfill	sand extraction
pier	bridge	residential	tourist

others (specify and explain): <u>Seawalls/floodwalls, levees, a Storm Surge gate, Elevated Living shoreline</u> and Breakwaters.

Description of proposed work: <u>Construction of 1 mile of seawalls, 1 mile of levees and 0.7 miles of elevated Living shoreline in WSJB-1B. 1 Storm Surge gate, 0.6 miles of levee and 0.2 miles of seawall in WSJB-2. 0.4 miles of elevated Living shoreline, 4 miles of seawalls and 0.7 miles of breakwaters in WSJB-3. Construction of 1.4 miles of seawalls and 0.3 miles of levee in WSJB-4, and 1.26 miles of Elevated Living shoreline in CL-1 (Figure 1). Overall, 1 Storm Surge gate, approximately 6.7 miles of seawalls/floodwalls, approximately 2.3 miles of Elevated Living shoreline, approximately 2.0 miles of levees and approximately 0.7 miles of Breakwaters.</u>

8. Natural, artificial, historic or cultural systems likely to be affected by the project

Place an X opposite any of the systems indicated below that are in the project area or its surroundings, which are likely to be affected by that activity. Indicate the distance from the project to any outside system that would likely be affected.

System	Within	Outside	Distance	Local name of
	Project	Project	(meters)	affected
				system
beach, dunes		Х	>150m	La Playita del
				Condado.
mangroves, wetlands	Х	Х	0 m	Condado
				Lagoon, La
coral, reefs		Х	>250m	Esperanza.
river, estuary	Х			La Malaria
				Channel, Río
bird sanctuary				Puerto Nuevo,
pond, lake, lagoon	Х			Condado
				Lagoon.
agricultural unit				
forest wood				
Torest, wood				
cliff brookwater				
citi, breakwater				
cultural or tourist area	x	x	0 m	La Esperanza
	Х	~	0.111	Park Cataño-
other (explain) Submerged Aquatic	х	x	0 m	San Juan Ferry
Vegetation	~		0	Terminal
				Condado
				Lagoon Park
coral, reefs river, estuary bird sanctuary pond, lake, lagoon agricultural unit forest, wood cliff, breakwater cultural or tourist area other (explain) Submerged Aquatic Vegetation	X X X X X	X X X X	>250m 0 m 0 m	Lagoon, I Esperanz La Malar Channel, F Puerto Nue Condado Lagoon. La Esperar Park, Cata San Juan Fo Termina Condado Lagoon Pa

Describe the likely impact of the project on the identified system (s).

Positive X

Negative X

Explain:

<u>The construction of the structural features in these 5 reaches is estimated to have a direct impact on</u> <u>11.8 acres of SAV, 11.3 acres of mangroves and 3.5 acres of freshwater wetlands. As for other systems within</u> <u>the project area, the impacts will be controlled, localized, temporary and minimized through Best Management</u> <u>Practices (BMPs) and methods. These impacts such as turbidity will only last as long as construction takes place.</u> <u>Meanwhile, the construction of the NNBF is estimated to create 23.5 acres of habitat through the Elevated</u> Living shoreline and potentially an additional 7 acres of habitat with the breakwaters. This would result in the direct impact of 26.6 acres of habitat and the creation of 30.5 acres of new habitat. The new habitat area are expected from the construction of Elevated Living shoreline in WSJB-1B, WSJB-3, by the La Esperanza Park, and CL-1 on the Condado Lagoon (Figure 1).

No direct or indirect impacts are expected to reefs or other systems outside the project area. Impacts are not expected as BMPs and methods to manage the construction will be implemented. Prior to any construction activity turbidity controls such as turbidity curtains, silt fences, and other Best Management Practice measures must be installed. Final details for BMPs and methods will be determined during the permitting and contracting process.

9. Indicate permits, approvals and endorsements of the proposal by Federal and Puerto Rican government agencies. Evidence of such support should be attached to the proposal.

		Yes	No	Pending	Application Number
a.	Planning Board			X	
b.	Regulation and Permits Administration				
c.	Environmental Quality Board			X	
d.	Department of Natural Resources			X	
e.	State Historic Preservation Office			X	SHPO No.: 12-27-18-01
f.	U.S. Army Corps of Engineers				
g.	U.S. Coast Guard				
h.	Other (s) (specify)				

CERTIFICATION

I CERTIFY THAT (project name) San Juan Metro CSRM Study _______is consistent with the Puerto Rico Coastal Zone Management Program, and that to the best of my knowledge the above information is true.

Angela E. Dunn	
----------------	--

Name (legible)

Signature

Chief, Environmental Branch

Position

Date



Figure 1. San Juan Metropolitan Area (Back Bay) Structural, Non-structural and NNBF alternatives in 5 reaches.







Map 1b. San Juan Metro Area 1:20.000 scale topographic map.



Map 1c. San Juan Metro Area 1:20,000 scale topographic map.







SAN JUAN METRO AREA, PUERTO RICO

COASTAL STORM RISK MANAGEMENT STUDY DRAFT INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

JULY 2020

APPENDIX G: ENVIRONMENTAL

ATTACHMENT 3 – ENVIRONMENTAL JUSTICE

APPENDIX G – ENVIRONMENTAL

ATTACHMENT 4 – ENVIRONEMTNAL JUSTICE ANALYSIS

San Juan Metropolitan Area Coastal Storm Risk Management Study

San Juan, Puerto Rico

ENVRIONMENTAL JUSTICE ANALYSIS June 2020

On February 11, 1994, the President of the U.S. issued Executive Order (E.O.) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This E.O. mandates that each Federal agency make environmental justice (EJ) part of the agency mission and to address, as appropriate, disproportionately high and adverse human health or environmental effects of the programs and policies on minority and low-income populations. Significance thresholds that may be used to evaluate the effects of a proposed action related to EJ are not specifically outlined. However, Council on Environmental Quality (CEQ) guidance requires an evaluation of a proposed action's effect on the human environment and the Corps must comply with Executive Order 12898. The Corps has determined that a proposed action or its alternatives would result in significant effects related to EJ if the proposed action or an alternative would disproportionately adversely affect an EJ community through its effects on:

• Environmental conditions such as quality of air, water, and other environmental media; degradation of aesthetics, loss of open space, and nuisance concerns such as odor, noise, and dust;

• Human health such as exposure of EJ populations to pathogens;

• Public welfare in terms of social conditions such as reduced access to certain amenities like hospitals, safe drinking water, public transportation, etc.; and

• Public welfare in terms of economic conditions such as changes in employment, income, and the cost of housing, etc.

The Corps conducted an evaluation of EJ impacts using a two-step process: as a first step, the study area was evaluated to determine whether it contains a concentration of minority and/or low-income populations. The second step includes evaluation to determine whether the proposed action would result in a disproportionately, high adverse effect on these populations.

As defined in Executive Order 12898 and the CEQ guidance, a minority population occurs where one or both of the following conditions are met within a given geographic area:

• The American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic population of the affected area exceeds 50 percent; or

• The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

An affected geographic area is considered to consist of a low-income population (i.e. below the poverty level for purposes of this analysis) where the percentage of low-income persons:

• is at least 50 percent of the total population; or

• is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis.

Step 1: Study Area's Minority and Low-Income Population Average Percentages Using the USEPA EJScreen Tool, the project area was user-defined (Figure 1) to calculate the average percentages for EJ criteria. Table 1 compares the average percentages for the project area, Puerto Rico, and U.S.



Figure 6. User defined EJ Analysis Buffer.

Low Income

Population

Table 5. USEPA EJScreen Tool Environmental Justice Criteria Percentages					
	User Define Project Area %	Puerto Rico Average %	U.S. Average %		
Minority Population	99%	99%	39%		

Table 5. USEPA EJScreen Tool Environmental Justice Criteria Percentag	ges
---	-----

71%

Based on the information provided by the USEPA EJAssist tool, the average minority population
is approximately 99% of the total population and approximately 71% of the individuals in the
project area are considered below the poverty level. Therefore, the study area, which comprises
the San Juan Metropolitan Area, is an EJ community because the population percentages are above
50 percent. It should be noted that the general population of Puerto Rico is Hispanic, and any area

73%

33%

selected on the island would measure above the 50 percent threshold for an EJ community based on a minority population when compared to the general population of the mainland United States.

<u>Step 2: Recommended Plan's Effect on EJ Community</u> The study area is comprised of an EJ community. The Corps has determined any potential adverse effects resulting from the project would affect individuals of higher socioeconomic status, such as large watercraft owners or landowners on the coastal areas surrounding the project. There would be a beneficial effect to the overall area, resulting in a more sustainable beach and storm reduction effects. These effects would benefit all populations in the area via reduction in damages as a result of back bay flooding. There are no disproportionate adverse impacts to minority or low income populations resulting from the implementation of the project.

REFERENCES

U.S. Environmental Protection Agency (USEPA). 2019. EPA EJScreen EPA'S Environmental Justice Screening and Mapping Tool (Version 2019). https://ejscreen.epa.gov/mapper/index.html?. Website accessed June 23, 2020.



SAN JUAN METRO AREA, PUERTO RICO

COASTAL STORM RISK MANAGEMENT STUDY DRAFT INTEGRATED FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT

JULY 2020

APPENDIX G: ENVIRONMENTAL

ATTACHMENT 4 – PRELIMINARY MITIGATION PLAN

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TABLE OF CONTENTS

1.0	PURPOSE OF THIS DOCUMENT AND MITIGATION OBJECTIVES4	
2.0	PURPOSE AND NEED FOR THE PROPOSED ACTION4	
3.0	ENVIRONMENTAL MITIGATION REQULATORY BACKGROUND4	
4.0	DESCRIPTION OF THE TENTATIVELY SELECTED PLAN	
5.0	DESCRIPTION OF PROJECT SITE AND IMPACT ANALYSIS	
6.0	COMPENSATORY WETLAND MITIGATION FUNCTIONAL ANALYSIS AND MITIGAT	
I	ION REQUIREMENTS12	
7.0	POTENTIAL MITIGATION STRATEGIES/ALTERNATIVES	3
8.0	SITING OF ONSITE COMPENSATORY MITIGATION SITES	3
9.0 I	RECOMMENDED MITIGATION PLAN ALTERNATIVE AND JUSTIFICATION OF THE	
ę	SELECTED MITIGATION PLAN ALTERNATIVE17	
10.0 I	REFERENCES	
LIST OF FI	GURES	
Figure 5-1.	Location and Type of Resources in Alternative 17	
Figure 5-2.	Location and Type of Resources in Alternative 2	
Figure 5-3.	Location and Type of Resources in Alternative 3	
Figure 5-4.	Location and Type of Resources in Alternative 4	
Figure 5-5.	Location and Type of Resources in Alternative 511	

LIST OF TABLES

Table 5-1.	Potential impact sites requiring compensatory mitigation	. 12
Table 8-3.	Goals and success performance metrics for the SAV Mitigation Site(s)	14
Table 8-4.	SAV Monitoring Parameters, Methods, and Frequency	15

1.0 PURPOSE OF THIS DOCUMENT AND MITIGATION OBJECTIVES

The purpose of this document is to describe the strategy for determining the type and quantity of compensatory mitigation required for implementation of the Tentatively Selected Plan (TSP), for the San Juan Metropolitan Area Back Bay Coastal Storm Risk Management (CSRM) Integrated Feasibility Report and Environmental Assessment (IFR/EA) in line with Section 2036(a) of WRDA 2007. This document also serves to describe the mitigation strategies and alternatives that were considered, and the functional model used to assess functional resource loss requiring mitigation.

The compensatory mitigation objectives for the San Juan Metro CSRM Project are the following:

- Describe the methodology that will be used to estimate the functional loss of unavoidable impacts to Submerged Aquatic Vegetation (SAV), mangroves, and wetlands with implementation of the TSP;
- Identify potential environmental mitigation plan alternatives that compensate for the functional loss of SAV, mangroves, and wetlands;
- Identify the most cost-effective compensatory mitigation alternative that strategizes to identify and implement the most cost-effective mitigation plan while also meeting all environmental mitigation requirements; and

This document is meant to describe the environmental mitigation framework and would be updated during the Preconstruction, Engineering, and Design (PED) Phase of the project when the final siting of structures and engineering designs are provided and the quantity and type of required environmental mitigation as well as real estate acquisitions are finalized. Any impacts to wetlands (to the extent practical, wetland impacts would be avoided), would be verified by on-theground surveys, to include the limits of the resources and any mitigation requirements and associated monitoring and adaptive management actions would be added to this plan.

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

The U.S. Army Corps of Engineers (Corps) is the lead federal agency for this project and the Department of Natural and Environmental Resources (DNER) is the non-federal sponsor for the project. The study serves to identify and evaluate potential coastal storm risk management measures for the San Juan metropolitan area. These measures will be formulated to reduce risk to residents, industries, and businesses which are critical to the nation's economy. For a detailed description of the purpose and need for the proposed action, please refer to the draft San Juan Metro CSRM IFR/EIS.

3.0 ENVIRONMENTAL MITIGATION REGULATORY BACKGROUND

The Corps and U.S. Environmental Protection Agency (USEPA) published regulations entitled, "Compensatory Mitigation for Losses of Aquatic Resources" (Mitigation Rule) on April 10, 2008. One of the primary goals of these regulations (33 Code of Federal Regulation (CFR) Parts 325 and 332) was to improve the quality and success of compensatory mitigation plans that are

designed to offset impacts to aquatic resources. The Mitigation Rule emphasizes the strategic selection of mitigation sites on a watershed basis and established equivalent standards for all types of compensatory mitigation (mitigation banks, in-lieu fee programs, and permittee-responsible mitigation plans). Per these regulations, compensatory mitigation means the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of wetlands and special aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved. The three mechanisms for providing compensatory mitigation listed in order of preference as stated in the Mitigation Rule are the following: mitigation banks, in-lieu fee programs, and permittee-responsible mitigation. Compensatory mitigation is necessary to offset these unavoidable impacts to aquatic resource functions and services.

4.0 DESCRIPTION OF THE TENTATIVELY SELECTED PLAN

For a detailed description of the TSP please refer to Section 4 of the San Juan Metro CSRM IFR/EIS.

The TSP includes the following features:

- West San Juan Bay (WSJB) 1B: One mile of levee, 0.7 miles of elevated living shoreline, and one mile of seawall/floodwall;
- WSJB 2: 1 sluice gate;
- WSJB 3: 0.6 miles of levee, 0.2 miles of seawall/floodwall;
- WSJB 4: 0.4 miles of elevated living shoreline, four miles seawalls/floodwalls, 0.7 miles of breakwaters
- Condado Lagoon 1.26 miles of elevated living shoreline

5.0 DESCRIPTION OF PROJECT SITE AND IMPACT ANALYSIS

Based on existing geospatial data, the project features that have the potential to be sited in or affect aquatic habitats (levees, floodwalls, living shorelines, sluice gate, breakwaters, and surge barriers) have the potential to impact SAV, mangrove, and wetland habitat. Figures 5-1 through 5-5 depict SAV, mangroves, and wetlands in throughout the project area. However, due to the lack of recent site-specific SAV data in the Region of Influence for this study, detailed site-specific surveys of SAV coverage, densities, and species composition would be conducted during the PED Phase of the project. Submerged Aquatic Vegetation presence, density, and species composition in the future, when the project would be implemented is relatively uncertain as well as determining an exact quantity of impacts at this time is not possible. It is possible that SAV could recover in the future or potentially that SAV species composition and/or distribution may shift in the future with the effects of climate change. However, this is relatively uncertain, and this justifies the future need for SAV surveys in the timeframe closer to project implementation. Wetlands and mangroves habitats are more likely to be stable and remain unchanged until project implementation. Given

Environmental Mitigation Plan

the current restrictions and timeframes, ground truthing the limits and amounts of all resources is not possible at this time. Best available information is being utilized to construct a compensatory mitigation plan.



Figure 5-1. Location and type of resources in Reach 1



Figure 5-2. Location and type of resources in Reach 2



Figure 5-3. Location and type of resources in Reach 3



Figure 5-4. Location and type of resources in Reach 4



Figure 5-5. Location and type of resources in Condado Lagoon

While the actual quantities of impacts to SAV, mangroves, and wetlands will not be quantified via surveys during the feasibility phase of the project, an estimation of the types of resources that could potentially be impacted and may require mitigation based on the visual site investigation and examination of existing geospatial data was completed for this mitigation plan. The final siting of structures and designs would be determined during the PED Phase of the project (Table 5-1) and final mitigation needs would be identified.

Description	Protected Resource
WSJB-1B – Levees, Elevated Living Shoreline, Seawall/Floodwall	4.58 acres of SAV, 4.83 acres of mangroves, 2.72 acres of wetlands
WSJB-2 – Sluice Gate	0.83 acres of mangroves, 0.8 acres of wetlands
WSJB-3 – Levees, Seawall/Floodwall	2.55 acres of SAV, 0.19 acres of mangroves
WSJB-4 – Elevated Living Shoreline, Seawall/Floodwall, Breakwater	2.00 acres of mangroves, 0.01 acre of wetlands
Condado Lagoon – Elevated Living Shoreline	4.65 acres of SAV, 3.47 acres of mangroves
Total for Tentatively Selected Plan	11.78 acres of SAV, 11.32 acres of mangroves, 3.53 acres of wetlands

 Table 5-1. Preliminarily Estimated TSP impact sites potentially requiring compensatory

 mitigation

*presence, abundance, diversity, and extent of protected resources would be determined during the PED Phase of the project when detailed, site-specific surveys would be conducted; additional protected resources may need to be added to Table 1-1 depending on the result of site-specific surveys

6.0 COMPENSATORY WETLAND MITIGATION FUNCTIONAL ANALYSIS AND MITIGATION REQUIREM ENTS

SAV, Mangrove, and Wetland Mitigation Functional Analysis and Mitigation Requirements

The Uniform Mitigation Assessment Model (UMAM) would be used to evaluate the estimated functional loss of SAV, mangrove, and wetlands associated with implementation of the TSP. This model is used to determine the functional loss of habitat and required mitigation ratios and associated required mitigation acreages.

The UMAM was approved for use in Puerto Rico by the U.S. Army Corps of Engineers ECO-PCX on June 9, 2020 and is required for wetland impact and mitigation sites. UMAM is applied in a wide variety of wetland habitat types throughout the State of Florida and Puerto Rico. The UMAM is well suited for evaluating a suite of impact and potential mitigation sites, including the preservation, enhancement, restoration, and creation of wetlands, as well as the evaluation and use of mitigation sites, and it provides a framework for standardized wetland assessment methodology. The impact or mitigation site is assessed via a qualitative description of the site and a quantification of the wetland function at the site. For the wetland function quantification, sites are evaluated in three categories and scored numerically from 0 to 10 (where 10 indicates a natural, pristine system). The first category, Location and Landscape Support, assess the surrounding landscape within which the system operates. The second examines the Water Environment, including an assessment of hydrology and water quality. The third category assess vegetation and structural habitat, for areas with plant cover, and benthic and sessile communities, for areas with a submerged benthic community.

The UMAM Uniform Mitigation Assessment Method Training Manual (Bardi et al., n.d.) provides a detailed guide of the UMAM concept and methodology and explains how to compile all of the data/information needed to perform the UMAM, how to document the standardized forms for the UMAM, and how to perform the necessary calculations to complete the UMAM functional analysis to quantify the habitat value of impact and mitigation sites.

7.0 POTENTIAL MITIGATION STRATEGIES/ALTERNATIVES

This section describes the mitigation alternatives that were evaluated that serve to meet the mitigation objectives. Based on a comprehensive search of the Regulatory In-Lieu Fee and Bank Information Tracking System (RIBITS), there are no mitigation banks or in-lieu fee sites approved for use in Puerto Rico. Therefore, mitigation banks and in-lieu fee funds were eliminated as potential mitigation alternatives due to lack of availability. Therefore, we anticipate all SAV, mangrove, and wetland mitigation to be the least cost onsite compensatory mitigation. Preliminarily estimated mitigation costs are \$7,791,195. However, this would be reinvestigated during the PED Phase of the project.

8.0 SITING OF ONSITE COMPENSATORY MITIGATION SITES

The siting of onsite compensatory mitigation sites would be conducted during the PED Phase of the project when site-specific survey data is available to assess bottom conditions, hydrology, water quality, and presence of other protected species (to avoid potential impacts to other protected species). A bathymetric survey would be conducted prior to in-water work to assess water depths and bottom conditions in the project area. The limits of the mangrove and wetland resources would be identified prior to implementation to ensure the estimated acreages and functional analysis are accurate. Wherever feasible, mitigation sites would be sited within approximately five miles of the impact site to offset impacts as close as possible to the impact site.

Appropriate real estate protections of the mitigation site(s) would be required to determine the protection and perpetuity of the site over time. Designs for the mitigation site would be completed during the PED Phase of the project. The actual location, acreage, and mitigation methodology may vary depending on the final development of the project and mitigation site designs that will occur during the PED Phase of the project.

SAV Monitoring and Adaptive Management

One of the most proven ways to mitigate for SAV impacts is for direct, in-kind replacement. This mitigation takes the form of planting new SAV beds or enhancing existing beds. Prior to selection of mitigation sites, previous SAV data, depth data, bottom type, hydrology, and water quality data would be examined to assess relative suitability of sites for SAV mitigation. Water clarity conditions would be assessed prior to planting efforts to ensure appropriate conditions at the mitigation site. Post-SAV planting, monitoring would involve taking sufficient samples at the site to accurately estimate SAV coverage by species and depth. A minimal standard error of the mean (SE), an estimate of sampling precision, is desirable so that the estimate of SAV coverage is accurate. The SE should be no greater than 15% of the mean.

SE larger than 15% of the mean indicates the precision is poor and additional samples should be taken in order to have a higher degree of confidence in the population estimate derived from the survey. Several transects or point samples throughout the planted area at different depths would be required in order to accomplish this objective. Water quality monitoring would also be required. As part of the monitoring, data that would be collected within the restored SAV bed would include, at the minimum, the following parameters: salinity, temperature, depth, and turbidity/clarity. Other parameters, such as chlorophyll, and Dissolved Oxygen are desirable but not required. Table 8-1 summarizes the goals and success performance metrics for the SAV mitigation site(s).

Table 8-3. Goals and success performance metrics for the SAV Mitigation Site(s)

Goals	Success Performance Metric Criteria			
Functional Goals	Attain SAV species density biodiversity reaching or exceeding that of impact site; planted SAV coverage at a minimum of 15%			

Post-planting Survey and Adaptive Management – A post-planting survey at the SAV mitigation site would be conducted following the initial planting. Sites would be required to have at least 15% SAV coverage. The areas devoid of SAV would be required to be replanted. Monitoring and adaptive management (as needed) would occur for a period of five years following the initial planting year to ensure project success. Adaptive management and monitoring to assess seagrass expanse, abundance, species diversity, and relative biomass would be conducted for a five-year period after the year of the initial SAV planting.

Table 8-4. SAV	' Monitorina	Parameters.	Methods.	and Fred	uencv
	monitoring	i urumotoro,	motrioao,		aonoy

Monitoring Element	Data Recorded	Methods	Monitoring Objective	Sampling Frequency
% coverage of each SAV species by area and depth	% SAV coverage, SAV species	Diver and/or ROV survey	Assess SAV presence, species diversity, % cover, and composition	Post Construction Year 1 Year 3 Year 5
Photographs of SAV restoration site(s)	Photographic record	Diver and/or ROV survey	Additional record collection	Year 1 Year 3 Year 5

SAV Adaptive Management

Potential adaptive management of the SAV mitigation site could include one or more of the following activities:

- Attempt a different type of mitigation strategy;
- Movement to a different mitigation site;
- Installation of predation-deterrent devices; and
- Sample SAV for disease or conduct additional water quality monitoring if there is an unusual mortality event or if it is otherwise unknown if the SAV metrics are not being met.

Reports – The Contractor shall record and create datasets of the required data for the species within the planted area and analyze the data.

The survey monitoring report will include a general description of the site(s), site maps identifying photo stations where monitoring transects or points were taken, and all raw data from all samples taken and subsequently analyzed in addition to the following elements:

- Summary of all activities completed during the monitoring year;
- Description of monitoring methods;
- Number and location of samples;
- Properly labeled photographs of samples;
- % coverage of each SAV species by area and depth
- Standard error of the mean (SE) calculations based on monitoring data;
- Listing of additional species observed;

- Discussion of data collected, methods, results and conclusions to support the number of samples necessary for next monitoring cycle;
- Comparison of site conditions from the previous monitoring year (when possible).
- Any recommended adaptive management if metrics are not being met

Mangrove Mitigation

The potential for mangrove mitigation is very high, both onsite and in the surrounding areas of the proposed project. The San Juan Back Bay has an abundance of shoreline and tidal creeks which are suitable mangrove habitat. Enhancement of existing mangrove forests in degraded areas or establishment of new habitat are the most effective strategies for achieving functional gain and offsetting the impacts from the associated project. Prior to the selection of the mitigation sites, existing habitat data and water quality data would be examined to assess relative suitability of sites for mangrove mitigation. Shoreline stabilization, tidal elevations, and substrate suitability would be assessed to ensure the sites would support the planting of mangroves. In the event of enhancement, water quality, erosion, and substrate data would be collected from the existing habitat to examine the path forward for corrective action. It is assumed that enhancement of the area will also provide suitable habitat for natural recruitment, which will be incorporated into the functional analysis when a comprehensive plan is selected. The TSP includes 2.36 miles of elevated living shorelines between project components 1, 2, and 4. Upon final design, the functional lift provided from the construction of the living shorelines will be incorporated into the functional assessments and mitigation plan, as it will offset a portion of the necessary mitigation.

Mangrove Monitoring

Monitoring of the success of the mangrove mitigation will be initiated after the planting or enhancement of the mangrove forests. Areas with failed plantings would need to be replanted. The number of individual mangrove plants would be recorded to ensure an 80% survival rate for establishment of new mangroves. In the event enhancement is selected, an increase in dissolved oxygen would be expected. It should be noted that a uniform increase in dissolved oxygen is not reasonably expected due to habitat heterogeneity. Dissolved oxygen would be reported as a mean concentration averaged over all sampling sites. Monitoring and adaptive management (as needed) would occur for a period of five years following the initial planting year to ensure project success. Adaptive management and monitoring to assess mangrove expanse, abundance, and relative biomass would be conducted for a five-year period after the year of the initial planting.

Mangrove Adaptive Management

Potential adaptive management of the mangrove mitigation site(s) could include one or more of the following activities:

- Movement to a different mitigation site;
- Installation of shoreline stabilization materials to inhibit mangrove destruction; and
- Sample mangroves for disease or conduct additional water quality monitoring if there is an unusual mortality event or if it is otherwise unknown if the mangrove metrics are not being met.

Reports – The Contractor shall record and create datasets of the required data within the planted area and analyze the data.

The survey monitoring report will include a general description of the site(s), site maps identifying photo stations where monitoring transects or points were taken, and all raw data from all samples taken and subsequently analyzed in addition to the following elements:

• Summary of all activities completed during the monitoring year;

- Description of monitoring methods;
- Number and location of samples;
- Properly labeled photographs of samples;
- % coverage of mangroves;
- Average of dissolved oxygen;
- Listing of additional species (both flora and fauna) observed;
- Discussion of data collected, methods, results and conclusions to support the number of samples necessary for next monitoring cycle;
- Comparison of site conditions from the previous monitoring year (when possible).
- Any recommended adaptive management if metrics are not being met

Wetland Mitigation

Mitigation for wetland impacts associated with the project could include enhancement of the surrounding freshwater, emergent wetlands located near the proposed impacts. There are numerous undeveloped sites located in close proximity to the project. Prior to selection of the mitigation site(s), wetland delineation and a functional assessment would be completed to accurately account for the amount, type, and level of enhancement for the wetlands. Activities for the wetland mitigation could include, but are not limited to, planting, grading, exotic removal, and hydrologic improvements.

9.0 RECOMMENDED MITIGATION PLAN ALTERNATIVE AND JUSTIFICATION OF THE SELECTED MITIGATION PLAN ALTERNATIVE

During the PED Phase of the project detailed site investigation surveys and UMAM site investigations would be conducted to determine the type and quantify of the required mitigation for the project. A Cost Effectiveness – Incremental Cost Analysis would be performed to ensure that the least cost mitigation alternative is selected.

10.0 REFERENCES

Bardi, E., Brown, M.T., Reiss, K.C., Cohen, M.J. n.d. *UMAM Uniform Mitigation Assessment Method Training Manual* Retrieved from: <u>http://sfrc.ufl.edu/ecohydrology/UMAM Training Manual ppt.pdf</u>

Approved by:

Angela E. Dunn June 22, 2020

U.S. Army Corps of Engineers, Jacksonville District

Chief, Environmental Branch