ENVIRONMENTAL ASSESSMENT
And Finding of No Significant Impact

January 2002

FLOOD CONTROL FEATURES FOR BECHARA INDUSTRIAL AREA, Rio Puerto Nuevo Flood Control Project San Juan / Guaynabo, Puerto Rico.

LEAD AGENCY: U.S. Army Corps of Engineers, Jacksonville District
COOPERATING AGENCY: Puerto Rico Department of Natural and Environmental Resources (DNER), representing the Commonwealth of Puerto Rico.

U.S. Army Corps
of Engineers
Jacksonville District

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

REPLY TO
ATTENTION OF

FINDING OF NO SIGNIFICANT IMPACT

I have reviewed the Environmental Assessment (EA) prepared for the recommended flood damage reduction plan in the Bechara Industrial Area (BIA) of the Rio Puerto Nuevo, Puerto Rico, Federal Flood Control Project. The action recommended is clean out of Puerto Nuevo Canal, extension of this canal northward to the edge of the Puerto Rico Ports Authority Property as an open, trapezoidal, earthen canal, and then excavation, pile installation, and construction of a pile-supported, concrete, double bay rectangular box culvert that will reach San Juan Bay at the Puerto Nuevo piers. The recommended plan differs from the option for BIA discussed in the 1985 Final Environmental Impact Statement and the plan described in the 1992 General Design Memorandum and 1993 EA/FONSI for the Rio Puerto Nuevo Project. I conclude that the recommended plan will have no significant adverse impact on the quality of the human environment. This conclusion is based on information analyzed in the new EA prepared for this Plan segment, which is herein incorporated by reference. It also reflects pertinent information obtained from other agencies and special interest groups having jurisdiction by law and/or special expertise, and on comments and recommendations obtained during interagency scoping and coordination. Reasons for this conclusion are, in summary,

1. The project as designed will not impact historic properties or existing residences. The project area is commercial and industrial.

2. Water quality will not be degraded, because most segments of drainage canal and culvert will be excavated "in the dry", using all appropriate methods for control of erosion and sedimentation of adjoining lands. The existing Water Quality Certificate for the Rio Puerto Nuevo Flood Control project, with its conditions and limitations, will be applied to the proposed work. No violations of water quality standards will occur.

3. No rare, unique, threatened or endangered species have been identified in the project area, and none will be affected by the project. There will not be adverse effects on populations, life stages or habitat of commercially important marine fish. A beneficial effect will be re-connection of upper Puerto Nuevo canal to tide, for the first time in 30 years.

4. The project has been determined to be consistent with the Puerto Rico Coastal Management Program.

5. Excavation and channel cleaning will remove 1 acre of land-locked mangroves (0.4 Functional Units, or FU) at the north (blind) end of the existing Puerto Nuevo River. After the channel in this area is widened and deepened, tidal flushing will be restored, and mangrove vegetation may re-establish itself. Adjacent mangroves, outside the project footprint, may benefit from restoration of the tidal connection. Deposit of materials on the power line right of way and construction of access roads and ramps will convert 7.5 acres of marshy emergent non-mangrove wetlands (2.25 FU) into uplands. Mitigation is proposed by creation of an additional 2.65 FU of mangrove wetlands along the Margarita channel or in San Juan Bay, to replace all estuarine functions lost due to construction of both the channel and levee. The recommended plan is the option with the smallest footprint over regulatory wetlands, of the four options evaluated.

6. A level-1 survey and assessment for the presence of hazardous, toxic or radioactive waste materials (HTRW), conducted in 1998 and updated in 2000, indicated no known or suspected materials were located in the project footprint. However, a diesel fuel dispensing and storage station was located inside the footprint in the Ports Authority Area. This station will be relocated prior to construction or removed by the project contractor.

7. Public benefits include reduction in flood-caused business losses in the Bechara Industrial Park and along Kennedy Avenue, and increased public safety due to reduced flooding along Kennedy Avenue itself, and elimination, for the most part, of traffic snarls caused during road flooding.

In consideration of the information summarized, I find that the proposed action will not significantly affect the human environment and does not require an Environmental Impact Statement.

29 MARCH 2002
Date

James G. May
Colonel, U.S. Army
District Engineer

Table of Contents

SYNOPSIS

This Environmental Assessment (EA) describes the plan recommended to provide flood control for the Bechara Industrial Area (BIA), also called Kennedy-Bechara sector, of the authorized Rio Puerto Nuevo (RPN), Puerto Rico, Flood Control Project. The RPN Project was authorized under the Water Resources Development Act of 1986. General design documentation was completed in 1991, accompanied by a new Environmental Assessment (EA), with a Finding of No Significant Impact (FONSI) signed in 1993. Project construction began in 1995. Flood control for the BIA was authorized as part of the RPN Project.

New hydrologic and topographic information generated by the Puerto Rico Government in the mid-1990's, after the RPN project was in construction, indicated that the 1993 design for Bechara, which was based on gravity drainage to the south through the Margarita Levee, would not function without modification. Local agencies examined drainage alternatives that proposed two or more large pump stations to remove the water to Caño Martín Peña and Quebrada Margarita. At the local sponsor's request, USACE examined proposed new flood control alternatives, in addition to a modification of the previous design, in detail, and is recommending a gravity drainage plan. The recommended plan consists of the following features: a drainage canal inside BIA that extends from the Bechara Industrial Park, located south of Kennedy Avenue, to San Juan Bay. The channel begins as a rectangular earthen canal 3 feet deep extending through the park to a point north of Kennedy avenue, continuing northward as a trapezoidal, 8.0- to 10.33-foot deep and 25 foot wide earthen channel, which then transitions into an underground double bay rectangular concrete box culvert under the Puerto Nuevo port facilities. The bottom of the box culvert would be supported on piles to minimize the volume of excavation in the soft substrate. The recommended alternative would adversely affect 1 acre of mangroves on the north side of Kennedy Avenue during drainage canal construction. The second major project feature is the "Margarita" levee, which will protect the BIA from flooding originating in the upper Quebrada Margarita drainage. Alignment of this levee in the recommended plan would be different from the previously coordinated "GDM alignment." The recommended levee would be shorter and would fall mostly over an existing, formerly filled power line right of way. Lands along the levee alignment are raised above surrounding lands, but have characteristics of emergent wetlands, which will be permanently converted to uplands. About 7.5 acres of the levee footprint are jurisdictional wetlands. A "desktop" wetland evaluation was made using the "E-WRAP" method. Resulting scores were 0.4 functional units (FU)per acre for the 1 acre mangrove footprint and 0.3 FU per acre or 2.25 FU. for the 7.5 acres of levee footprint. Mitigation (determined through the NEPA evaluation process for this work and agreed with by Commonwealth and Federal resource agencies) is proposed for the 2.65 FU of wetland loss by mangrove planting farther south in the historic river bed at the Rupert Armstrong parcel. The recommended alternative would dispose of excess excavated material as overbuild on the Margarita levee, or, at the Contractor's option, the

contractor would be permitted to remove it to an approved upland site. No additional wetlands fill would be permitted for excavated material disposal.

In coordination with the State Historic Preservation Officer (SHPO) USACE has determined that no historic properties will be affected by the recommended plan. No residents or residential areas will be affected by the proposed construction. Water quality will not be adversely affected. No disposal of excavated material in wetlands is proposed, other than deposition of material to build the Margarita levee. Coordination with the US Fish and Wildlife Service resulted in a draft Coordination Act Report. No species protected under the US Endangered Species Act or the Commonwealth of Puerto Rico Endangered Species Regulation were identified within the work area, or are likely to be affected. Coordination was also carried out with the National Marine Fisheries Service under provisions of the Magnuson-Stevens Fishery Conservation and Management Act. No adverse effects on commercial or recreational fisheries were determined.

1.00 SUMMARY

1.1 Major Conclusions and Findings.

The proposed action is construction of an open channel and underground box culvert to provide gravity drainage to the Bechara sector (Bechara Industrial Area, BIA) of the Rio Puerto Nuevo, Puerto Rico Flood Control Project. The proposed action is in the National interest and can be constructed while protecting the human environment from unacceptable impacts. Benefits of the channel/culvert will be a substantial reduction in economic and human losses due to high waters on roads and highways, traffic delays, and commercial property loss and damage due to flooding in the area. Adverse impacts will include an estimated loss of about 7.5 acres of disturbed emergent wetlands and 1 acre of mangroves due to channel extension and levee construction. Mitigation proposed for the mangrove and emergent wetlands is based on the results of a desktop "E-WRAP" analysis that found that the mangroves represented 0.4 Functional Units (FU), and the levee footprint wetlands represent 2.25 FU, of wetlands habitat that will be adversely affected by project construction. Project environmental benefits would include restoration of tidal flushing to the wetland parcel located north of Kennedy Avenue. To compensate for the overall wetlands functional loss, mitigation is proposed. The Corps would create 2.65 FU of mangrove vegetation, either by restoring additional lands north of the Margarita channel in the Rupert Armstrong parcel, or by creating additional mangrove habitat north of Martín Peña Channel at San Juan Bay.

1.2 Summary of The Proposed Action.

The proposed action, selected after an alternatives analysis and design refinement in cooperation with participating Commonwealth sponsors, is construction of a gravity drainage channel and culvert for the BIA, also called the Kennedy-Bechara area. The proposed flood control feature would run from the old "Puerto Nuevo" canal, beginning at a pump station inside Bechara Industrial Park, toward the north, passing under Kennedy Avenue as at present, bordering the east edge of the "PRIDCO" parcel, which is mangrove covered, and then extending farther north, following roughly the old river course to the edge of Ports Authority property. The channel will cross Ports Authority property, intercepting its local drainage, as an underground, pile supported, two-bay concrete culvert. It will empty into San Juan Bay at the Puerto Nuevo piers, just west of the end of the SeaLand cranes. The Margarita Levee, discussed in the 1993 General Design Memorandum (GDM) would be built along an existing, somewhat elevated power line right-of-way, with ramp access provided at intervals for power line service. Excavated material would be deposited as top-dressing on the Margarita levee, or, at the contractor's option, excess material could be transported off site to an approved upland disposal site. This alternative would not drain the rest of the PRIDCO parcel. The recommended plan would require

2-3 years for completion of construction, due to its complexity and the need to stage carefully to allow for normal port operations, but once built it would function without high operations or pump maintenance costs.

1.3 Areas of Controversy.

The major controversy associated with the overall Rio Puerto Nuevo Flood Control Project was and is its adverse effect on mangrove wetland cover and other green spaces in metro San Juan. The improvements to the main channel cut into both banks to provide a wider flood channel, converting 19.5 acres of mangrove wetlands into open water, when built to the upper end of tide water (U.S. Army Corps of Engineers, 1993). Negotiated mitigation for this impact was creation of 30 acres of mangrove wetlands along the project. Project design incorporated the 30 acres of new mangroves. The RPN Project is shown, in construction stages, as Plate 1. Mangrove mitigation was to include: areas outside the mouth of Martín Peña channel (to the northeast), areas along RPN itself, on the southeast river bank, and areas along both sides of Margarita Creek. This "GDM" plan did not contemplate further excavation or fill in BIA wetlands. Flood control for BIA was to be provided by a battery of four flap gated culverts draining passively from BIA to the south, through the "Margarita" levee, into Margarita Creek.

This EA discusses Corps evaluation of several considered alternatives to drain BIA, and the recommended plan. Alternatives were developed in 1998-99 and coordinated publicly through a Notice of Intent to Prepare an EIS, followed by a public scoping letter, in October 1999. As originally proposed there were two new gravity options, a new pumped drainage option and a modified "GDM" option that also required pumpage. The preliminary channel options would have adversely affected additional wetlands acreage (the "PRIDCO" mangrove parcel, north of Kennedy Avenue), while the pump options depended on large electric or diesel-operated pumps to function (refer to Appendix D, Coordination). Public comments during scoping concentrated on pump reliability, and minimizing the footprint of project features on wetlands. Conservation of the few remaining San Juan mangroves also emerged as a major decision factor in selecting a recommended alternative. Environmental agencies, including the project sponsor, Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS) and Environmental Protection Agency (EPA) criticized alternatives with a large footprint and the proposal to use a mangrove covered wetland for disposal of excavated material. The single most significant public issue during formal "scoping," other than the flooding itself, was avoidance of further adverse effects on remnant wetlands.

In response to this issue, the gravity drainage alternatives were reformulated to avoid excessive channeling in, drainage of or disposal over, the PRIDCO parcel wetlands. Remaining controversy, as indicated by scoping comments, is related to project size, distrust of structural flood control measures

and concerns with reducing further wetland loss due to the project. To the greatest practicable extent the recommended plan addresses these concerns by avoiding wetland use for disposal and minimizing other wetlands impacts, consistent with providing the authorized level of flood protection. The Corps has made a proposed determination that the recommended plan, with wetlands mitigation, is not likely to adversely affect environmental resources in the San Juan area, and that an Environmental Impact Statement (EIS) is not required. In March, 2000, the Corps published a Notice of Cancellation of Notice of Intent to publish an Environmental Impact Statement for the Bechara segment of the RPN project in the Federal Register.

1.4 Permits, Concurrences and Certifications required.

Construction of the recommended features is covered in the Water Quality Certificate for the overall Project, previously issued by the Puerto Rico Environmental Quality Board (EQB). This Certificate, which has no expiration date, specifies the Margarita levee but does not address channeling the lowermost Puerto Nuevo Canal inside the BIA. Since the work is Federal work within an existing drainage path, the U.S. Environmental Protection Agency (EPA) stated that a permit under the National Pollutant Discharge Elimination System (NPDES) would not be required. Concurrences with the proposed plan will be sought and obtained from the Puerto Rico Department of Natural and Environmental Resources (river bank, flood control and water resources jurisdiction); Puerto Rico Planning Board (coordination island-wide of land use and construction projects as well as Coastal Program consistency determinations) and the Puerto Rico Ports Authority (landowner of the Puerto Nuevo Port facilities) as well as other government landowners in project lands. The State Historic Preservation Officer (SHPO) concurred (by letter dated September 24, 2001) with a USACE determination of no effect on historic resources. The project was coordinated under the Endangered Species Act and the Fish and Wildlife Coordination Act with the US Fish and Wildlife Service (FWS). It was also coordinated under the Magnuson-Stevens Fishery Management and Coordination Act with the National Marine Fisheries Service, and with the Environmental Protection Agency (EPA) under the provisions of the National Environmental Policy Act (NEPA) and Clean Air Act.
The Puerto Rico Planning Board determined this work to be in compliance with the Puerto Rico Coastal Management Plan, as shown in Appendix A to this report (letter of October 9, 2001).

2.00 ISSUES, CONCERNS AND OBJECTIVES

2.1 Rio Puerto Nuevo and BIA project History

The Río Piedras/Río Puerto Nuevo is a single river. It is the principal drainage of the western half of San Juan, covering about 25 square miles. It rises in the foothills south of Río Piedras and now ends near the western end of Martín Peña

channel, though it originally flowed into San Juan Bay at the location of the Port Authority docks. In the 1950's the river mouth and lowermost ¾ mile of channel were re-routed to the east, to empty into Martín Peña Channel. In the early 1960's, after the river had been diverted, the Puerto Rico Ports Authority began to build the Puerto Nuevo Port complex, and the USACE dredged the new Puerto Nuevo Navigation Channel in San Juan Harbor to serve these docks. Creation of the Puerto Nuevo port area and diversion of the River stimulated public, commercial and industrial development along John F. Kennedy Avenue, and the Avenue became a major arterial road for port traffic and commuters. The Bechara Industrial Park is part of this commercial/industrial development. The new port was built over fill deposited into the area north of Kennedy Avenue (formerly all mangrove swamp). This fill effectively "plugged" the lower end of the natural Puerto Nuevo River drainage and did not provide an alternate outlet for drainage north of Margarita Creek. Lands to the south of Kennedy Avenue within the BIA catchment area, the "PRIDCO" parcels, and the road itself, flood regularly, blocking port traffic and commuter and commercial traffic between urban San Juan and outlying commercial and residential areas west of San Juan. Expressway PR-22, the De Diego Expressway, is an alternate route that does not flood, but does not provide access to the Port, and cannot carry all two-way traffic entering and leaving San Juan from the west. Channeling the main river, now underway, will not provide efficient drainage for BIA without pumping or providing an alternative outlet to the bay. Providing efficient drainage to this area has become a high priority for the Sponsor and other Commonwealth of Puerto Rico agencies.

2.2 Purpose of the Federal Project.

The purpose of the authorized Rio Puerto Nuevo Flood Control Project (RPN Project) of the U.S. Army Corps of Engineers (Corps) is to protect lives and property from damages attributable to a 1% exceedance probability flood along the River and its tributaries. This level of protection is commonly called "100-year" flood protection. The whole project will provide 11.2 miles of channel improvements to the river and five major tributaries, Quebradas Margarita, Josefina, Doña Ana, Buena Vista, and Guaracanal. The project is shown on Plate 1. After publication of a Survey Report and Final EIS in 1985, the RPN Project was authorized by the Water Resources Development Act of 1986. A General Design Memorandum and Environmental Assessment were prepared for overall project design in 1991-93. Construction of the main channel began in 1995. The Puerto Rico Department of Natural and Environmental Resources is the local sponsor for the RPN Project, which includes the BIA improvements. Protection for the BIA segment was authorized under the original project. The means of providing the protection have undergone revision in light of new data on topography and hydrology.

2.3 Cooperating Agency Purpose and Objectives.

The RPN project is a high priority project for several Commonwealth agencies and the Municipality of San Juan. The Puerto Rico Department of Natural and Environmental Resources (DNER) is the sponsor, representing its own interests in flood control and the interests of other Puerto Rico agencies. Kennedy Avenue has been undergoing widening, replacement of "bottleneck" intersections and repaving, under jurisdiction of the Puerto Rico Department of Public Works, Highways Authority. The Puerto Nuevo dock and warehousing area is being reorganized by the Puerto Rico Ports Authority (PRPA). The San Juan Municipal Public Works Department operates the San Juan Landfill on lands adjacent to Bechara and the lower Río Puerto Nuevo, and has redesigned drainage for its lands. Flooding has been a problem during several rainy season flood events during the 1990's, causing massive traffic tie-ups and severe damage in auto dealerships, warehouses and other commercial facilities in the industrial park. The joint purpose of Commonwealth agencies is to provide flood protection to existing infrastructure and facilities, facilitate traffic flow along the major arterial road and avoid injuries and potential loss of life due to flood-related traffic accidents. Another purpose is to develop a cost-effective and low maintenance solution that is minimally dependent on electricity or presence of an around the clock team of operators in order to work.

3.00 ALTERNATIVES ANALYSIS.

Alternatives considered are illustrated on Plates 2 through 5 and compared in Table 1. These alternatives arose as part of ongoing design considerations. Their potential costs and benefits were discussed in a Value Engineering Study prepared by Jacksonville District USACE in May 1999. They were later presented to sponsoring agencies, which concurred in selecting a recommended alternative (gravity drainage option, with box culvert under the Port) in late 1999. All of the alternatives discussed below are functional: they would provide drainage for the 100-year flood inside the BIA. They differ in construction costs, real estate costs, operations and maintenance costs, mechanical considerations and natural resources impacts.

3.1 No Action or "Base Plan" Alternative

In the context of the RPN overall project, the no action alternative would be to build the "GDM" plan. This plan is based on draining the entire catchment to the south, into Margarita Creek, as illustrated in Plate 2. Features of this plan include: 1) cleaning out the existing "Puerto Nuevo Canal" inside Bechara Industrial Park and north of Kennedy Avenue, replacing the Marginal Sur bridge on Kennedy Avenue, regrading Puerto Nuevo Canal in BIA to create a gradient toward the south; 2) building an earthen, trapezoidal connector canal between the Puerto Nuevo Canal and Margarita Levee; 3) Building the 6,100 foot long Margarita levee and 4) installing a 1,000 cfs (cubic feet per second) capacity

pump station in this levee. The original "base" design indicated this area would be drained passively by four, 72 inch diameter flap-gated culverts through the levee. The design was conditionally endorsed by environmental agencies, based on a Fish and Wildlife Coordination Act Report included in the 1984 Final Environmental Impact Statement (FEIS). More detailed studies of the topography and hydrology of BIA showed that, in order to obtain efficient southward drainage, a large (1,000 cubic feet per second, cfs) pump station would be needed at the "Margarita levee" to actively force water into the abandoned river channel, and a connector canal would need to be built to carry water from the north into the southern area. The "base plan" levee alignment, discussed as mostly over uplands in the 1993 EA, is now known to cover mostly jurisdictional wetlands. The "base plan" levee alignment would run over 6,100 feet, and together with the sump and connector canals, cover a wetlands footprint of 17.3 acres and cause a loss of at least 5 WRAP Functional Units. This alternative would require excavation of 14,200 cubic yards of material (in Puerto Nuevo canal and the new connector canal), and fill deposition over the "GDM levee route" to create the Margarita levee (to be built just on the north side of the re-shaped Margarita Channel). The 1,000 cubic feet per second (cfs) pump station would be either electric or diesel, and would pump during flood stages, but would require constant manning and regular inspection to assure it would function when needed.

The Base Plan and another pumped drainage plan, New Alternative 3, have the advantages that they would not interfere significantly with traffic patterns inside the port area. With a correctly sized pump they would provide full flood drainage for BIA. The no action alternative further would not affect mangroves on the blind northern end of the Puerto Nuevo Canal (old river bed) north of Kennedy Avenue. Drawbacks to this plan include a relatively long and wide levee footprint, requiring relatively large amounts of fill, through jurisdictional wetlands. The base plan has potentially the largest adverse impact on jurisdictional wetlands at 17.3 acres. Another drawback is the relatively high maintenance requirements for the electric or diesel pump or pumps (estimated at nearly $12 million over the life of the project). Perhaps the most serious potential drawback to this and other pumped drainage plans is dependence on a pump to function during large tropical storms or hurricanes. Puerto Rico is in the hurricane zone and recent years have shown the island's vulnerability to these recurring storms. It is routine for the government to de-activate electric power lines just before the main brunt of hurricane-force winds is expected to strike an area, in order to avoid potential loss of life due to downed power lines. This protects civilians as well as power authority field repair crews, but it means that an electric pump, or a diesel pump operated by remote electric switching, would be vulnerable to loss of power at the time it might be needed most. Pumps operated from a diesel engine would not suffer this drawback, but the engines would require constant maintenance, as well as operators on-site to turn them on and monitor them when needed. Since the BIA is not a residential area, it was felt by some engineers and government representatives that a locally operated

pump might not receive the priority attention, between flood events, that would allow it to operate efficiently during floods. Therefore an attempt was made to develop options that would allow drainage of the BIA by gravity.

3.2 New Alternative 1 (The Kennedy Avenue Open Channel Option).

This gravity-drained alternative is illustrated on Plate 3. It would begin with cleanout of the Puerto Nuevo Canal in BIA, starting at the local storm drainage pump station for the industrial park and extending to the north. It would require replacement of the South Marginal Road bridge at Kennedy Avenue. The drainage canal would emerge on the north side of Kennedy Avenue to turn right (north-eastward). From this point It would run along the north side of Kennedy Avenue, to discharge into Caño Martín Peña. The drainage channel would have to fit between the Ports Authority's Puerto Nuevo operations area and the north shoulder of Kennedy Avenue, and probably would have to be a vertical walled channel reinforced with sheet pile. It would drain by gravity into Caño Martín Peña, just north of the Kennedy Avenue bridge. The existing king pile and panel wall at this point along Caño Martín Peña would have to be removed to provide a drainage outlet into the channel. The Margarita levee would be realigned to run along an existing power line right of way that is already elevated above the surrounding lands. The new levee alignment would reduce the quantity of fill required, because it could be lower and shorter than the "base plan" or no action levee.

This alternative would require excavation of an estimated 250,000 cubic yards of material and would remove 1.5 acres of mangroves (1 acre in the old Puerto Nuevo river end and 0.5 acres at Caño Martín Peña; 0.8 Functional Units, according to a desktop WRAP analysis by USACE biologists). The levee alignment would be identical under all new alternatives, that is, along an existing power line right of way that encompasses about 7.5 acres of marshy, emergent wetlands. This alternative would require additional mitigation for the emergent wetland loss of 2.2 Functional Units. The large amount of excavated material to be generated under this alternative would have to be disposed of off-site on an upland to be identified by the project contractor. The large quantity of excavated material, high cost of the required real estate easements, relatively high cost of construction for a long, sheet pile reinforced channel in a narrow right-of way, worked together to make this new alternative more costly to build than either pumped drainage option. It also had the potential to interfere (during its construction) with traffic in the port area. A potential advantage of the open channel configuration would be that it could be easily cleaned of accumulated sediments. A drawback, at the point of discharge, would be that during major flood events water in the canal might be impounded by high water levels in the main river (the point of discharge), delaying drainage and causing short-lived local flooding.

3.3 New Alternative 2 (Box Culvert Under Port).

This Alternative is illustrated on Plate 4. It would begin as in New Alternative 1, with a clean-out of the old Puerto Nuevo Canal, and would extend north under Kennedy Avenue as before, but then it would continue to extend north-north west into and under the Ports Authority property, where it would become an underground, concrete-lined, pile supported, double bay culvert. This alignment alternative for the channel would empty into San Juan Bay at the Ports Authority docks, just southwest of the western end of the SeaLand crane. The Margarita levee would be realigned as in New Alternative 1, to run over a power line right of way in order to reduce the quantity of fill involved and limit impacts over undisturbed wetlands. Alternative 2 would require excavation of approximately 75,000 cubic yards of material, to be disposed of on the realigned levee or carried off-site to an upland disposal area (to be located by the Contractor). This alternative would clear 1 acre of mangroves at the blind north end of the Puerto Nuevo Canal (north of Kennedy Avenue) with a corresponding loss of 0.4 Functional Units, according to a desktop WRAP analysis performed by USACE biologists. Its impact over the emergent wetlands due to the levee and access roads would be 7.5 acres and 2.2 Functional Units.

Advantages to Alternative 2 include the following: 1) it would reduce wetlands impact of the drainage channel, as compared to Alt 1, because the mangroves at Caño Martín Peña would not be affected; 2) construction cost of the combined open earthen channel and pile supported concrete box culvert is expected to be less than the cost of the long channel parallel to Kennedy Avenue; 3) this alternative provides a much shorter, more efficient drainage route for BIA than the Kennedy Avenue channel.

3.4 New Alternative 3 (Pumped drainage with realigned Margarita Levee).

This Alternative would combine the large pump station and sump with the shorter, "new" alignment of the Margarita Levee over the power line right of way. It would require excavation of approximately 95,000 cubic yards of material, would remove no mangroves, and fill or excavate 11.3 acres of emergent wetlands under the levee, sump and pump. As with the other alternatives, a desktop E-WRAP analysis indicated a Functional Unit value per acre of the emergent wetlands as 0.3. This alternative would require replacement of 3.4 WRAP units of wetlands. It has the advantage of no potential adverse effect on the mangroves north of Kennedy Avenue, but pump operations, as in the case of the "no action" alternative, may be problematic. The potential operations and maintenance cost of this alternative appeared higher than that of either gravity drainage alternative.

3.5 Comparison of Alternatives and Selection of the recommended plan.

Table 1 compares the alternatives in terms of construction cost, operations and maintenance cost, quantity of excavated material they would generate, wetlands impacted, and functionality Although New Alternative 3 has the least impact on mangrove wetlands, considerations of reliability, operability and relative cost clearly favor the gravity drainage options. Among gravity drainage options, the more cost effective and efficient gravity drainage option was also the less environmentally adverse. The recommended alternative is identified as New Alternative 2, gravity drainage by box culvert under the port.

Table 1. Alternatives to control flooding in the Kennedy-Bechara area. Environmental impacts, cost and other considerations.

Option Item	GDM or "base" plan	New Alt 1 : Open Kennedy Ave Channel	New Alt. 2 Box Culvert Under Port	New Alt. 3 Revised Pump Station and Levee
Excavated material for disposal, cu yd	14,200	250,000	75,000	94,518
Levee footprint on wetlands, acres and HU WRAP FU per acre = 0.3	Levee 13.2 acres	7.5 acres (previously filled) WRAP FU= 2.2	7.5 acres (previously filled) WRAP FU=2.2	7.5 acres (previously filled) sump 0.8 acres connector canal 3.3 acres Total 11.3 acres WRAP FU =3.4
Channel excavation of Mangroves WRAP FU per acre = 0.4 for blind river end; 0.8 for Martin Peña	sump 0.8 acres; connector canal 3.3 acres Total 17.3 acres WRAP FU = 5.9	1 ac mangroves N of Kennedy Bridge; 0.5 acres along Kennedy Ave near Caño Martín Peña Total 1.5 Acres WRAP FU 0.8	1-acre mangroves N of Kennedy Bridge. Total 1 acre WRAP FU=0.4	None
Mitigation, FU	5.9 (highest)	2.8	2.6 (lowest)	3.4
Construction cost	High due to poor soil conditions, high cost of pump.	High: Sheet pile lined channel is expensive due to length	High: box culvert construction is expensive.	Higher than box culvert due to poor soils and high cost of pump)
Operations and Maintenance Cost	High. Pump motors require regular maintenance and constant staffing.	Low	Low	High. See "base plan" comments, pump motor maintenance and staffing.
Real Estate Cost	Low: most lands government owned and already acquired.	High: lands along Kennedy Ave have high RE value	Mod-High. Less RE than Option 1	Low: most lands government owned and already acquired
Efficiency and Reliability	Moderate: pump must be staffed around the clock and requires regular maintenance to function.	Good: project drains continuously as with natural channel; some backwater effect at outlet during high floods	Best: due to short distance to outlet, project drains continuously as with natural channel. No backwater effect at San Juan Bay.	Moderate: (see base plan) pump requires regular maintenance and source of energy.

As part of a Value Engineering Study, the Margarita Levee was moved from its location in the general design memorandum (parallel along the north side of the Margarita Channel) to its current location along the south side of the Bechara Industrial Area. By relocating the levee, the levee's length was reduced from 6,100 feet to 3,500 feet, and the total area impacted by the levee's footprint was reduced from 17.2 acres of wetlands (levee footprint only) to a total of 7.5 acres of emergent wetlands.

The new levee alignment was selected to correspond with an existing construction/access berm between two high voltage electrical transmission lines. Due to weak soils in the area, the existing berm has subsided some since it was originally constructed. Lack of maintenance has allowed the berm to become heavily vegetated. The Puerto Rico electrical power Authority (PREPA) currently owns the right-of-way, transmission lines, and access berm. By selecting the PREPA access berm for improvement for flood control levee, previously undisturbed areas of wetlands remain unaffected by the flood control project, and PREPA's existing maintenance access to the transmission lines is preserved and improved.

Also, the estimated cost of improving the existing berm is substantially less than the cost to build a floodwall. The current estimated construction cost for the margarita Levee is $541,000. The cost to construct a floodwall would be over $5,000,000 due to the length of the wall (3,500 feet), the height of floodwall stages in the Margarita Channel, and the weak soils in the area.

4.00 EXISTING ENVIRONMENT

4.1 Location, Physiography and Drainage

The study area is the last segment of the Río Piedras/Puerto Nuevo River through the municipalities of San Juan and Guaynabo. This area is nearly flat, but slopes slightly to the north, toward San Juan Bay. Kennedy Avenue, which bisects the area from southwest to northeast, is a major arterial road serving the port area, the municipality of Cataño, and the western San Juan suburbs of Guaynabo and Bayamón. Flooding along Kennedy Avenue originates locally in the Bechara area and is also partly caused by overflow of upper Margarita Creek. The Margarita levee will eliminate the risk of flooding from upstream, but further improvements are needed to conduct drainage from the watershed to the sea. The current route of the downstream Puerto Nuevo River channel is man-made from a point near the Highway 22 bridge over this river, to its mouth in Caño Martín Peña. The abandoned river segment is known as Puerto Nuevo Canal. Although it may be seen from Bechara Industrial Park (East Side) and Kennedy Avenue, it is a blind canal with no outlet, and often holds only a minimal quantity of water in the dry season. Near the re -routed main channel, the old river channel can be traced (as seen from the north side of PR-22) as a series of oxbows and sloughs filled with giant aquatic herbs (mostly

Colocasia). Only after flooding with several feet of water, will it drain "backwards" into Margarita Creek or the "new" Puerto Nuevo Channel. By this time water has entered buildings in the Bechara Industrial Area and has flooded portions of Kennedy Avenue, causing traffic backups, accidents and the damages to property and income the recommended plan is designed to prevent.

4.2 Land Use in the Bechara segment.

Land use in the project segment is public, industrial, commercial and transport related. Public facilities in the area along the bay include a fuel pipeline terminus, a major electric power generating station and the Ports facilities. Inland the area includes the main San Juan wastewater treatment plant, San Juan Municipal Public Works headquarters, including the San Juan Municipal Landfill, which has its own drainage system, and the many businesses that have located along Kennedy Avenue or inside Bechara Industrial Park, including insurance, banks, automobile dealerships, a lumberyard, moving and storage companies, wholesale warehouse facilities and others. Lands of the PRPA are used for loading and off-loading, storage and distribution of (mostly) containerized cargo. There are a diesel refueling station and some storage tanks inside the PRPA property in the affected area. Kennedy Avenue is a major east-west artery. Traffic exiting the port at Kennedy Avenue may proceed eastward to make a connection to San Juan, or with Las Americas Expressway (PR-52) and thus arrive at other island towns, including Cages, Humacao, Ponce and Mayaguez; or it may turn westward to continue along the north coast to Guaynabo, Bayamon, Arecibo or Aguadilla. South of Kennedy Avenue, land use is a mix of public (San Juan Public Works, and the landfill) and private (Bechara Industrial Park). No private residences are known in the area. Most of the land has been filled. Some parcels were used for previous disposal of dredged materials or fill. The most recent fill occurred over a large parcel at the West Side of Bechara Industrial Park, including lands that will be under the West End of the realigned Margarita levee. A large raised electric power line right of way constitutes the rest of the proposed levee footprint. Virtually the only land that still has more or less natural plant cover is the abandoned river bed itself and a small parcel located between Quebrada Margarita (Margarita Creek) and the Bechara Industrial Park, a remnant of the "Rupert Armstrong" parcel, property of the Puerto Rico Government. Its cover, described in the 1984 EIS and the 1993 EA, has been reduced overall during the past 15 years, due to encroachment of fills from the north and west, some related to businesses in Bechara Industrial Park and some related to auto dealerships located farther to the west along Kennedy Avenue. Rupert Armstrong has also been used as a dredged materials disposal site as shown by the remnants of old perimeter dikes north of Margarita Creek.

4.3 Cultural Resources.

Previous studies of historic resources were conducted for the Survey Report and Environmental Impact Statement (EIS) written for the RPN project. The recommended levee alignment and the gravity drainage features described here have not previously been surveyed for the Rio Puerto Nuevo Federal Project. However, since the alignment of the levee is all along an old raised power line, and the drainage canal follows an existing canal in its exposed portion, no historic resources are expected to be present. The Corps is in the process of coordinated the project information with the Puerto State Historic Preservation Officer (SHPO), which determined that there were no Cultural or Historic resources in the work area.

4.4 Fish and Wildlife Resources.

The U.S. Fish and Wildlife Service (FWS) prepared a Coordination Act Report (CAR) for the original Survey Report and EIS for the RPN Flood Control Project. This CAR, dated 1980, was annexed to the EIS. It described the mangroves at the mouth of Rio Puerto Nuevo/Martín Peña Channel in detail, but only briefly described the vegetation of the levee area

Historically, the project area was all part of the Puerto Nuevo Estuary and the open waters of San Juan Bay. The original river mouth was located approximately inland from the west end of the existing Ports Authority piers, just east of the power plant (Ports Authority lands were extended into the bay in the early 1960's through deposition of fill over submerged bottoms). The original mangrove habitat must have been the best avian habitat in San Juan Bay, but now only a few relict stands remain in the project area. Wildlife habitats now present in the area include the relict mangroves, grassy open areas with mixed shrub and tree cover on the Rupert Armstrong parcel, the abandoned river course (wild aroids), as well as road and sidewalk margins, generally covered by common grasses or exotic ornamental trees and shrubs

The following paragraph, taken from the previous (1993) EA for the RPN project area, is still a good basic description of wildlife:

"Original habitat throughout the work area consisted of estuarine wetlands. Since development over fill has eliminated most estuarine and wetlands habitat, the area does not presently support a great abundance or diversity of wildlife, with the exception of birds. . In addition to well-known feral urban fauna like city pigeons, cats, dogs, mongoose, rats and mice, open green areas also support a considerable avian population dominated by seed, nectar and insect-eaters, including finches, bananaquits, grassquits, kingbirds, ground and zenaida doves, European rock doves, anis and others. At least one pair of red-tailed hawks generally patrols the lower river, usually nesting somewhere on the grounds of the Experiment Station. The Station, especially the south parcel, and the University of Puerto Rico main campus (nearby but not affected by the project) provide the best avian forest habitat in urban San Juan, due mainly to the large

numbers of mature trees preserved there. Any green space, however, offers some wildlife habitat. Exotic bird species are common and are often associated with the wooded or grassy parts of the river corridor; they may include whydahs, many species of finches, parakeets, conures and some introduced parrots. Migratory birds often seen, even in the city, include water thrushes, peregrine falcon, warblers, kingfishers and the spotted sandpiper. Herpetofauna includes the large exotic toad Bufo marinus, the white-lipped frog, and lizards including the common grass anole, the tree anole Anolis cristatellus and the ground lizard Ameiva exsul."

4.5 Federally Managed Fisheries and EFH

Marine fish are not found in the now dead-ended Puerto Nuevo canal. This water body does not naturally drain to the south, and has no connection to tide. It serves rather as a linear sump that collects runoff water from surrounding parcels. Other than a few mosquito fish, it does not provide habitat for estuarine species, and it is too shallow to shelter tolerant freshwater species such as tilapia. San Juan Bay, the intended receiving water of the re-connected channel, has a fish fauna best characterized as estuarine, with an admixture of marine species in the outer Bay during certain seasons. In the deep Puerto Nuevo navigation channel, which is part of the inner Bay, waters are more or less anoxic and turbid, and do not serve as significant fish habitat for most species. This situation is not expected to change in the near future

4.6 Endangered Species.

In 1993, when overall RPN project plans were coordinated, two endangered species were identified as inhabiting the general project area. They were: the brown pelican (Caribbean population, endangered) and the yellow-shouldered blackbird (endemic, endangered). Further coordination led to a determination that the project would not adversely affect either species. FWS concurred with that determination. More recent coordination indicates that the yellow-shouldered blackbird has not been observed in the Rio Puerto Nuevo area for many years. Pelicans still fish and loaf in parts of San Juan Bay, but they do not frequent the Bechara area, where the waterfront is lined by commercial wharves and no roosts are present. In the bay, both manatees and sea turtles (both endangered) have been observed in the northern, clearer water areas, but no sightings are known from the commercial port area of the inner bay. No Federally listed species or Commonwealth of Puerto Rico species of special concern are believed to inhabit the project area. Habitat conditions are not expected to improve significantly in the near future. The USACE coordinated with FWS and NMFS on endangered species. No endangered species issues surfaced for this project and none were addressed in the extensive correspondence between the USFWS and the USACE.

4.7 Wetlands.

Only remnants of the original wetlands persist in the Bechara area. Both mangrove and freshwater emergent wetlands are present. There are two relicts of the old San Juan insular forest (a mangrove forest) in or near the project area. They are mangrove-covered parcels owned by the Puerto Rico Industrial Development Company (PRIDCO). One such parcel was called the "PRIDCO" parcel in early scoping correspondence for this project. It will be traversed, on its East Side, by the proposed gravity drainage channel, but is no longer proposed for dredged material disposal. It is dominated by red and black mangroves, near the blind channel end, and by mixed facultative wetland trees and grasses farther away from the channel. The mangroves of the PRIDCO parcel are "perched" (located in a topographic position above tide levels). They are growing over old dredged material (probably dating from the early 1960's) at elevations ranging from +2 to +3. feet. These mangroves grew up from propagules pumped in along with the dredged material, or have been carried into the lands by birds or mammals, and are surviving due to the high salt content of the dredged material. Such isolated stands have low functional value, because there is no tidal or flood interchange with the bay. Likewise, there is no export of detritus to the bay, and they cannot serve as developmental habitat for estuarine or marine fishes or invertebrates. They are valuable habitat for resident and migratory songbirds, however. A desktop "EWRAP" analysis of the PRIDCO parcel assigned a functional unit value of 0.4FU per acre. The functional condition of this stand cannot improve unless it can be reconnected to tide. The other pure mangrove parcel, which also belongs to PRIDCO, is located on the south side of Kennedy Avenue, northeast of the canal footprint, and will not be affected.

Other wetlands in the project area include the mixed wetland remnants of the "Rupert Armstrong parcel", now greatly decreased due to encroachment of fill by auto dealerships along Kennedy Avenue. Vegetation in the areas north and south of the proposed levee footprint (the power line right of way) was described as a wetlands/uplands mix by FWS in 1981.

"The southeast portion of (the Rupert Armstrong parcel) comprises 1.4 hectares of mangroves. This forest is relatively dry and not as dense as the one of the other (south) side of the berm. It is nearly a pure stand of white mangrove..., while the other nearby forests are predominantly blacks with some whites. The (other) areas...are transitional in that there is a mixture of species, some of which are characteristic of wetlands and some characteristic of uplands. Portions of these are vegetated with a thicket of leather fern (Acrostichum aureum) which is characteristic of wetland conditions. In some spots the Acrostichum forms pure stands and could be considered a wetland; in others it is intermixed with upland tree species. By far the most common of these trees is the tall albizia (Albizzia procera). Less abundant trees are the African Tulip Tree (Spathodea campanulata)and the Australian pine (Casuarina equisetifolia). The central upland portion of the...area is mainly a grassland sparsely wooded by tall Albizia trees. The most common grass is Panicum maximum. In other places there is a cover of morning

glory vines. The upland sites indicate that the area has been disturbed in some fashion. Most likely the area was at one time a mangrove forest that was filled either as a dump or as a previous dredged material disposal area. (J. Blankenship, 1981)."

The observations of the biologist were correct. This parcel is an old dredged material disposal area. The amount of mangrove cover on the "Rupert Armstrong" farm appears to have decreased over the past 20 years. However, a considerable part of the Rupert Armstrong lands located south of the proposed Bechara Levee and north of Quebrada Margarita are now slated to become a mangrove creation area for the overall Rio Puerto Nuevo project (refer to Plate 1).

The abandoned bed of the Puerto Nuevo river extends as a thin, meandering slough between the bridge at PR-22 and the local pump station inside BIA. The river path can be traced as a green line of wetland grasses and giant aroids. It still provides local habitat for amphibians and some birds, and it will not be affected by the proposed gravity drain.

4.8 Socioeconomic setting.

The last segment of the Rio Puerto Nuevo drainage includes the busy commercial offices along Avenida Kennedy and inside the Bechara Industrial Park, as well as the Port. The area is entirely composed of public, commercial and industrial activities. Floods along Kennedy Avenue and its feeder roads occur when floodwaters are backed up inside BIA until they reach the level of the roadway. BIA itself houses a major moving and storage company, various wholesale businesses and warehouses, a large hardware-lumber business, and several auto and truck retail and service businesses. Floods inside the industrial park reach into the first floors of warehouses and showroom floors, causing financial losses. Because it is close to the port and to the business centers of Hato Rey, Santurce, Miramar and old San Juan, the BIA is a desirable area for business location. However, existing businesses in this area had been subject to frequent flood damage.

4.9 Infrastructure.

Kennedy Avenue is a major traffic artery, with branches providing access to Cataño and the rest of the north coast as Highways PR- 185 and PR-2. On the south side of BIA, limited access highway PR-22, the José De Diego Expressway, runs from Santurce to a point just west of Arecibo. Although PR-22 was built above the 100-year flood level, Kennedy Avenue and its accesses are subject to flooding. Other major infrastructure elements in the area include the previously mentioned power line, a major trunk sewer (a land outfall connecting the San Juan and Bayamon wastewater treatment plants and ocean outfall), the San Juan municipal landfill and Public Works Department, and the Puerto Nuevo Port Area, operated by the Puerto Rico Ports Authority.

4.10 Hydrology.

The work area falls within the 100-year floodplain of the Puerto Nuevo River. It is the lowermost drainage basin of this river, and is located north of Highway PR-22. The BIA naturally drains to the north, but this drainage is impeded by the topographic "dam" created by the fill inside the Port Authorities property. Ponding of rainwater behind this man-made "dam" and localized flooding will continue to occur until alternative flood control measures are provided.

4.11 Aesthetic resources.

Visual resources of the area are limited. The tall hill of the San Juan landfill dominates most views. Looking from Kennedy Avenue to the north, the cranes of the port and the smokestacks of the Puerto Nuevo power plant dominate the view. From this same road looking south, only a line of business concerns can be seen. From the elevated roadway of highway PR-22 (westbound), one can still see a few acres of green in the Rupert Armstrong parcel and along the abandoned river channel. In general vistas are urban and commercial.

4.12 Water Quality.

The recommended plan will discharge to San Juan Bay at the Puerto Nuevo docks. No discharges to Quebrada Margarita or the Puerto Nuevo River are planned. Existing water quality at the Puerto Nuevo piers is poor to fair, according to studies recently completed for the San Juan Bay Estuary Program. Problem contaminants include dissolved oxygen (too low), total and fecal coliforms (too high) and nutrients (too high) (*Webb and Gomez-Gomez.* 1998) and *Kennedy et al.* 1996). Water quality in the existing Puerto Nuevo Canal is not known, but it is expected to be influenced by the character of the watershed, which is about 50% vegetated and 50% urban/commercial.

4.13 Air Quality.

Currently, the BIA airshed frequently violates Puerto Rico air quality standards for fine particulates. Non-compliance is due to pollution from power plants, industrial facilities, and motor vehicles and the "downwind" position of the BIA relative to salt spray and major San Juan emitters. No major new sources of emission form part of the Rio Puerto Nuevo Project or this segment. As population in San Juan inevitably grows and road traffic increases proportionately, air quality problems cannot be expected to improve.

4.14 Noise.

The project area is urban and industrial, and contains two major arterial roads. Daytime high sound levels, caused mostly by heavy traffic and port loading activities, are typical. There are no schools, hospitals or residential neighborhoods in the area. The noise environment is not expected to change or improve in the future, as the area is entirely industrial and commercial.

4.15 Hazardous, Toxic and/or Radioactive Waste.

Preliminary research (background information, literature search, etc.) revealed that no known sources of HTRW materials existed in the project footprint. A Civil Works Environmental Audit as defined in ER-1165-2-1132 for HTRW materials was carried out in March of 1998 and again in November of 2000. The following signs of potential HTRW problems were identified: adjacent landfill and water treatment plant; buildings; diesel fueling station, above ground storage tanks and transport areas (inside the Port property). Surrounding areas have been tested with negative results. The potential areas of concern are not within the project footprint, except for the diesel station and the above ground storage tanks.

5.00 ENVIRONMENTAL CONSEQUENCES OF THE RECOMMENDED PLAN

5.1 General and temporary environmental impacts during construction.

Construction of the recommended plan will lead to periodic interruption or re-routing of Port traffic at the Puerto Nuevo piers, increased congestion on Avenida Kennedy (during extension of the Puerto Nuevo Canal north of the bridge and replacement of the South Marginal Road bridge), temporary increases of turbidity in the canal, and temporary increases of turbidity at the Bay outfall, when the channel is broken through. Depending on staging of the Canal cleanout, there will also be some temporary increases in traffic inside BIA, adjacent to the Canal. These conditions are expected to return to normal when construction is complete. All appropriate measures, such as silt fences, hay bales, etc., will be used to avoid and minimize mobilization of exposed soils and sedimentation of waterways. These measures will be part of project environmental specifications, as is customary.

5.2 Effects on Land Use.

The recommended project is expected to intensify land use in the Industrial Park, as it will decrease the risk of damage to building structures and contents. Outside the Park and Port lands, most of the undeveloped lands are government owned wetlands. Wetlands development will be controlled, as at present, by Section 404 of the Clean Water Act.

5.3 Cultural Resources.

No historic properties have been identified on project lands. In accordance with the National Historic Preservation Act, the Corps has made a preliminary determination of "no historic properties affected," confirmed by the SHPO.

5.4 Fish and Wildlife Resources

Fish. Re-connection of the lower Puerto Nuevo Canal with the Bay will probably lead to an invasion of salt water and estuarine species, mostly small fish and crustaceans, into this canal. Connection of the canal to tide will not decrease water quality of the receiving body, which is so anoxic and turbid that normal, low flow discharges of the Canal may actually improve water quality of Bay waters. Tidal connection will potentially increase the species diversity of the two mangrove parcels. However, the productivity and colonization of the drainage by estuarine organisms will be limited by water quality in the adjacent harbor waters, where oxygen is generally deficient. There may be some potential for colonization of the concrete lined lower culvert with barnacles. Tidal flushing of the lower Canal will be restored.

Wildlife. Wildlife will be displaced or eliminated from the 1.0 acre of mangroves that will be cleared for channel improvements, and from the 7.5 acres of transitional wetland vegetation under the power line right of way that will be converted into the new Margarita levee. The trapezoidal-walled upper Bechara channel may provide foraging habitat for wading birds, a habitat type now virtually absent in this sub-basin. The mitigation proposed for wetland loss is creation of an additional 5 acres of mangrove habitat on or off-project. This will more than compensate for loss of the mangrove habitat, but it will not replace the emergent habitat of the existing power line corridor. The wildlife habitat loss under this corridor is not considered significant.