

**FINAL - NATURAL RESOURCE ASSESSMENT
RIO DESCALABRADO FLOOD CONTROL PROJECT
SANTA ISABEL, PUERTO RICO**

And

**FINAL - CONCEPTUAL MITIGATION PLAN
RIO DESCALABRADO FLOOD CONTROL
PROJECT**



DIAL CORDY
AND ASSOCIATES INC
Environmental Consultants

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October 2000

**Prepared for:
U.S. Army Corps of Engineers
Jacksonville District
400 West Bay Street
Jacksonville, FL 32202**

**Prepared by:
Dial Cordy and Associates Inc.
115 Professional Drive, Suite 104
Ponte Vedra Beach, FL 32082**

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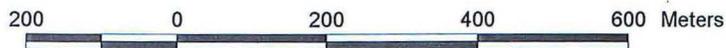
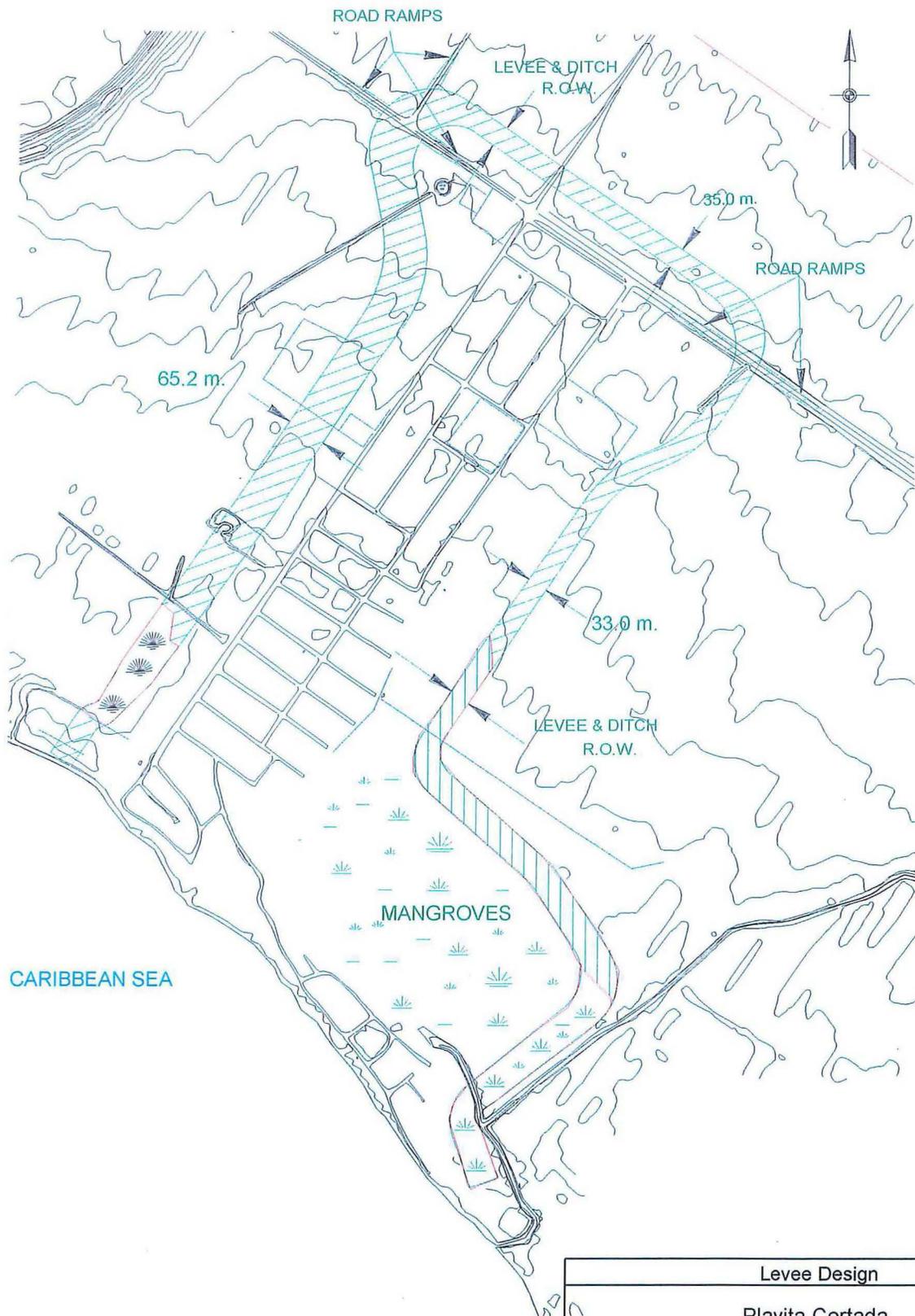
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1.0 INTRODUCTION

The Jacksonville District, U.S. Army Corps of Engineers, hereafter referred to as the Government, is currently preparing to conduct flood control activities within the community of Playita Cortada in response to flooding and related problems from Rio Descalabrado at Santa Isabel, Puerto Rico. A Final Detailed Project Report and Environmental Assessment was completed in February 1996 to determine if the Federal Government may participate in the development of the flood control project. The recommended plan described in the report called for construction of a 3,690 meters long levee around west, north, and east sides of the community. Since the completion of the report, the community of Playita Cortada has expanded in size, requiring that the southern side of the levee be relocated to the south. This relocation will result in additional wetland impacts and requires that the baseline environmental conditions be reevaluated and updated to determine any other affects of the action. The Government issued contract DACW17-99-D-0057 to Dial Cordy and Associates, Inc. to perform field investigations and database searches to update the natural resource baseline conditions in the February 1996 Detailed Project Report and Environmental Assessment and develop a conceptual mitigation plan. The specific area to be investigated is indicated in the levee design (Figure 1).

2.0 METHODS

Available data, reports, aerial photographs, and other relevant information were obtained from the Government or other local agencies and institutions. A plant cover map was prepared based on the desktop survey of existing information and field verified. Wetland communities were included on the plant cover map and field verified, as well. The jurisdictional wetland line was delineated in the field in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* and mapped using Differential Global Positioning System (DGPS). Corps of Engineers jurisdictional wetland determination data sheets were prepared and are included in Appendix A. Functional values of the wetlands to be impacted were calculated based upon the Estuarine Wetland Rapid Assessment Procedure (EWRAP) and Wetland Rapid Assessment Procedure (WRAP). Information on the natural resources of the site was collected in the field and recorded, which included neotropical migratory songbird utilization, general wildlife utilization, and potential habitat for protected species. Avian surveys were conducted during the morning hours to coincide with greater levels of bird activities. Surveys consisted of remaining in a fixed location for five minutes and recording all bird species seen or heard during that period. Locations were determined by choosing areas that were accessible and not posted as private property. When possible, avian survey locations were placed near the areas of the proposed levee construction. The level of potential environmental impacts under the proposed project was determined and a preliminary list of potential mitigation measures were developed to compensate for the impacts.



Levee Design	
Playita Cortada	
Scale: 1:10,000	Drawn By: MR
Date: 08/00	Approved By: JC
	J00-354
	Figure 1

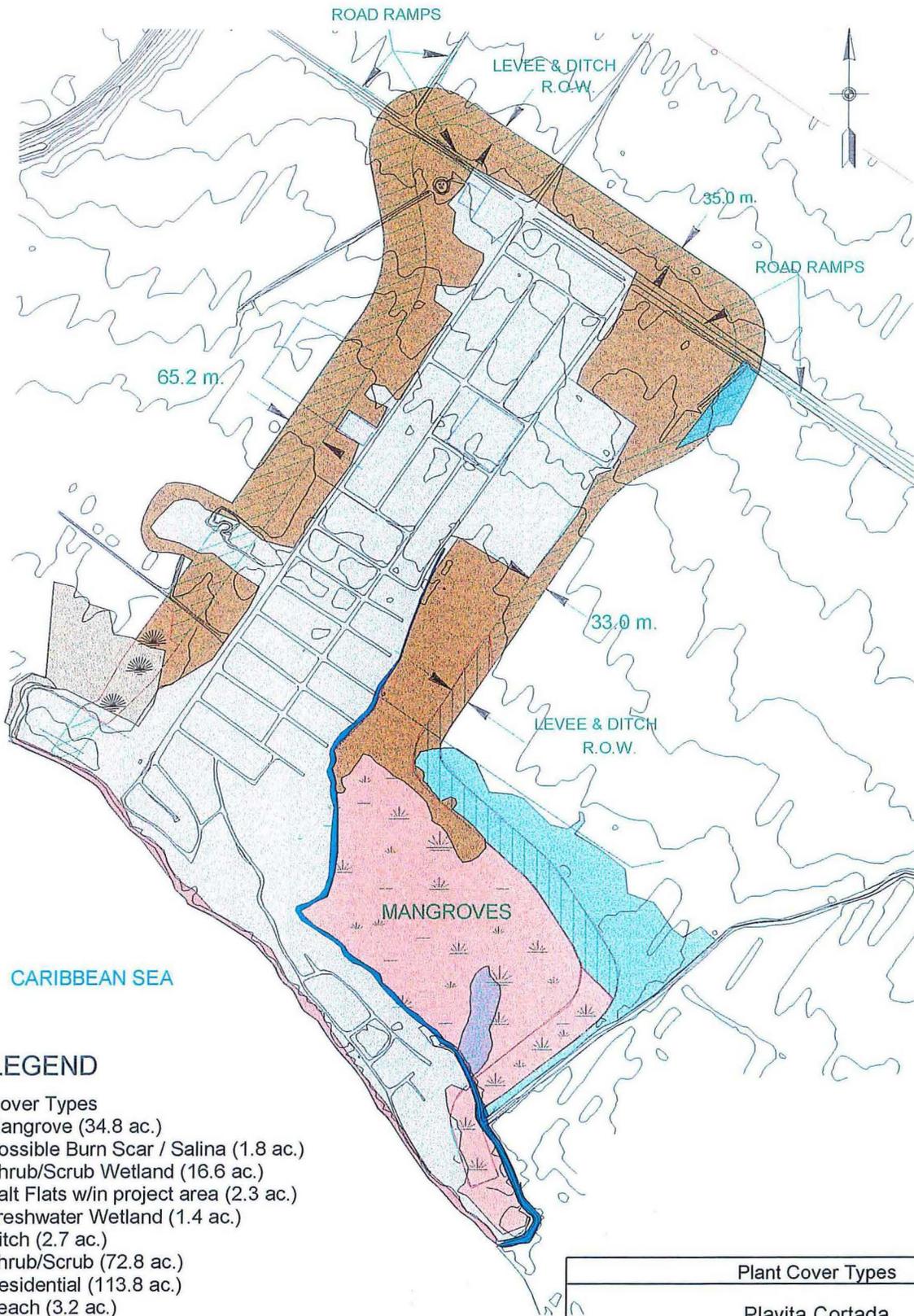
3.0 RESULTS

3.1 Plant Communities

Plant communities within the project area are all disturbed to some degree. Most areas reflect decades of sugarcane cultivation followed by abandonment. Natural succession has led to the formation of an open savannah-like woodland. Plant communities found within the project site are shown in Figure 2 and include; basin mangrove forest, salt flats, shrub/scrub wetland, shrub/scrub upland, freshwater marsh, beach, and residential areas. The basin mangrove forest occurs in the southeast area of the project and is dominated by red (*Rhizophora mangle*) and black (*Avicennia germinans*) mangroves. The salt flats are herbaceous wetland areas dominated by salt-tolerant plants, such as, *Batis maritima* and *Paspalum vaginatum*. The shrub/shrub wetlands occur on the eastern portion of the project and are dominated by shrubs, such as, *Parkinsonia aculeata* with scattered open areas dominated by salt flat plants. The shrub/scrub upland areas are dominated by shrubs, such as, *Acacia tortuosa* and *Prosopis pallida*. The freshwater marsh in the northeastern portion of the project site is dominated by *Typha* spp. All the vegetated areas exhibit signs of grazing by pigs, goats, cattle and horses. The residential area has expanded since the 1996 Environmental Assessment along the western side of the project site and a new housing development is currently under construction immediately south of the school on the eastern side of the project.

3.2 Wetlands

Wetland community types are shown in Figure 3 along with the location of data collection points. Based on the field delineated wetland limits shown in Figure 4, the levee "footprint" will cover a total of 12.3 acres of brackish to hypersaline estuarine wetlands, as follows; 1.7 acres of salt flat emergent wetlands on the southwestern end of the levee, 5.7 acres of degraded salina/scrub/shrub on the eastern levee extension, and 4.9 acres of basin mangrove in the southeastern corner. One change that has occurred since the initial Environmental Assessment in 1996 is that a wetland area formed in the northeast area of the levee. This is a small area dominated by cattails and appears to be the result of fill being removed for construction of an access road on adjacent property. Impacts to this cattail wetland total 1.1 acres. Another change since the initial report is continued encroachment into the mangrove area by residents. Approximately 1.8 acres of burn scar and/or hypersaline area has been cleared and partially filled. Table 1 lists wetland types, acreages impacted, and EWRAP scores. EWRAP data sheets are located in Appendix B.



LEGEND

Plant Cover Types

- Mangrove (34.8 ac.)
- Possible Burn Scar / Salina (1.8 ac.)
- Shrub/Scrub Wetland (16.6 ac.)
- Salt Flats w/in project area (2.3 ac.)
- Freshwater Wetland (1.4 ac.)
- Ditch (2.7 ac.)
- Shrub/Scrub (72.8 ac.)
- Residential (113.8 ac.)
- Beach (3.2 ac.)

Plant Cover Types

Playita Cortada

Scale: 1:10,000

Date: 08/00

Drawn By: MR

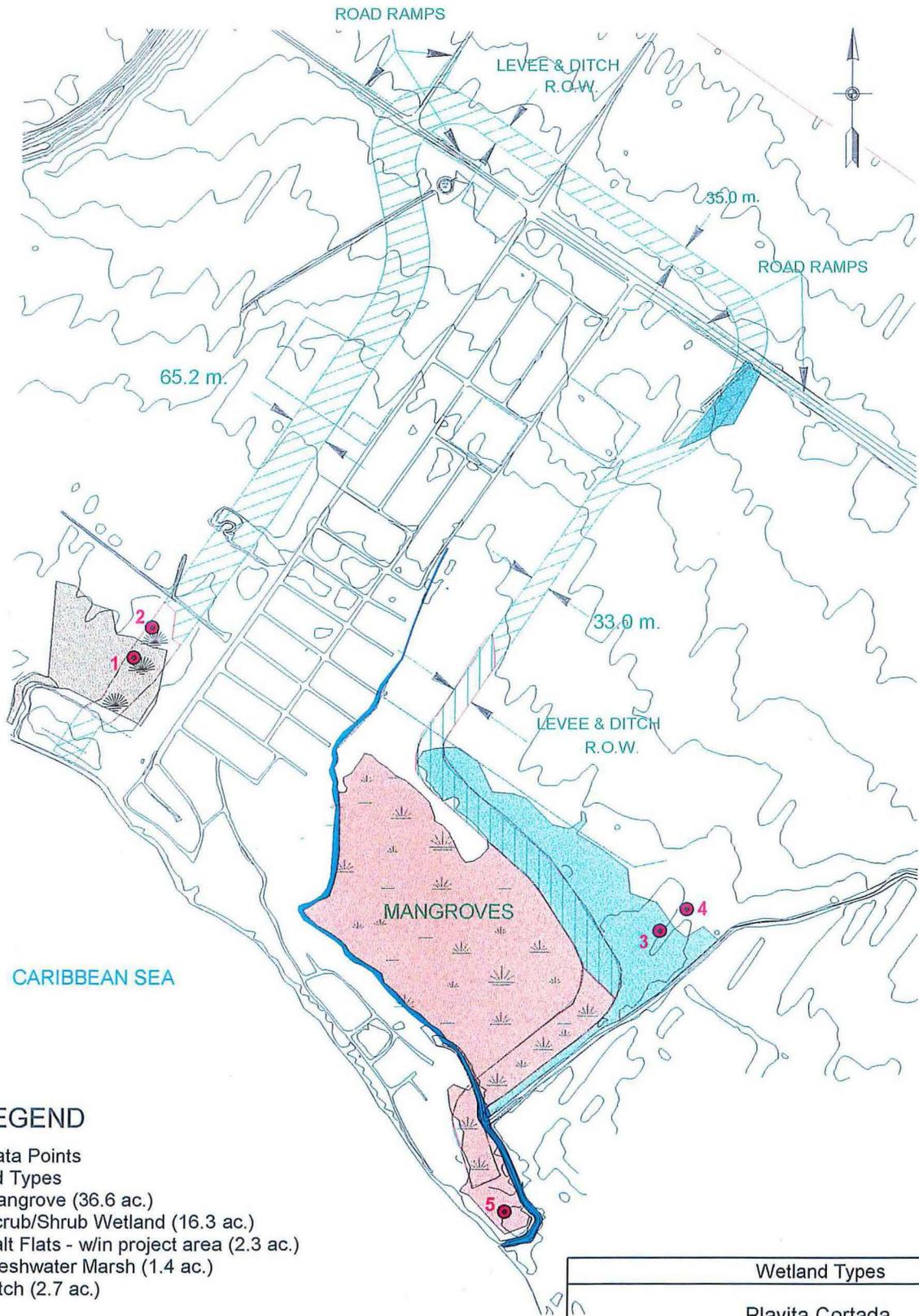
Approved By: JC



J00-354

Figure 2

200 0 200 400 600 Meters

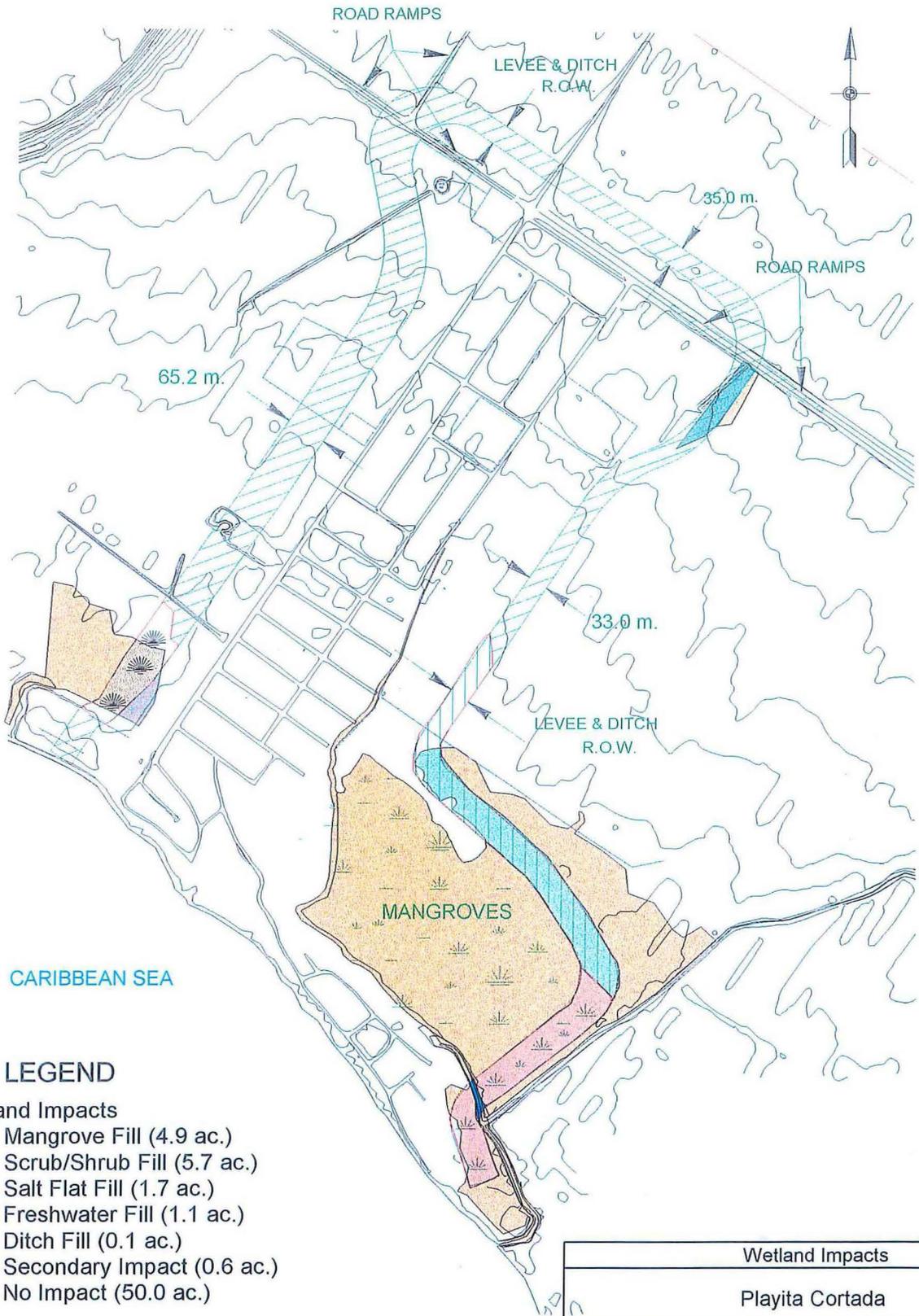


LEGEND

- Data Points
- Wetland Types
 - Mangrove (36.6 ac.)
 - Scrub/Shrub Wetland (16.3 ac.)
 - Salt Flats - w/in project area (2.3 ac.)
 - Freshwater Marsh (1.4 ac.)
 - Ditch (2.7 ac.)



Wetland Types	
Playita Cortada	
Scale: 1:10,000	Drawn By: MR
Date: 08/00	Approved By: JC
 DIAL, CORDY AND ASSOCIATES INC <i>Environmental Consultants</i>	J00-354
	Figure 3



LEGEND

- Wetland Impacts**
- Mangrove Fill (4.9 ac.)
 - Scrub/Shrub Fill (5.7 ac.)
 - Salt Flat Fill (1.7 ac.)
 - Freshwater Fill (1.1 ac.)
 - Ditch Fill (0.1 ac.)
 - Secondary Impact (0.6 ac.)
 - No Impact (50.0 ac.)



Wetland Impacts	
Playita Cortada	
Scale: 1:10,000	Drawn By: MR
Date: 08/00	Approved By: JC
 DIAL, CORDY AND ASSOCIATES INC <small>Environmental Consultants</small>	J00-354
	Figure 4

Table 1 Wetland Impacts

Wetland Type	EWRAP Score	Acreage to be Impacted	Total Score
Salt Flats / Shrub-Scrub	0.42	7.4	3.12
Mangrove	0.57	4.9	2.81
Cattail Marsh	0.42	1.1	0.46
Total Impacts			6.39

3.3 Wildlife Survey

Avian surveys were conducted during the morning hours between February 23 and 24, 2000. A total of 27 bird species were recorded within the vicinity of the proposed project area (Table 2). Only one species recorded is a federally listed species, the brown pelican (*Pelecanus occidentalis*). No other bird species recorded is listed as endangered or threatened.

Wildlife utilization by non-avian species was low. Loose domestic pigs (non-feral), goats, horses, and cats were identified on-site during our wildlife surveys. No other wildlife species recorded is listed as endangered or threatened.

3.4 Protected Species

The U.S. Fish and Wildlife Service (USFWS) identified the Antillean manatee (*Trichechus manatus*), Hawksbill sea turtle (*Eretmochelys imbricata*), and the brown pelican as the only species protected under the Endangered Species Act that might occur within the project area (April 1993). The manatee may forage in the turtlegrass offshore. The brown pelican may also be seen offshore, however, no nesting is known to occur within the project area. The Hawksbill sea turtle does not nest along the shores of the proposed project area because the rocky shoreline does not provide suitable habitat.

In their December 1994 letter, the USFWS indicated that the proposed project will not adversely affect any threatened or endangered species (U.S. Army Corps of Engineers 1996).

4.0 SUMMARY

The majority of the project area is in the same condition as when the initial Environmental Assessment was done (1996). Some notable changes are (1) the formation of the freshwater cattail marsh in the northeastern portion of the project apparently due to the construction of an adjacent gravel road, (2) continued encroachment of residents filling and ditching portions of the mangrove area (3) expansion of residential areas along the western and eastern portions of project

Table 2 Bird Species Observed at Playita Cortada, Puerto Rico, 23-24 February 2000

Common Name	Scientific Name	Location				
		Mangrove	Salt Flats	Scrub/Shrub	Residential	Ocean
Antillean Mango	<i>Anthracothorax dominicus</i>	X		X		
Cattle Egret	<i>Bubulcus ibis</i>		X			
Red-tailed Hawk	<i>Buteo jamaicensis</i>			X		
Green Heron	<i>Butorides striatus</i>	X				
Belted Kingfisher	<i>Ceryle alcyon</i>	X				
Killdeer	<i>Charadrius vociferus</i>	X				
Bananaquit	<i>Coereba flaveola</i>	X	X	X	X	
Rock Dove	<i>Columba livia</i>			X	X	
Common Ground Dove	<i>Columbina passerina</i>		X	X	X	
Smooth-billed Ani	<i>Crotophaga ani</i>			X		
Adelaid's Warbler	<i>Dendroica adelaidae</i>			X		
Prairie Warbler	<i>Dendroica discolor</i>	X		X		
Palm Warbler	<i>Dendroica palmarum</i>	X		X		
Yellow Warbler	<i>Dendroica petechia</i>	X		X		
Magnificent Frigatebird	<i>Fregata magnificens</i>					X
Puerto Rican Woodpecker	<i>Melanerpes portoricensis</i>	X				
Northern Mockingbird	<i>Mimus polyglottos</i>		X	X	X	
Shiny Cowbird	<i>Molothrus bonariensis</i>	X				
Night Heron	<i>Nycticorax spp.</i>	X				
House Sparrow	<i>Passer domesticus</i>		X		X	
Brown Pelican	<i>Pelecanus occidentalis</i>					X
Greater Antillean Grackle	<i>Quiscalus niger</i>	X	X	X	X	
Northern Waterthrush	<i>Seiurus noveboracensis</i>	X				
Strip-headed Tanager	<i>Spindalis zena</i>	X				
Gray Kingbird	<i>Tyrannus dominicensis</i>	X	X	X		
White-winged Dove	<i>Zenaida asiatica</i>			X	X	
Zenaida Dove	<i>Zenaida aurita</i>			X	X	
Mourning Dove	<i>Zenaida macroura</i>			X	X	

APPENDIX A

Wetland Data Sheets

DATA FORM
 ROUTINE WETLAND DETERMINATION
 (1987 COE Wetlands Delineation Manual)

Project/Site: <u>Rio Descalabrado Flood Control Project</u>	Date: <u>2/23/00</u>
Applicant/Owner:	County: _____
Investigator: <u>Jerry Cordy</u>	State: <u>Puerto Rico</u>
Have Vegetation, soils, or hydrology been disturbed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Heavily Grazed Is the area a potential Problem Area? (If needed, explain on reverse) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Community ID: _____ Transect ID: _____ Plot ID: <u>1</u>

VEGETATION (Note: those species observed to have morphological adaptations to wetlands with a*)

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Batis maritima</i>	H	OBL	9.		
2. <i>Paspalum vaginatum</i>	H	OBL	10.		
3. <i>Sporobolus virginicus</i>	H	FACW+	11.		
4. <i>Heliotropium curassavicum</i>	H	OBL	12.		
5. <i>Sesuvium portulacastrum</i>	H	FACW	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (*) as showing morphological adaptations to wetlands. <u>100%</u>
Describe Morphological Adaptations:
Remarks: Heavily grazed area

HYDROLOGY

Recorded Data (Describe in Remarks) _____ ___ Stream, Lake, or Tide Gage ___ Aerial Photograph ___ Other ___ No Recorded Data Available	Wetland Hydrology Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands ___ Oxidized Root channels in Upper 12 Inches ___ Water Stained Leaves ___ Local Soil Survey Data ___ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: _____ (in) Depth to Free Water in Pit: _____ (in) Depth to Saturated Soil: <u>>12</u> (in)	
Remarks:	

SOILS

Map Unit Name: <u>Teresa</u>		Drainage Class: <u>poorly drained</u>			
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type: Yes ___ No ___			
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
<u>2</u>	<u>A</u>	<u>10YR6/1</u>	_____	_____	<u>Silty loam</u>
<u>2-8</u>	<u>A</u>	<u>10YR2/1</u>	_____	_____	<u>Silty loam clay</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Hydric Soil Indicators:					
<input type="checkbox"/>	Histosol	<input type="checkbox"/>	Concretions		
<input type="checkbox"/>	Histic Epipedon	<input checked="" type="checkbox"/>	High Organic Content in Surface Layer		
<input type="checkbox"/>	Sulfidic Odor	<input type="checkbox"/>	Organic Streaking		
<input type="checkbox"/>	Probable Aquic Moisture Regime	<input type="checkbox"/>	Listed on Local Hydric Soils List		
<input type="checkbox"/>	Reducing Conditions	<input type="checkbox"/>	Listed on National Hydric Soils List		
<input checked="" type="checkbox"/>	Gleyed or Low-Chroma Colors	<input type="checkbox"/>	Other (Explain in Remarks)		
Remarks:					

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	Is this Sampling Point Within a Wetland? Y <input checked="" type="checkbox"/> N <input type="checkbox"/>
Hydric Soils Present?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Wetland Hydrology Present?	Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	
Remarks:		

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Rio Descalabrado Flood Control Project</u>	Date: <u>2/23/00</u>
Applicant/Owner:	County: _____
Investigator: <u>Jerry Cordy</u>	State: <u>Puerto Rico</u>
Have Vegetation, soils, or hydrology been disturbed? Yes <u> X </u> No <u> — </u>	Community ID: _____
Is the area a potential Problem Area? (If needed, explain on reverse) Yes <u> — </u> No <u> X </u>	Transect ID: _____
	Plot ID: <u> 2 </u>

VEGETATION (Note: those species observed to have morphological adaptations to wetlands with a*)

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acacia tortuosa</i>	S	UPL	9.		
2. <i>Parkinsonia aculeata</i>	S	FAC	10.		
3. <i>Panicum maximum</i>	H	FAC-	11.		
4. <i>Andropogon spp.</i>	H	NI	12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (*) as showing morphological adaptations to wetlands. <u>25%</u>
Describe Morphological Adaptations:
Remarks: Heavily Grazed area

HYDROLOGY

Recorded Data (Describe in Remarks)___ ___ Stream, Lake, or Tide Gage ___ Aerial Photograph ___ Other ___ No Recorded Data Available	Wetland Hydrology Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands ___ Oxidized Root channels in Upper 12 Inches ___ Water Stained Leaves ___ Local Soil Survey Data ___ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: ___ (in) Depth to Free Water in Pit: ___ (in) Depth to Saturated Soil: <u>>18</u> (in)	
Remarks:	

SOILS

Map Unit Name: <u>Teresa Series</u>		Drainage Class: <u>poorly drained</u>			
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type: Yes <u>X</u> No <u> </u>			
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
<u>0-4</u>	<u>A</u>	<u>10YR6/1</u>	_____	_____	<u>Silty clay loam</u>
<u>4-10</u>	<u>B</u>	<u>10YR5/3</u>	_____	_____	<u>Silty clay loam</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Hydric Soil Indicators:					
<u> </u>	Histosol	<u> </u>	Concretions		
<u> </u>	Histic Epipedon	<u> </u>	High Organic Content in Surface Layer		
<u> </u>	Sulfidic Odor	<u> </u>	Organic Streaking		
<u> </u>	Probable Aquic Moisture Regime	<u> </u>	Listed on Local Hydric Soils List		
<u> </u>	Reducing Conditions	<u> </u>	Listed on National Hydric Soils List		
<u> </u>	Gleyed or Low-Chroma Colors	<u> </u>	Other (Explain in Remarks)		
Remarks:					

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Y <u> </u>	N <u>X</u>	Is this Sampling Point Within a Wetland? Y <u> </u> N <u>X</u>
Hydric Soils Present?	Y <u> </u>	N <u>X</u>	
Wetland Hydrology Present?	Y <u> </u>	N <u>X</u>	
Remarks:			

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Rio Descalabrado Flood Control Project</u>	Date: <u>2/23/00</u>
Applicant/Owner:	County: _____
Investigator: <u>Jerry Cordy</u>	State: <u>Puerto Rico</u>
Have Vegetation, soils, or hydrology been disturbed? Yes <u> X </u> No <u> — </u>	Community ID: _____
Heavily Grazed Is the area a potential Problem Area? (If needed, explain on reverse) Yes <u> — </u> No <u> X </u>	Transect ID: _____
	Plot ID: <u> 3 </u>

VEGETATION (Note: those species observed to have morphological adaptations to wetlands with a*)

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Batis maritima</i>	H	OBL	9.		
2. <i>Parkinsonia aculeata</i>	S	FAC	10.		
3. <i>Sporobolus virginicus</i>	H	FACW+	11.		
4. <i>Heliotropium curassavicum</i>	H	OBL	12.		
5. <i>Sesuvium portulacastrum</i>	H	FACW	13.		
6. <i>Paspalum vaginatum</i>	H	OBL	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (*) as showing morphological adaptations to wetlands. <u> 100% </u>
Describe Morphological Adaptations:
Remarks: Heavily grazed area

HYDROLOGY

<p>Recorded Data (Describe in Remarks) _____</p> <p>_____ Stream, Lake, or Tide Gage</p> <p>_____ Aerial Photograph</p> <p>_____ Other</p> <p>_____ No Recorded Data Available</p>	<p>Wetland Hydrology Indicators:</p> <p>_____ Inundated</p> <p>_____ Saturated in Upper 12 Inches</p> <p>_____ Water Marks</p> <p>_____ Drift Lines</p> <p>_____ Sediment Deposits</p> <p>_____ Drainage Patterns in Wetlands</p> <p>_____ Oxidized Root channels in Upper 12 Inches</p> <p>_____ Water Stained Leaves</p> <p>_____ Local Soil Survey Data</p> <p>_____ Other (Explain in Remarks)</p>
<p>Field Observations:</p> <p>Depth of Surface Water: _____ (in)</p> <p>Depth to Free Water in Pit: _____ (in)</p> <p>Depth to Saturated Soil: <u> >12 </u> (in)</p>	
<p>Remarks: Salt crystals on soil in this area (some gems).</p>	

SOILS

Map Unit Name: <u>Teresa</u>		Drainage Class: <u>poorly drained</u>			
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type: Yes ___ No ___			
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
<u>2</u>	<u>A</u>	<u>10YR6/1</u>	_____	_____	<u>Silty loam clay</u>
<u>2-8</u>	<u>A</u>	<u>10YR2/1</u>	_____	_____	<u>Silty loam clay</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Hydric Soil Indicators:					
<input type="checkbox"/>	Histosol		<input type="checkbox"/>	Concretions	
<input type="checkbox"/>	Histic Epipedon		<input checked="" type="checkbox"/>	High Organic Content in Surface Layer	
<input type="checkbox"/>	Sulfidic Odor		<input type="checkbox"/>	Organic Streaking	
<input type="checkbox"/>	Probable Aquic Moisture Regime		<input type="checkbox"/>	Listed on Local Hydric Soils List	
<input type="checkbox"/>	Reducing Conditions		<input type="checkbox"/>	Listed on National Hydric Soils List	
<input checked="" type="checkbox"/>	Gleyed or Low-Chroma Colors		<input type="checkbox"/>	Other (Explain in Remarks)	
Remarks:					

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Is this Sampling Point Within a Wetland? Y <input checked="" type="checkbox"/> N <input type="checkbox"/>
Hydric Soils Present?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Wetland Hydrology Present?	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Remarks:			

DATA FORM
 ROUTINE WETLAND DETERMINATION
 (1987 COE Wetlands Delineation Manual)

Project/Site: <u>Rio Descalabrado Flood Control Project</u>	Date: <u>2/23/00</u>
Applicant/Owner:	County: _____
Investigator: <u>Jerry Cordy</u>	State: <u>Puerto Rico</u>
Have Vegetation, soils, or hydrology been disturbed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Community ID: _____
Is the area a potential Problem Area? (If needed, explain on reverse) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Transect ID: _____
	Plot ID: <u>4</u>

VEGETATION (Note: those species observed to have morphological adaptations to wetlands with a*)

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Acacia tortuosa</i>	S	UPL	9.		
2. <i>Prosopis pallida</i>	S	UPL	10.		
3. <i>Panicum maximum</i>	H	FAC-	11.		
4. <i>Gossypium hirsutum</i>	S	FACU	12.		
5. <i>Acacia farnesiana</i>	S	NI	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (*) as showing morphological adaptations to wetlands. <u>0</u>
Describe Morphological Adaptations:
Remarks: Area heavily grazed

HYDROLOGY

Recorded Data (Describe in Remarks) _____ ___ Stream, Lake, or Tide Gage ___ Aerial Photograph ___ Other ___ No Recorded Data Available	Wetland Hydrology Indicators: ___ Inundated ___ Saturated in Upper 12 Inches ___ Water Marks ___ Drift Lines ___ Sediment Deposits ___ Drainage Patterns in Wetlands ___ Oxidized Root channels in Upper 12 Inches ___ Water Stained Leaves ___ Local Soil Survey Data ___ Other (Explain in Remarks)
Field Observations: Depth of Surface Water: _____ (in) Depth to Free Water in Pit: _____ (in) Depth to Saturated Soil: <u>>18</u> (in)	
Remarks:	

SOILS

Map Unit Name: <u>Teresa Series</u>		Drainage Class: <u>poorly drained</u>			
Taxonomy (Subgroup):		Field Observations Confirm Mapped Type: Yes <u>X</u> No <u> </u>			
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
<u>0-4</u>	<u>A</u>	<u>10YR6/1</u>	<u> </u>	<u> </u>	<u>Silty clay loam</u>
<u>4-10</u>	<u>B</u>	<u>10YR5/3</u>	<u> </u>	<u> </u>	<u>Silty clay loam</u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Hydric Soil Indicators:					
<u> </u>	Histosol	<u> </u>	Concretions		
<u> </u>	Histic Epipedon	<u> </u>	High Organic Content in Surface Layer		
<u> </u>	Sulfidic Odor	<u> </u>	Organic Streaking		
<u> </u>	Probable Aquic Moisture Regime	<u> </u>	Listed on Local Hydric Soils List		
<u> </u>	Reducing Conditions	<u> </u>	Listed on National Hydric Soils List		
<u> </u>	Gleyed or Low-Chroma Colors	<u> </u>	Other (Explain in Remarks)		
Remarks:					

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Y <u> </u>	N <u>X</u>	Is this Sampling Point Within a Wetland? Y <u> </u> N <u>X</u>
Hydric Soils Present?	Y <u> </u>	N <u>X</u>	
Wetland Hydrology Present?	Y <u> </u>	N <u>X</u>	
Remarks:			

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Rio Descalabrado Flood Control Project</u>	Date: <u>2/24/00</u>
Applicant/Owner:	County: _____
Investigator: <u>Jerry Cordy</u>	State: <u>Puerto Rico</u>
Have Vegetation, soils, or hydrology been disturbed? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Community ID: _____
Is the area a potential Problem Area? (If needed, explain on reverse) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Transect ID: _____
	Plot ID: <u>5</u>

VEGETATION (Note: those species observed to have morphological adaptations to wetlands with a*)

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Avicennia germinous</i>	C	OBL	9.		
2. <i>Rhizophora mangle</i>	C	OBL	10.		
3. <i>Laguncularia racemosa</i>	C	OBL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (except FAC-). Include species noted (*) as showing morphological adaptations to wetlands. 100%

Describe Morphological Adaptations:

Remarks:

Pigs and goats forage throughout area, Area in central portion of mangroves cleared

HYDROLOGY

<p>Recorded Data (Describe in Remarks) _____</p> <p>_____ Stream, Lake, or Tide Gage</p> <p>_____ Aerial Photograph</p> <p>_____ Other</p> <p>_____ No Recorded Data Available</p>	<p>Wetland Hydrology Indicators:</p> <p>_____ Inundated</p> <p><u> x </u> Saturated in Upper 12 Inches</p> <p><u> x </u> Water Marks</p> <p>_____ Drift Lines</p> <p><u> x </u> Sediment Deposits</p> <p>_____ Drainage Patterns in Wetlands</p> <p>_____ Oxidized Root channels in Upper 12 Inches</p> <p>_____ Water Stained Leaves</p> <p>_____ Local Soil Survey Data</p> <p>_____ Other (Explain in Remarks)</p>
<p>Field Observations:</p> <p>Depth of Surface Water: _____ (in)</p> <p>Depth to Free Water in Pit: _____ (in)</p> <p>Depth to Saturated Soil: <u> 6 </u> (in)</p>	
<p>Remarks:</p>	

SOILS

Map Unit Name: _____		Drainage Class: _____			
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type: Yes ___ No ___			
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Rhizospheres, etc.
0-2	A	10yr2/2	_____	_____	_____
2+	_____	10yr2/1	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Hydric Soil Indicators:					
___	Histosol	___	Concretions		
___	Histic Epipedon	___x	High Organic Content in Surface Layer		
___x	Sulfidic Odor	___	Organic Streaking		
___	Probable Aquic Moisture Regime	___	Listed on Local Hydric Soils List		
___	Reducing Conditions	___	Listed on National Hydric Soils List		
___	Gleyed or Low-Chroma Colors	___	Other (Explain in Remarks)		
Remarks:					

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Y ___x	N ___	Is this Sampling Point Within a Wetland? Y ___x N ___
Hydric Soils Present?	Y ___x	N ___	
Wetland Hydrology Present?	Y ___x	N ___	
Remarks: Basin mangrove system			

APPENDIX B
EWRAP Data Sheets

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.57

Date of Site Visit: 24 February 2000

Evaluator(s): Jerry Cordy and Mark Howell (Dial Cordy and Associates Inc.)

Project Site: Playita Cortada

Permit Number:

Wetland ID: Wetland B

Wetland Type: Mangrove Swamp

Land-Use: Natural

2.0 Fish and Wildlife Utilization

Notes: Moderate fish and wildlife utilization. Adequate protective cover for wildlife. Evidence of some human-induced impacts. Evidence of pig foraging activity in mangrove.

2.0 Overstory/Shrub Canopy

Notes: Few undesirable trees/shrubs. Natural recruitment. Trees healthy although there is some evidence of stress.

1.0 Ground Cover

Notes: Ground cover impacted by heavy grazing, but exhibits evidence of seed germination or natural recruitment.

1.0 Upland/Wetland Buffer

Notes: Some buffer on 1/2 of the wetland. Encroachment by grazing and fill common. Portion connected to contiguous wetland (Atlantic Ocean).

2.0 Field Indicators of Wetland Hydrology

Notes: Wetland hydroperiod adequate, although site conditions exist that can interfere with natural hydroperiod.

2.32 Water Quality Inputs and Treatment

Notes: $[(0.25 \times 3.0) + (0.50 \times 2.5) + (0.25 \times 1.5)] + [(0.25 \times 3.0) + (0.50 \times 3.0) + (0.25 \times 0.0)] / 2$

LU = 25% Natural (beach), 50% Unimproved pasture, 25% Single family residential

PT = 25% Natural, 50% Natural, 25% Untreated

Land-Use = 2.38
Pre-Treatment = 2.25

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.42

Date of Site Visit: 24 February 2000

Evaluator(s): Jerry Cordy and Mark Howell (Dial Cordy and Associates Inc.)

Project Site: Playita Cortada

Permit Number:

Wetland ID: Wetland D

Wetland Type: Cattail Marsh

Land-Use: Natural

1.0 Fish and Wildlife Utilization

Notes: Little evidence of wildlife utilization. Area heavily grazed by horses

N/A Overstory/Shrub Canopy

1.0 Ground Cover

Notes: Ground cover dominated by undesirable invasive species (*Typha* spp.), Area heavily grazed.

1.0 Upland/Wetland Buffer

Notes: Roadways on two sides, remaining areas heavily grazed.

2.0 Field Indicators of Wetland Hydrology

Notes: Wetland hydroperiod adequate, although site conditions exist that can interfere with natural hydroperiod.

1.25 Water Quality Inputs and Treatment

Notes: $LU = (0.5 \times 1) + (0.5 \times 2.5) = 1.75$ LU Total

$PT = (0.5 \times 0) + (0.5 \times 1.5) = 0.75$ PT

WQIT=1.25

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.42

Date of Site Visit: 23 February 2000

Evaluator(s): Jerry Cordy and Mark Howell (Dial Cordy and Associates Inc.)

Project Site: Playita Cortada

Permit Number:

Wetland ID: Wetland A

Wetland Type: Salt Flats

Land-Use: Natural

0.5 Fish and Wildlife Utilization

Notes: Little habitat for fish and wildlife utilization. Wetland located near horse stables and residential homes. Presence of trash/junk scattered throughout wetland and horse activity within wetland.

N/A Overstory/Shrub Canopy

Notes:

1.0 Ground Cover

Notes: Few undesirable plants present, however, heavy grazing has reduced plant biomass.

1.5 Upland/Wetland Buffer

Notes: Buffer generally greater than 30 feet but less than 300 feet. Desirable cover with appropriate vegetation.

1.5 Field Indicators of Wetland Hydrology

Notes: Plants appear healthy, although site hydroperiod inadequate to maintain the wetland Wetland connection to ocean is now limited due to damming and trash deposits...

1.82 Water Quality Inputs and Treatment

Notes: $[(0.50 \times 3.0) + (0.25 \times 1.5) + (0.25 \times 1.0)] + [(0.50 \times 3.0) + (0.25 \times 0.0) + (0.25 \times 0.0)] / 2$

LU = 50% natural/open space, 25% single-family residential, 25% road

PT = 50% natural undeveloped area, 25% no treatment, 25 % no treatment

Land-Use = 2.13
Pre-Treatment = 1.50

**FINAL
CONCEPTUAL MITIGATION PLAN
For
RIO DESCALABRADO FLOOD CONTROL
PROJECT**

October 2000

**Prepared for:
U.S. Army Corps of Engineers
Jacksonville District
400 West Bay Street
Jacksonville, FL 32202**

**Prepared by:
Dial Cordy and Associates Inc.
115 Professional Drive, Suite 104
Ponte Vedra Beach, FL 32082**

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1.0 INTRODUCTION

The Jacksonville District, U.S. Army Corps of Engineers, hereafter referred to as the Government, is currently preparing to conduct flood control activities within the community of Playita Cortada in response to flooding and related problems from Rio Descalabrado at Santa Isabel, Puerto Rico. A Final Detailed Project Report and Environmental Assessment was completed in February 1996 to determine if the Federal Government may participate in the development of the flood control project. The recommended plan described in the report called for construction of a 3,690 meters long levee around west, north, and east sides of the community. Since this recommended plan will involve unavoidable wetland impacts, the Government issued contract DACW17-99-D-0057 to Dial Cordy and Associates, Inc. to perform field investigations and develop a conceptual mitigation plan.

2.0 PROJECT IMPACTS

The areas to be impacted by the levee are not of high biological diversity or functional quality, due to past agricultural activities and ongoing disturbances by human residents and their domestic animals. The levee "footprint" will cover a total of 12.3 acres of brackish to hypersaline estuarine wetlands, as follows; 1.7 acres of salt flat emergent wetlands on the southwestern end of the levee, 5.7 acres of degraded salina/scrub/shrub on the eastern levee extension, and 4.9 acres of basin mangrove in the southeastern corner. Impacts to the freshwater cattail wetland total 1.1 acres. Estuarine Wetland Rapid Assessment Procedure (EWRAP) was utilized to conduct a functional assessment of wetland impacts and proposed mitigation. Assessment worksheets can be found in Appendix A.

Table 1 Functional Assessment of Impacts

IMPACTS			
Wetland Type	EWRAP Score	Acres	Total Score
Salt Flats	0.42	7.4	3.12
Mangrove	0.57	4.9	2.81
FW Marsh	0.42	1.1	0.46
		Total Impacts	6.39

3.0 PROPOSED MITIGATION

The following mitigation measures are proposed to offset project impacts:

1. Acquisition and preservation of remainder of mangrove stand

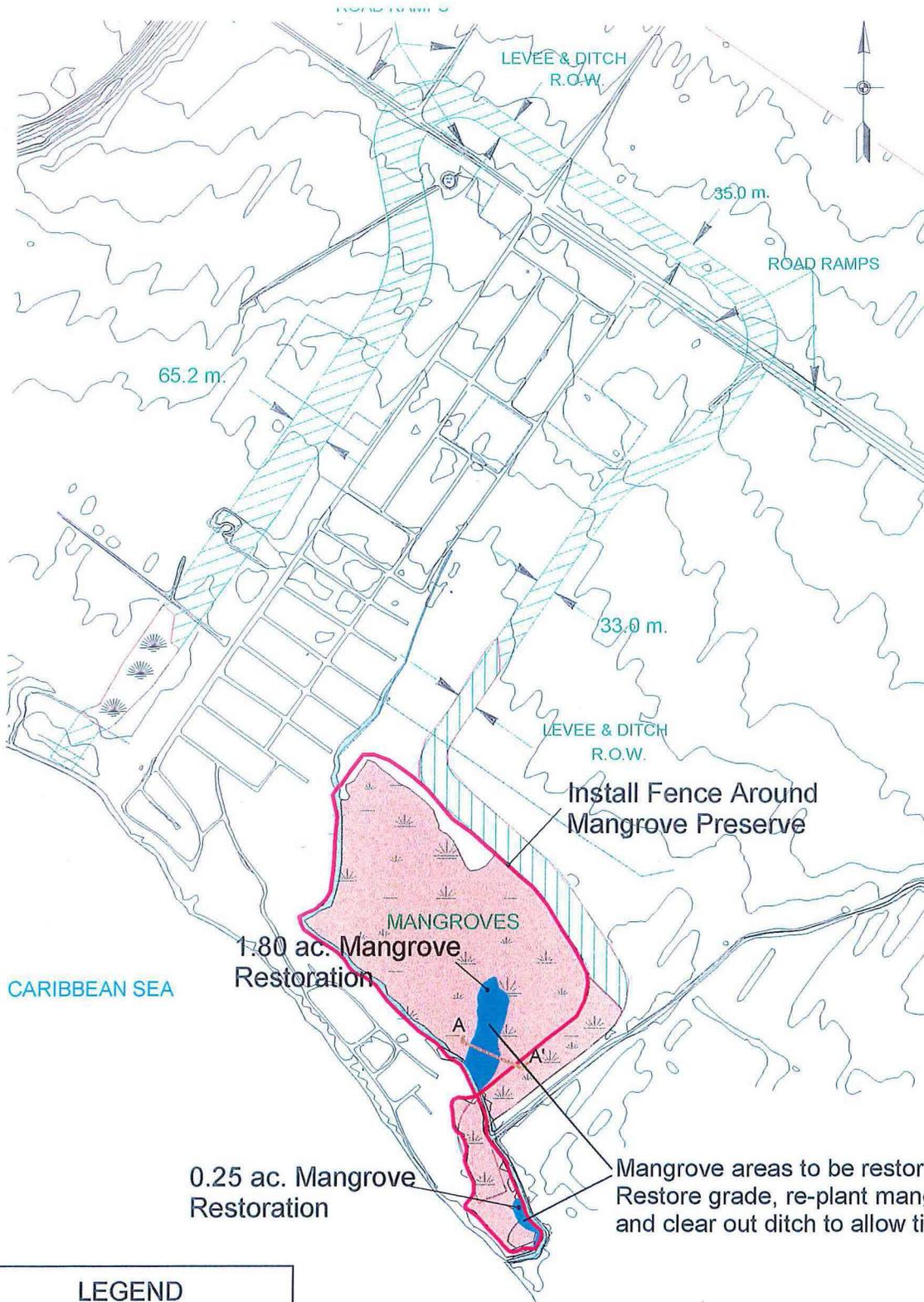
Fencing this area would prevent further encroachment of residential yards and would also prevent the entry of domestic dogs and foraging livestock. This would allow for a more diverse herbaceous vegetation layer, aid in the reproduction and spread of the mangroves and increased wildlife usage. If the area were acquired and preserved it would provide a lift factor of 0.14 to the Mangrove EWRAP score (Table 2). Preserving 31 acres would lead to a mitigation scoring of 4.31 (0.14 x 31 acres) for this portion of the mitigation.

2. Restoration of 2.05 acres of mangrove

This restoration comprises two areas as shown in Figure 1. The first is 0.25 acres, which was cleared and filled when the tidal channel was partially dredged. The second consists of 1.8 acres of cleared, ditched, and partially filled area adjacent to residences. Restoration of the 0.25 acre area will consist of removal of fill material, grading toward the channel, and planting of red mangrove seedlings. The 1.8-acre area (Figure 2) will be restored by removal of fill piles and approximately 6 inches of fill material over most of the area, grading of the ditch areas, planting of red mangrove seedlings in the ditch areas, and planting black mangroves in the slightly higher areas. Mangroves will be planted on 3-foot centers to ensure rapid restoration. Approximately 2420 red mangroves and 7500 black mangrove seedlings will be planted. The restored mangrove areas would yield an EWRAP score of 0.85. This portion of the mitigation would provide a total score of 1.75 (0.85 X 2.05 acres).

3. Construction of swales along levee

These areas will be created along the interior drainage channels which were shown in the channel cross sections in the Main Report of the 1996 Environmental Assessment. It was assumed that approximately 2000 linear meters of the "flatter" side of each channel would develop emergent vegetation in a 5m wide section for a total replacement of 2.5 acres. Their principal wetlands function will occur when they flood shallowly during mid- to late-rainy season. At these times they should provide feeding and resting areas for migrant shorebirds and both migrant and native waders. The EWRAP score for these vegetated swales would be 0.55, for a total score of 1.39 (0.55 X 2.5 acres).



Install Fence Around Mangrove Preserve

1.80 ac. Mangrove Restoration

0.25 ac. Mangrove Restoration

Mangrove areas to be restored: Restore grade, re-plant mangroves, and clear out ditch to allow tidal flushing.

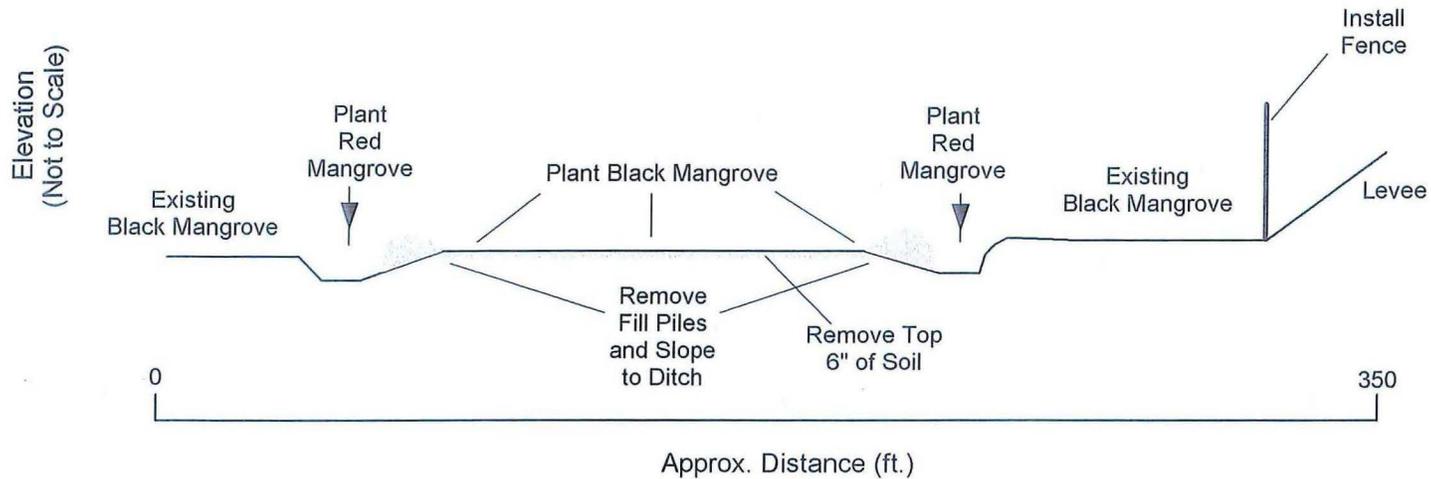
CARIBBEAN SEA

LEGEND

-  Cross Section
-  New Fence
-  Restored Mangrove Areas
-  Mangrove
-  Ditch



Mitigation Plan	
Playita Cortada	
Scale: 1:10,000	Drawn By: MR
Date: 08/00	Approved By: JC
	J00-354
	Figure 1



*Note - Mangrove to be planted on 3' centers (4840/ac.)

Typical Cross-Section of Mangrove Area to be Restored	
Playita Cortada	
Scale: 1:10,000	Drawn By: MR
Date: 08/00	Approved By: JC
	J00-354
	Figure 2

Table 2 Functional Assessment of Mitigation

MITIGATION EWRAP Scores	Swale Construction	Mangrove Preservation	Mangrove Restoration
EWRAP Score	0.55	0.71	0.85
Lift Factor*	n/a	0.14	n/a
ACRES	2.5	31	2.05
Total	1.39	4.31	1.75
		Total Mitigation	7.44

* Difference in score between Mangrove Preservation through acquisition and score of Mangrove area "as is".

Totaling the values for all mitigation yields a score of 7.44, which is more than sufficient to offset the total impact score of 6.39.

4.0 SUMMARY

The alignment of the levee was set to minimize impacts as no levee route that avoided wetlands could be identified. The recommended route minimizes the project's footprint over high value wetlands and provides for mitigation in the form of creation, preservation/protection, restoration and enhancement.

APPENDIX A
EWRAP WORKSHEETS

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.42

Date of Site Visit: 24 February 2000

Evaluator(s): Jerry Cordy and Mark Howell (Dial Cordy and Associates Inc.)

Project Site: Playita Cortada

Permit Number:

Wetland ID: Wetland D

Wetland Type: Cattail Marsh

Land-Use: Natural

1.0 Fish and Wildlife Utilization

Notes: Little evidence of wildlife utilization. Area heavily grazed by horses

N/A Overstory/Shrub Canopy

1.0 Ground Cover

Notes: Ground cover dominated by undesirable invasive species (*Typha* spp.), Area heavily grazed.

1.0 Upland/Wetland Buffer

Notes: Roadways on two sides, remaining areas heavily grazed.

2.0 Field Indicators of Wetland Hydrology

Notes: Wetland hydroperiod adequate, although site conditions exist that can interfere with natural hydroperiod.

1.25 Water Quality Inputs and Treatment

Notes: $LU = (0.5 \times 1) + (0.5 \times 2.5) = 1.75$ LU Total

$PT = (0.5 \times 0) + (0.5 \times 1.5) = 0.75$ PT

WQIT=1.25

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.57

Date of Site Visit: 24 February 2000

Evaluator(s): Jerry Cordy and Mark Howell (Dial Cordy and Associates Inc.)

Project Site: Playita Cortada

Permit Number:

Wetland ID: Wetland B

Wetland Type: Mangrove Swamp

Land-Use: Natural

2.0 Fish and Wildlife Utilization

Notes: Moderate fish and wildlife utilization. Adequate protective cover for wildlife. Evidence of some human-induced impacts. Evidence of pig foraging activity in mangrove.

2.0 Overstory/Shrub Canopy

Notes: Few undesirable trees/shrubs. Natural recruitment. Trees healthy although there is some evidence of stress.

1.0 Ground Cover

Notes: Ground cover impacted by heavy grazing, but exhibits evidence of seed germination or natural recruitment.

1.0 Upland/Wetland Buffer

Notes: Some buffer on 1/2 of the wetland. Encroachment by grazing and fill common. Portion connected to contiguous wetland (Atlantic Ocean).

2.0 Field Indicators of Wetland Hydrology

Notes: Wetland hydroperiod adequate, although site conditions exist that can interfere with natural hydroperiod.

2.32 Water Quality Inputs and Treatment

Notes: $[(0.25 \times 3.0) + (0.50 \times 2.5) + (0.25 \times 1.5)] + [(0.25 \times 3.0) + (0.50 \times 3.0) + (0.25 \times 0.0)] / 2$
LU = 25% Natural (beach), 50% Unimproved pasture, 25% Single family residential
PT = 25% Natural, 50% Natural, 25% Untreated

Land-Use = 2.38
Pre-Treatment = 2.25

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.42

Date of Site Visit: 23 February 2000

Evaluator(s): Jerry Cordy and Mark Howell (Dial Cordy and Associates Inc.)

Project Site: Playita Cortada

Permit Number:

Wetland ID: Wetland A

Wetland Type: Salt Flats

Land-Use: Natural

0.5 Fish and Wildlife Utilization

Notes: Little habitat for fish and wildlife utilization. Wetland located near horse stables and residential homes. Presence of trash/junk scattered throughout wetland and horse activity within wetland.

N/A Overstory/Shrub Canopy

Notes:

1.0 Ground Cover

Notes: Few undesirable plants present, however, heavy grazing has reduced plant biomass.

1.5 Upland/Wetland Buffer

Notes: Buffer generally greater than 30 feet but less than 300 feet. Desirable cover with appropriate vegetation.

1.5 Field Indicators of Wetland Hydrology

Notes: Plants appear healthy, although site hydroperiod inadequate to maintain the wetland Wetland connection to ocean is now limited due to damming and trash deposits...

1.82 Water Quality Inputs and Treatment

Notes: $[(0.50 \times 3.0) + (0.25 \times 1.5) + (0.25 \times 1.0)] + [(0.50 \times 3.0) + (0.25 \times 0.0) + (0.25 \times 0.0)] / 2$

LU = 50% natural/open space, 25% single-family residential, 25% road

PT = 50% natural undeveloped area, 25% no treatment, 25 % no treatment

Land-Use = 2.13
Pre-Treatment = 1.50

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.71

Date of Site Visit: 24 February 2000
Evaluator(s): Jerry Cordy (Dial Cordy and Associates Inc.)
Project Site: Playita Cortada
Permit Number:
Wetland ID: Wetland B
Wetland Type: Preservation of Mangrove Swamp
Land-Use: Natural

2.0 Fish and Wildlife Utilization

Notes: expect moderate fish and wildlife utilization and adequate protective cover for wildlife.

2.0 Overstory/Shrub Canopy

Notes: Fencing will act as buffer to prevent encroachment by grazing

2.5 Ground Cover

Notes: Ground cover should recover rapidly once grazing animals are fenced out

2.0 Upland/Wetland Buffer

Notes: . Levee will act as buffer along a large portion.

2.0 Field Indicators of Wetland Hydrology

Notes: Wetland hydroperiod should be adequate with improvements to channel

2.32 Water Quality Inputs and Treatment

Notes: $[(0.25 \times 3.0) + (0.50 \times 2.5) + (0.25 \times 1.5)] + [(0.25 \times 3.0) + (0.50 \times 3.0) + (0.25 \times 0.0)] / 2$

LU = 25% Natural (beach), 50% Unimproved pasture, 25% Single family residential

PT = 25% Natural, 50% Natural, 25% Untreated

Land-Use = 2.38
Pre-Treatment = 2.25

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.85

Date of Site Visit: 24 February 2000
Evaluator(s): Jerry Cordy (Dial Cordy and Associates Inc.)
Project Site: Playita Cortada
Permit Number:
Wetland ID: Wetland C
Wetland Type: Restoration of Mangrove Swamp
Land-Use: Natural

2.0 Fish and Wildlife Utilization

Notes: expect moderate fish and wildlife utilization and adequate protective cover for wildlife.

2.0 Overstory/Shrub Canopy

Notes: Planting the mangroves on 3 foot centers should lead to deveopment of good canopy coverage

2.5 Ground Cover

Notes: Ground cover should recover rapidly once grazing animals are fenced out

2.0 Upland/Wetland Buffer

Notes: Fencing will act as buffer to prevent encroachment by grazing. Levee will act as buffer along a large portion.

2.0 Field Indicators of Wetland Hydrology

Notes: Wetland hydroperiod should be adequate

2.32 Water Quality Inputs and Treatment

Notes: $[(0.25 \times 3.0) + (0.50 \times 2.5) + (0.25 \times 1.5)] + [(0.25 \times 3.0) + (0.50 \times 3.0) + (0.25 \times 0.0)] / 2$

LU = 25% Natural (beach), 50% Unimproved pasture, 25% Single family residential

PT = 25% Natural, 50% Natural, 25% Untreated

Land-Use = 2.38
Pre-Treatment = 2.25

EVALUATION SUMMARY

ESTUARINE WETLAND RAPID ASSESSMENT PROCEDURE

E-WRAP SCORE: 0.55

Date of Site Visit: 23 February 2000
Evaluator(s): Jerry Cordy (Dial Cordy and Associates Inc.)
Project Site: Playita Cortada
Permit Number:
Wetland ID: Wetland A
Wetland Type: Swale Construction
Land-Use: Natural

1.0 Fish and Wildlife Utilization

Notes: Wading birds will most likely utilize swales

N/A Overstory/Shrub Canopy

Notes:

2.0 Ground Cover

Notes: Herbaceous plants should easily recruit into the swales and provide cover.

1.5 Upland/Wetland Buffer

Notes: buffer provided by levee

2.0 Field Indicators of Wetland Hydrology

Notes: site hydroperiod should be adequate to maintain the wetland

1.82 Water Quality Inputs and Treatment

Notes: $[(0.50 \times 3.0) + (0.25 \times 1.5) + (0.25 \times 1.0)] + [(0.50 \times 3.0) + (0.25 \times 0.0) + (0.25 \times 0.0)] / 2$

LU = 50% natural/open space, 25% single-family residential, 25% road

PT = 50% natural undeveloped area, 25% no treatment, 25 % no treatment

Land-Use = 2.13
Pre-Treatment = 1.50