

Appendix

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CONCLUSION

Study areas were monitored between November and December 2010 for the detection of the Puerto Rican crested toad, and extended until February for the presence of the coquí llanero. The crested toad was not detected during that period neither in the north nor in the south of the Island. However, the presence of the toad in those areas cannot be categorically discarded since the habitat is suitable for the species. Moreover, the areas that were monitored are within the historical range of this species. In terms of the coquí llanero, the species was detected in December and January along the side of one of the channels that runs through the study area in the municipality of Toa Baja.

Coquí llanero

The studied section can be described as heterogeneous in terms of its vegetation. The area extends from road PR-165 to the south of road PR- 867, and comprises a mosaic of herbaceous wetland and upland. The dominant vegetation in these areas was improved pastures, cattail (*Typha domingensis*) and black mimosa (*Mimosa pigra*). In terms of the amphibian community, the common coquí (*Eleutherodactylus coqui*), the Antillean coquí (*Eleutherodactylus antillensis*), whistling coquí (*Eleutherodactylus cochranae*), white-lip frog (*Leptodactylus albilabris*) and common Scinax (*Scinax rubra*; introduced to the Island in 1988), were the most commonly observed and/or heard. The coquí llanero was neither heard nor observed in this area during the study. The area near point three was not visited for safety reasons. An illegal drug dealer was operating in this site.

The section that runs from road PR-867 and ends in road PR-165 to the north is mostly comprised by areas of improved pastures, interrupted by canals and lagoons populated by *Panicum aquaticum*, *Cyperus giganteus*, *Eichhornia crassipes*, *Alternanthera philoxeroides* and *Pistia stratiotes*, among others. Closer to the coast, in addition to areas covered by grass, there are groups of trees and shrubs that include almond, coconut palms and mangroves, among others. During visits to this portion of the section, the presence of at least six individuals of the coquí llanero was detected (Figure 6). The species was heard in the grassy vegetation along the sides of the water channel. This site represents the first location for the coquí llanero outside of the habitat originally described for the species.

Vega Baja Section

The flow accumulation model identified 9 areas within the proposed route along the Vega Baja section (Figure 8). Within the visited areas a permanent artificial pond was identified as potential breeding place for the species, the pond is near the accumulation area number two. This pond is located in a flat area about 75 m away from the nearest haystack hill and is surrounded by pastures (Figure 9). In this pond, tadpoles of the common toad were observed. However, in this section, the area with the greatest potential for occurrence of the species is located between points 5 and 6 (see Figure 8). This area consists of a sinkhole that flows into an intermittent streambed which forms small temporary ponds during rain periods (Figure 10). This site is within part of a limestone forest that is in good condition, and is characterized by a large number of cavities and leaf litter (see Figure 10). The sinkhole runs between the haystack hills, connecting with other streambeds until reaches a residence backyard. These forests are part of the limestone area where individuals of crested toad had been observed in the past (Bird-Picó and Binet, personal communication).

Manatí Section

In this section the model of flow accumulation identified a total of 14 areas (Figure 11). Of these, the areas 6, 7 and 12 contain potential habitat for the crested toad. Area 6 consists of a sinkhole that collects runoff water. It is surrounded by limestone forest and contains cavities that can serve as retreat sites for the species. Area 7 is a sinkhole with a small permanent pond in which tadpoles of white-lipped frog were observed. This area is surrounded by both limestone forest and open areas. Finally, the area 12 is a sinkhole that collects runoff water forming small intermittent ponds. This area is adjacent on one side to a haystack hill and to an abandoned agricultural field on the other side. All ponds contained tadpoles of the white-lipped frog.

During visits to this section, the presence of the Puerto Rico boa (*Epicrates inornatus*) was documented in two locations (Figure 12). In one of the places, a dead juvenile individual, probably attacked by a predator, was found (Figure 13). In addition, at least one individual of *Ottoschulzia rhodoxylon* was observed on the top of one of the haystack hills (Figure 12).

RESULTS AND DISCUSSION

Crested toad

No individuals of crested toad were either observed or heard during the visits conducted to determine the presence of the species in the study areas (Table 1). Tadpoles of the species were not observed on any of the temporary and permanent ponds found throughout the areas studied. However, the presence of the toad in those areas cannot be categorically discarded because the search coincided with the period of low activity for the species and therefore, the probability of detection was significantly reduced. The active period for the species coincides with the rainy season, when males and females leave their places of refuge to breed in permanent or temporary ponds (USFW 1992, Rivero 1998). Furthermore, amphibians are ectotherms and their nocturnal activity is determined by air temperature, where activity increases with higher temperatures (Lampo and Bayliss 1996, Duellman and Trueb 1994).

As part of efforts to increase the chances of finding the species, a flow accumulation model was used. The model identified a total of 27 sites within a range of approximately 200 feet along the search sections in the pipeline alignment. Of these, 5 accumulation areas were in the south (Figure 7), 9 on Vega Baja (Figure 8) and 14 in the path of Manatí (Figure 11). All areas were visited and evaluated according to the habitat requirements of the species. Many of the habitat requirements of the species such as continuous limestone forest areas, caves and crevices between rocks and temporary ponds were present in the visited areas (USFW 1992). In addition, the sites visited are within the historical distribution range of the species in both north and south of the Island (USFWS 1992). Below is a description of the sites identified as potential for the presence of the species.

South Section

Of the five areas identified by the model in the south, three have the potential to be habitat for the species (Figure 7). Area 1 and 5 hold water intermittently and both are surrounded by dry forest. Area 2 consists of two permanent ponds surrounded by dry forest. The areas have a separation of thirty feet among them but lies within the same channel. The ponds are being used by the common toad (*Rhynella marina*) and white-lip frog (*Leptodactylus albilabris*). During the visits, adult and tadpoles of both species were observed.

METHODOLOGY

Crested toad

The search was focused in three sections within the *Via Verde* project alignment that are considered part of the historical distribution of the species. One of these locations is in the municipality of Peñuelas and the other two are located in the municipalities of Manatí and Vega Baja. Prior to the field visits, a simple water flow accumulation model was developed using geographic information system (GIS). For the development of the model, digital elevation maps for Puerto Rico were used, each built with 30-meter cells. Using the spatial analysis hydrology tool, a flow management tool was applied to create a grid using the elevation information. The numerical model uses this information to calculate what flow would follow the raindrops falling on each plot. As a result of this analysis, maps that identified the areas where the accumulation of water will occur were created (Figures 3, 4 and 5). This tool is frequently used to identify watersheds, streams and rivers, among others. All water accumulation areas indicated by the model that were located in the proposed alignment of *Via Verde* were identified. Then, all those areas were visited and the search was narrowed to 100 feet to each side of the proposed alignment. All areas identified were visited during the day, which allowed identifying the landscape and its associated habitat. In addition, visits were carried out at night to detect the species. During the visits, substrates such as small caves and rock shelters were searched actively. The presence of cavities and cracks in the limestone are of vital importance for this species, as it provides hydrated places where the crested toad can hide during the day (Matos-Torres 2003). Moreover, tadpoles were searched and identified in all areas where pools were identified. All visits were conducted between the months of November and December 2010.

Coquí Llanero

For the coquí llanero, habitat assessment and search for the species was conducted along the proposed alignment of the project in the municipality of Toa Baja. Prior to the field visits, equidistant points on the aerial photo were set along the proposed alignment and were used as search reference (Figure 6). Visits were conducted during daylight in December 2010 and day and night during the month of January and February 2011. In addition, playback calls were used during night to encourage males to vocalize.

individuals congregate to breed (USFW 1992, Rivero 1998). The crested toad has the ability to travel about two miles from cavities and crevices used as retreat sites in the wooded hills (Moreno 1985, Lentini 1992, Johnson 2001).

Coquí Llanero

The coquí llanero (*Eleutherodactylus juanariveroi*) was discovered in 2004 in seasonally flooded herbaceous wetland in the municipality of Toa Baja. This species is the smallest of the genus *Eleutherodactylus* on the Island. Adults are 15 mm in body length on average (Ríos-López and Thomas 2007). Its color ranges from yellow to yellowish brown with a light, longitudinal, reversed comma mark on each side; its mid-dorsal zone is broadly bifurcated and has two conspicuous post-tympanic glands (Figure 2). The call consists of a series of short high pitched notes with call duration varying from 4 to 21 seconds. The calling activity starts at sunset and decreases before midnight.

The coquí llanero is characterized by the smallest geographical distribution of all frogs in Puerto Rico. The only known population, is located in the Sabana Seca, Ingenio Ward within the Sabana Seca U.S. Naval Security Group Activity property and the Caribbean Primate Research Center in the municipality of Toa Baja. The species is considered a habitat specialist, limited to a 180 hectares of seasonally flooded palustrine wetland at 17 m (55.8 ft) above sea level on limestone formation (Ríos-López and Thomas 2007). The 25% of the wetland vegetation consists of two rare species of ferns, *Blechnum serrulatum* (Blechnaceae), *Thelypteris interrupta* (Thelypteridaceae) and *Sagittaria lancifolia* (Alismataceae), a plant where the coquí llanero lays its eggs. This species has been designated as critically endangered (DRNA 2007) and its habitat has been designated as Essential Critical Habitat (DNER 2007).

Description of target species

Crested toad

Individuals of crested toad are medium-sized (64-120 mm, SVL), characterized by supraorbital crests and a long upturned snout (Figure 1). Its dorsal color is brown-blackish with white or yellow marbling; females are off-white in the ventral area, while males are yellowish. The species exhibits sexual dimorphism, females being larger than males (120 mm females, 85 mm males), in addition females have prominent cephalic crests and lack nuptial pads on the first fingers (Rivero 1998).

The crested toad is the only species of toad endemic to Puerto Rico and Virgin Gorda. On Virgin Gorda, the species has not been observed in the last three decades and is now considered extinct (Díaz-Lameiro et al. 2010). In Puerto Rico, the historical distribution of the species is associated with lowland limestone forest in both the north and south parts of the Island. Historical records in the north include locations in the municipalities of Isabela, Quebradillas, Arecibo, Barceloneta, Bayamón, and Vega Baja, whereas in the south the species is known for the municipalities of Guánica and Coamo (USFWS 1992, Díaz-Lameiro et al. 2010). The species was considered extinct in Puerto Rico until it was rediscovered in Isabela in 1966 (García Díaz 1967), and in Quebradillas in 1974 (Rivero 1980). In southern Puerto Rico the crested toad was rediscovered in 1984 in the Guánica National Forest (Moreno 1985). Currently, the only known wild populations of this species are located in Guánica, Guayanilla and Yauco. In 2006 the species was reintroduced at El Tallonal Private Reserve in Arecibo, and 2007 tadpoles were released in the municipality of Coamo. At present, *P. lemur* is listed as an endangered species by the U.S. Fish and Wildlife Service and the Puerto Rico Department of Environment and Natural Resources. In addition, the species is on the red list of threatened species of the International Union for the Conservation of Nature (IUCN 2009).

The habitat of *P. lemur* is associated with humid, arid or semiarid limestone forests, characterized by a high content of cavities and cracks in soil with good drainage and diverse vegetation (USFWS 1992). Areas of runoff accumulation or permanent ponds that serve for breeding are essential components of habitat for the species. The period of greatest activity of the species is during the rainy season, specifically after heavy rain, when both males and females leave their refuges and travel long distances to get to the permanent or temporary pools where

Some of these areas are also listed as potential habitat for the species (USFWS 1992). In the case of coquí llanero, the pipeline would traverse wetland areas in the municipality of Toa Baja, that has been identified as potential habitat for the species. The purpose of this report is to present the findings on efforts to document the presence of crested toad and coquí llanero in three areas within the proposed alignment for the *Via Verde* project.

INTRODUCTION

The government of Puerto Rico, through the Puerto Rico Electric Power Authority, proposes the construction of a 24-inch diameter steel pipe to transport natural gas from the Eco-Electric plant in Guayanilla, southwestern Puerto Rico to Central Palo Seco in the municipality of Cataño. This project is known as *Via Verde* and will have a total length of 92 miles, running through the municipalities of Peñuelas, Adjuntas, Utuado, Arecibo, Barceloneta, Manatí, Vega Baja, Vega Alta, Dorado, Toa Baja, Cataño, Bayamón and Guaynabo.

Construction of the project includes cleaning of right of way, digging trenches, installing pipe and testing the pipe installed. The right of way to be established during construction will be 150 feet wide along the entire alignment and include areas of maintenance and operation. Within this right of way, 50 feet will be for permanent operational maintenance of the pipeline. This 50-foot transect will be kept free of deep-rooted vegetation and any construction. According to the environmental impact statement (EIS), the remainder of the maintenance right of way will be reforested. On the other hand, the trenches will have a depth of five to six feet and a width of four to five feet. The same excavated material will be used to cover the installed pipe.

As indicated in the EIS, the proposed project will cross roads and water bodies. To minimize the impact in both cases, boring will be used under roads and water bodies (Section 1.2, pages 10 and 11). In these areas, the right of way will be greater than 150 feet and less than 300 feet. The areas affected by the construction of *Via Verde* will be restored. In the case of wetlands, vegetation to be impacted or removed will be mitigated once finished the construction. However, in forested areas the right of way will be kept free of vegetation.

As part of the environmental requirements for the proposed project, an inventory of the flora and fauna elements was conducted along the proposed alignment. However, due to the magnitude of the project and the diversity of habitats through which it crosses, it becomes necessary to supplement the information related to specific wildlife species previously identified by regulatory agencies. Among the species of interest are the Puerto Rican crested toad (*Peltophryne lemur*) and coquí llanero (*Eleutherodactylus juanariveroi*). In regard to the crested toad, the project would impact an area in the municipality of Peñuelas that has been identified as potential habitat for the species. In addition, *Via Verde* is proposed to cross historical crested toad sites, in northern Puerto Rico, specifically in the municipalities of Manatí and Vega Baja.

SUMMARY

The government of Puerto Rico, through the Puerto Rico Electric Power Authority, proposes the construction of a pipeline that would run from the Eco-Electric plant in Guayanilla, southwestern Puerto Rico, to Central Palo Seco in the municipality of Cataño. The project is known as *Vía Verde* and will have a total length of 92 miles. As part of environmental assessment required for the construction of the project, it was necessary to conduct a study to determine the presence of the Puerto Rican crested toad (*Peltophryne lemur*) and coquí llanero (*Eleutherodactylus juanariveroi*) in specific sections within the proposed alignment of the pipeline. Both species are considered endangered. Although the study areas meet many of the habitat requirements for the crested toad, during the search period no individuals of this species were found. However, this study documents the presence of a new location for the coquí llanero.

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**Search of the Puerto Rican crested toad (*Peltophryne lemur*)
and coquí llanero (*Eleutherodactylus juanariveroi*) in areas proposed for the
construction of *Vía Verde***

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APPENDIX 4

Letter from PREPA to DNER- Puerto Rican Crested Toad
Letter from DNER Regarding the Rio Abajo State Park Puerto Rican Parrot population

APPENDIX 3
UNITED STATES FISH AND WILDLIFE SERVICE
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POTENTIAL HABITAT MAPS
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APPENDIX 1
SELECTED SPECIES SURVEYS AND STUDIES

PREPA VIA VERDE PIPELINE USFWS/NMFS SECTION 7 AFFECTS DETERMINATION

	No Common Name	No Common Name	Plant	E	Guánica Commonwealth Forest	No Affect	See Appendix 1
<i>Mitracarpus polycladus</i>	No Common Name	No Common Name	Plant	E	Biafara Arrozal	MANLAA	See Appendix 1
<i>Myrcia paganii</i>	No Common Name	No Common Name	Plant	E	Lower Montane Forest and Riparian Habitats	No Affect	
<i>Patagioenas (Columba) inornata wetmorei</i>	Puerto Rican Plain Pigeon	Paloma Sabanera	Bird	E	Medial Luna Ward, Candelaria Ward, Sabana Ward	MANLAA	See Appendix 1
<i>Ottoschulzia rhodoxylon</i>	No Common Name	Palo de Rosa	Plant	E	Coastal Zones, Lago Dos Bocas, No Nesting	No Affect	
<i>Pelecanus occidentalis</i>	Brown Pelican	Pelicano Pardo	Bird	E	Northern Karst Regions	MANLAA	See Appendix 1, Management Plan to be Provided
<i>Pelitophryne lemur</i>	Puerto Rican Crested Toad	Sapo Concho	Amphibia	T		MANLAA	See Appendix 1
<i>Pleiodendron macranthum</i>	No Common Name	Chupacallos	Plant	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Polystichum calderonense</i>	No Common Name	No Tiene Nombre Comun	Plant	E	Cerrote Peñuelas	MANLAA	See Appendix 1
<i>Schoepfia arenaria</i>	No Common Name	No Tiene Nombre Comun	Plant	T	Rio Abajo State Forest (Cuesta de los Perros)	No Determination	See Appendix 1
<i>Solanum dymophilum</i>	No Common Name	No Tiene Nombre Comun	Plant	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Stahilia monosperma</i>	No Common Name	Cobana Negra	Plant	E	Northern Wetlands and White Sands	MANLAA	See Appendix 1
<i>Sterna dougallii</i>	Roseate Tern	Palometa	Bird	T, CH	Coastal Areas and Offshore Cays, Nesting	No Affect	Marine/Coastal Species
<i>Tectaria estremarana</i>	Halberd Fern	Helecho alabarda	Plant	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Thelypteris inabontensis</i>	No Common Name	No Common Name	Plant	E	None identified near project	MANLAA	See Appendix 1
<i>Thelypteris yaucoensis</i>	No Common Name	No Common Name	Plant	E	None identified near project	MANLAA	See Appendix 1
<i>Thelypteris verecunda</i>	No Common Name	Helecho doncella del Barrio Charcas	Plant	E	None identified near project	MANLAA	See Appendix 1
<i>Trichechus manatus manatus</i>	Antillean Manatee	Manati Antillano	Mammal	E	Coastal Zones	No Affect	Marine/Coastal Species
<i>Trichilia triacantha</i>	No Common Name	Bariaco	Plant	E	Encarnacion, (Urb. El Peñon), Tallaboa Pontiente	MANLAA	See Appendix 1
<i>Zanthoxylum thomasianum</i>	St. Thomas Prickly Ash		Plant	E	Northern Karst Regions	MANLAA	See Appendix 1

Status

E = Endangered

T = Threatened

CH = Critical Habitat

Determination

No Affect = No Affect

MANLAA = May Affect Not Likely to Adversely Affect

May Affect = May Affect

No Determination = Determination to be Made by USFWS

Table 15: Section 7 Affects Determination

PREPA VIA VERDE PIPELINE		USFWS/NMFS		SECTION 7 AFFECTS DETERMINATION			
SCIENTIFIC NAME	COMMON NAME	NAME SPANISH	GROUP	STATUS	DISTRIBUTION	DETERMINATION	COMMENTS
<i>Accipiter striatus venator</i>	Puerto Rican Sharp-Shinned Hawk	Falcon de Sierra	Bird	E	Monte Guilarte State Forest	MANLAA	See Appendix 1
<i>Agelaius xanthomus</i>	Yellow-Shouldered Black Bird	Mariquita	Bird	E, CH	Coastal Forest	No Affect	
<i>Amazona vittata vittata</i>	Puerto Rican Parrot	Cotorra Puertorriqueña	Bird	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Auerodendron pauciflorum</i>	No Common Name	No Common Name	Plant	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Banara vanderbilii</i>	No Common Name	Palo de Ramon	Plant	E	Rio Lajas Hills	MANLAA	See Appendix 1
<i>Buteo platypterus brunescens</i>	Puerto Rican Broad-Winged Hawk	Guaragua de Bosque	Bird	E	Monte Guilarte State Forest	MANLAA	See Appendix 1
<i>Buxus vahalii</i>	Val's Boxwood	Diabliito de Tres Cuernos	Plant	E	Tallaboa Limestone Hills	MANLAA	See Appendix 1
<i>Calyptronoma nivalis</i>	No Common Name	Palma de Manaca	Plant	T	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Caprimulgus noctitherus</i>	Puerto Rican Nightjar	Guabairo	Bird	E	Coastal Forest	MANLAA	See Appendix 1
<i>Catesbaea melanocarpa</i>	No Common Name	No Common Name	Plant	E	Dry Limestone Hills, Guayanilla to Ponce	MANLAA	See Appendix 1
<i>Chamaecrista glandulosa var mirabilis</i>	No Common Name	No Common Name	Plant	E	Tortuguero Lagoon Natural Reserve	MANLAA	See Appendix 1
<i>Chelonia mydas</i>	Green Sea Turtle	Peje Blanco	Reptile	T, CH	Coastal Zones	No Affect	Marine/Coastal Species
<i>Cordia alliodora</i>	No Common Name	No Common Name	Plant	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Cordia ruficoma</i>	Chigger Palo	Palo de Nigua	Plant	E		MANLAA	See Appendix 1
<i>Cornutia obovata</i>	No Common Name	Palo de Nigua	Plant	E	Rio Abajo State Forest	MANLAA	See Appendix 1
<i>Cyathea dryopteroides</i>	Elfin Tree Fern	Helecho de Bosque Enano	Plant	E	Monte Guilarte State Forest	MANLAA	See Appendix 1
<i>Daphnopsis hellerana</i>	No Common Name	No Common Name	Plant	E	Nevares Limestone Hills, Near Sabana Seca, Primate Center	MANLAA	See Appendix 1
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	Tinglar	Reptile	E, CH	Coastal Zones	No Affect	Marine/Coastal Species
<i>Eleutherodactylus jaunaruveroi</i>	Plains Coqui	Coqui Llanero	Amphibian	Under Review		MANLAA	See Appendix 1
<i>Epicrates inornatus</i>	Puerto Rican Boa	Boa Puertorriqueña	Reptile	E	Forested Volcanic and Limestone (Karst) hills	MANLAA	See Appendix 1, Management Plan to be Provided
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	No Common Name	Reptile	E, CH	Coastal Zones	No Affect	Marine/Coastal Species
<i>Eugenia woodburyana</i>	No Common Name	No Common Name	Plant	E	Encarnación West of Las Cucharas	MANLAA	See Appendix 1
<i>Goetzea elegans</i>	Beautiful Goetzea	Malabuey	Plant	E	Coastal Zones	MANLAA	See Appendix 1
<i>Juglans jamaicensis</i>	West Indian Walnut	Nogal	Plant	E	Monte Guilarte State Forest (La Silla de Calderon)	MANLAA	See Appendix 1
<i>Mitracarpus maxwelliae</i>	No Common Name	No Common Name	Plant	E	Guánica Commonwealth Forest	MANLAA	See Appendix 1

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reestablished to its pre-existing contours to the extent practicable, and the temporary construction ROW would be allowed to revert to natural conditions. The permanent ROW would consist of an approximately 50-foot-wide easement in uplands that would be re-contoured and maintained free of deeply rooted vegetation throughout the life of the Project. The permanently maintained ROW would provide open areas to aid in aerial surveillance and to permit emergency access to the pipeline for inspection and maintenance. In areas where the Via Verde Pipeline corridor is collocated within existing utility ROWs, PREPA will use the existing ROWs to the extent practicable to avoid the clearing of additional lands.

The vast majority of the Project is located in low-populated rural areas. Impacts to land use/land cover would vary according to the type crossed and the distance traversed. Only a minor portion of the land use/land cover potentially impacted by the construction of the proposed Project would include conservation areas maintained under local or state jurisdiction (i.e., state forests, wildlife preserves, forested wetlands, and forests) and residential areas. Long-term impacts lasting the life of the Project would occur within the permanent ROW with regard to certain agricultural uses and development of commercial or residential structures. Silviculture and citrus groves would not be permitted within the permanent ROW, and commercial or residential building construction within the permanent ROW would be prohibited. To the extent these uses or development rights exist in the permanent ROW prior to construction, there may be a permanent loss of these uses. Other agricultural uses may be allowed over the permanent ROW after the Project's construction phase is complete.

All other land use/land cover would not be lost or changed, but would be allowed to revert to natural conditions. Tree removal would be required for construction within forested areas, and would be conducted in accordance with applicable local nonprocedural standards to the extent practicable

8 Conclusions

Table 15 presents the findings determination for each species and where applicable makes recommendations for mitigation measures, future studies, and resource conservation/preservation. If all of the procedures identified are implemented, it is expected that any effects to suitable habitat and individual species will be mitigated and that a may affect, but not likely to adversely affect (MANLAA) determination could be given for plant species. Pre-construction surveys would avoid direct impacts to listed species whenever possible and others could be transplanted, etc.

6.7.4 Summary of Impacts

Due to the stringent methods and location of construction activities on or near beaches and waterbodies, direct impacts to corals are not expected. Construction methods and sediment control methods will prevent any impacts to corals. Maintenance of the pipeline will be conducted by pipeline inspection gauges (PIG) and will not require any future open trenching or earth moving.

6.7.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.7.6 Conservation Measures and Recommendations

A sediment control plan has been provided to USACE. This will prevent any sediments from impacting offshore marine environments.

6.7.7 Conclusion

Based on the Current information available from DNER and the information within this document, the project would not affect the elkhorn coral.

7 Direct Impacts, Indirect Impacts, and Cumulative Impacts

Construction impacts associated with the Via Verde Pipeline will be temporary. The total project area encompasses approximately 1,114 acres, over one-half of which will be allowed to recruit back to, or will be restored to, its natural pre-construction state. The permanent right-of-way, to be maintained in a naturally vegetated state, will be limited to approximately 554 acres. The natural vegetation to be allowed in this area will include all but the largest and most deep rooted of the tree species and will continue to provide habitat.

7.1 Construction Impacts to Existing Land Use, Land Cover, and Conservation Areas

Construction impacts to existing land use/land cover would typically be temporary and are expected to have minimal, long-term impacts. Activities associated with the construction of the Via Verde Pipeline Project would result in temporary impacts to existing land use/land cover, such as clearing of vegetation and excavation of the pipeline trench. Typically, an approximately 100-foot-wide construction ROW (60-foot in waters of the U.S.) would be needed for the construction of the proposed mainline and laterals. Following construction, the ROW would be

The dominant mode of reproduction is asexual with new colonies forming when branches break off and reattach to substrate. Sexual reproduction of this species is via broadcast spawning gametes into the water annually in August or September.

This coral is fast growing, with colonies reaching their maximum size in approximately 10-12 years. Elkhorn coral has been one of the three most important Caribbean corals in terms of its contribution to reef growth and fish habitat.

6.7.2 Distribution and Abundance

The elkhorn coral is found throughout the Florida Keys, the Bahamas, and widely distributed in the Caribbean islands. Elkhorn coral is found in shallow water, 3-6 feet deep, throughout the Caribbean and Florida reefs. This coral species prefers exposed reef crest and fore reef environments in water depths less than 20 feet.

Critical habitat for elkhorn and staghorn corals were designated in November 2008 in four areas: Florida, Puerto Rico, St. John/St. Thomas, and St. Croix. The Puerto Rico area comprised approximately 1,383 square miles of marine habitat (Federal Register/ Vol 73, No. 229)

6.7.3 Current Conditions

Currently, there are a number of stressors affecting the *Acropora* corals, both natural and anthropogenic. Without sufficient light, the ability for corals to grow and maintain photosynthetic rates is reduced. Land based sources of pollution such as sewage discharge, stormwater runoff, sediment loading associated with uncontrolled non-point source pollution cause stress to this species. Corals grow best in marine waters that are clear and free from excess nutrients, runoff, or algal blooms.

The proposed project is land based and does not involve any marine based development. The pipeline has been designed to avoid impacting any marine habitats. Horizontal Directional Drilling (HDD) methods will be utilized when crossing major waterbodies. This method prevents the potential for sedimentation that can be associated with other pipeline installation methods. The pipeline laydown and extra work areas near coastal waters are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

The proposed project is land based and does not involve any marine based development. The pipeline has been designed to avoid impacting any marine habitats. Horizontal Directional Drilling (HDD) methods will be utilized when crossing major waterbodies. This method prevents the potential for sedimentation that can be associated with other pipeline installation methods. The pipeline laydown and extra work areas near coastal waters are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

6.6.4 Summary of Impacts

Due to the stringent methods and location of construction activities on or near beaches and waterbodies, direct impacts to corals are not expected. Construction methods and sediment control methods will prevent any impacts to corals. Maintenance of the pipeline will be conducted by pipeline inspection gauges (PIG) and will not require any future open trenching or earth moving.

6.6.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.6.6 Conservation Measures and Recommendations

A sediment control plan has been provided to USACE. This will prevent any sediments from impacting offshore marine environments.

6.6.7 Conclusion

Based on the Current information available from DNER and the information within this document, the Project would not affect the staghorn coral.

6.7 *Acropora palmata*- Elkhorn Coral

Status: Threatened

6.7.1 General Species Biology

Elkhorn coral is the larger species of *Acropora* in the Atlantic. The elkhorn coral is a branching coral with flattened to near round frond-like branches reaching up to 50 cm across. The elkhorn can grow up to 12 feet in diameter. The tissue color ranges from a brown to a yellowish-brown.

6.5.7 Conclusion

Based on the Current information available from DNER and the information within this document, the Project would not affect the Kemp's Ridley's Sea Turtle.

6.6 *Acropora cervicornis*- Staghorn Coral

Status: Threatened

6.6.1 General Species Biology

The staghorn coral is a branching coral characterized by staghorn antler-like colonies with cylindrical branches ranging from a few centimeters to over 6.5 feet. The tissue color ranges from golden yellow to medium brown.

The dominant mode of reproduction is asexual with new colonies forming when branches break off and reattach to substrate. Sexual reproduction of this species is via broadcast spawning gametes into the water annually in August or September.

This coral is the fastest growing of all known western Atlantic corals. Staghorn coral has been one of the three most important Caribbean corals in terms of its contribution to reef growth and fish habitat.

6.6.2 Distribution and Abundance

The staghorn coral is found throughout the Florida Keys, the Bahamas, and widely distributed in the Caribbean islands. Staghorn coral occurs in back reef and fore reef environments from 0-98 feet deep.

Critical habitat for elkhorn and staghorn corals were designated in November 2008 in four areas: Florida, Puerto Rico, St. John/St. Thomas, and St. Croix. The Puerto Rico area comprised approximately 1,383 square miles of marine habitat (Federal Register/ Vol 73, No. 229)

6.6.3 Current Conditions

Currently, there are a number of stressors affecting the *Acropora* corals, both natural and anthropogenic. Without sufficient light, the ability for corals to grow and maintain photosynthetic rates is reduced. Land based sources of pollution such as sewage discharge, stormwater runoff, sediment loading associated with uncontrolled non-point source pollution cause stress to this species. Corals grow best in marine waters that are clear and free from excess nutrients, runoff, or algal blooms.

6.5.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.5.6 Conservation Measures and Recommendations

- 1) A turtle monitoring program should be implemented 70 days prior to the commencement of construction activities and will cease once all equipment and personnel have vacated the premises. Monitoring shall be performed daily between hours of dawn and 8:00. The surveys shall be conducted by personnel with appropriate DNER Endangered Species Permit.
- 2) A schedule for the monitoring program shall be submitted to the US Fish & Wildlife Service (USFWS), Boquerón Field Office, at least 15 days prior to commencement of the activities.
- 3) The area to be surveyed shall be clearly marked with flagging and shall encompass an area of 50 meters at each side of the excavation area. An additional 200 meters shall be established on both sides as buffer zones. The survey shall be performed along the entire area. Special care in observance shall be given to the construction site.
- 4) Nests and any evidence of crawls shall be mapped and noted on standard daily field sheets provided by the Department of Natural and Environmental Resources (DNER). A final report summarizing the monitoring activities shall be submitted to the USFWS.
- 5) If a nest occurs within the footprint of the area to be affected by the proposed installation and/or excavation activities, nest relocation shall be conducted the same morning at the same beach. Tracks shall be erased and nest camouflaged in order to avoid possible poaching. Any signs of poaching shall be immediately reported to the DNER and the USFWS. The area designated for relocation of nests shall be coordinated with the DNER and the USFWS. No personnel or vehicles are allowed to enter to the area designated for relocation.
- 6) No lights, vegetation removal, or impacts to nesting habitat shall be allowed.
- 7) DNER and USFWS shall be notified 48 hours prior to construction.
- 8) During construction, a fence shall be installed at excavated areas so that no turtle can fall into an open excavation. A night security guard shall be posted on site.

On February 17, 2010, both USFWS and NMFS received petitions to designate critical habitat for Kemp's ridleys sea turtles for nesting beaches along the Texas coast and marine habitats in the Gulf of Mexico and Atlantic Ocean. The petition is currently under review.

Kemp's ridleys turtles are not known to nest in Puerto Rico but utilize coastal marine habitats for foraging.

The population of this species has been in sharp decline since nesting aggregations were discovered in 1947 at Rancho Nuevo, Mexico (Draft Recovery Plan). At this time the adult female population was estimated to be in excess of 40,000 individuals. The lowest recorded nest count was 702 in 1985 at Ranch Nuevo. As of 2009, over 20,000 nests were recorded at Rancho Nuevo and adjacent camps (recovery plan). The Draft Recover Plan indicates that the number of nests recorded from 2005 to 2009 indicates a female population of approximately 5,500 in the Gulf of Mexico.

6.5.3 Current Conditions

In Puerto Rico, all sandy beaches are considered suitable sea turtle nesting habitat according to NOAA's Environmental Sensitivity Index. The marine beaches associated with the Via Verde Pipeline which border PR-165 (Levittown beachfront) are moderately eroded and have been armored with stone rip-rap. These areas were not considered to be suitable habitat for sea turtle nesting. The central and western ends of this shoreline (Station 4336+06 to Station 4385+00) do include some sandy expanses with natural vegetation above the mean high water line.

The Puerto Rico Department of Natural Resources (DNER) currently monitors and maintains a comprehensive data base for sea turtle nesting sites in Puerto Rico. The DNER maps and data base for the Levittown shoreline area were reviewed on February 21, 2011. No nest sites, false crawls or habitat utilization of this beach front area, Station 4336+06 to Station 4435+10, have been documented. All pipeline laydown and extra work areas in this segment of the Via Verde pipeline project are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

6.5.4 Summary of Impacts

Due to the methods and location of construction activities on or near beaches, impacts to potential sea turtle nesting areas are not expected.

avoid possible poaching. Any signs of poaching shall be immediately reported to the DNER and the USFWS. The area designated for relocation of nests shall be coordinated with the DNER and the USFWS. No personnel or vehicles are allowed to enter to the area designated for relocation.

- 6) No lights, vegetation removal, or impacts to nesting habitat shall be allowed.
- 7) DNER and USFWS shall be notified 48 hours prior to construction.
- 8) During construction, a fence shall be installed at excavated areas so that no turtle can fall into an open excavation. A night security guard shall be posted on site.

6.4.7 Conclusion

Based on the Current information available from DNER and the information within this document, the Project would not affect the Hawksbill Turtle.

6.5 *Lepidochelys kempii*- Kemp's ridleys sea turtle

Status: Endangered

6.5.1 General Species Biology

Kemp's ridleys are considered to be the smallest marine sea turtles, weighing on average 100 pounds and 2-3 feet in length. Their carapace is grayish in color and is often as wide as it is long, giving it a circular shape.

The Kemp's ridleys are omnivorous as adults and feed on mollusks, crustaceans, jellyfish, algae, and sea urchins.

Juvenile Kemp's ridleys utilize floating sargassum as refuge and/or food. These juveniles are found between northwest Atlantic waters and the Gulf of Mexico until they reach maturity or sub-adult phase.

Nesting season for Kemp's ridleys is April to August and nesting mostly occurs in the Mexican state of Tamaulipas and occasionally on Padre Island, Texas in the U.S. The female turtles land in groups on beaches in an arribada or group nesting.

6.5.2 Distribution and Abundance

The Kemp's ridleys has a restricted distribution. Kemp's ridleys are distributed throughout the Gulf of Mexico and U.S. Atlantic seaboard from Florida to New England. (Draft Recovery Plan 2010)

The Puerto Rico Department of Natural Resources (DNER) currently monitors and maintains a comprehensive data base for sea turtle nesting sites in Puerto Rico. The DNER maps and data base for the Levittown shoreline area were reviewed on February 21, 2011. No nest sites, false crawls or habitat utilization of this beach front area, Station 4336+06 to Station 4435+10, have been documented. All pipeline laydown and extra work areas in this segment of the Via Verde pipeline project are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

6.4.4 Summary of Impacts

Due to the methods and location of construction activities on or near beaches, impacts to potential sea turtle nesting areas are not expected.

6.4.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.4.6 Conservation Measures and Recommendations

- 1) A turtle monitoring program should be implemented 70 days prior to the commencement of construction activities and will cease once all equipment and personnel have vacated the premises. Monitoring shall be performed daily between hours of dawn and 8:00. The surveys shall be conducted by personnel with appropriate DNER Endangered Species Permit.
- 2) A schedule for the monitoring program shall be submitted to the US Fish & Wildlife Service (USFWS), Boquerón Field Office, at least 15 days prior to commencement of the activities.
- 3) The area to be surveyed shall be clearly marked with flagging and shall encompass an area of 50 meters at each side of the excavation area. An additional 200 meters shall be established on both sides as buffer zones. The survey shall be performed along the entire area. Special care in observance shall be given to the construction site.
- 4) Nests and any evidence of crawls shall be mapped and noted on standard daily field sheets provided by the Department of Natural and Environmental Resources (DNER). A final report summarizing the monitoring activities shall be submitted to the USFWS.
- 5) If a nest occurs within the footprint of the area to be affected by the proposed installation and/or excavation activities, nest relocation shall be conducted the same morning at the same beach. Tracks shall be erased and nest camouflaged in order to

black. The shells of hatchlings are mostly brown. The rear edge of the carapace is usually serrated.

The hawksbill's head is elongated, tapering to a point, with a beak like mouth, which allows the turtle to reach into holes and crevices of coral reefs for sponges and other invertebrates. The primary food source of the hawksbill turtle are sponges. Coral reefs are recognized as the resident foraging habitat for juveniles, subadults, and adults. Posthatchlings are considered pelagic and often take shelter in floating weed lines and debris that accumulate in convergence zones.

6.4.2 Distribution and Abundance

Hawksbills occur in tropical and subtropical waters of the Atlantic, Pacific, and Indian Oceans. This species is widely distributed in the Caribbean Sea and western Atlantic Ocean. In U.S. Caribbean Sea waters, the hawksbill is most common in Puerto Rico and its associated islands and in the U.S. Virgin Islands. In the continental U.S., hawksbills can be seen along the Gulf states and eastern seaboard.

Within U.S. jurisdiction in the Caribbean Sea, nesting occurs on beaches in Puerto Rico and the U.S. Virgin Islands. The most important sites are Mona Island, Puerto Rico, and Buck Island, St. Croix, U.S. Virgin Islands. Nesting also occurs on other beaches of St. Croix, Culebra Island, Vieques Island, mainland Puerto Rico, St. John, and St. Thomas. Within their range, hawksbills typically nest in low densities. The largest known nesting concentrations in the Caribbean are the Yucatan Peninsula, Mexico (Meylan 1989- USFWS Recovery plan).

Critical habitat has been designated for this species. In June 1982 and September 1998, critical habitat was designated on selected beaches and/or waters of Mona, Monito, Culebrita, and Culebra Island, Puerto Rico.

6.4.3 Current Conditions

In Puerto Rico, all sandy beaches are considered suitable sea turtle nesting habitat according to NOAA's Environmental Sensitivity Index. The marine beaches associated with the Via Verde Pipeline which border PR-165 (Levittown beachfront) are moderately eroded and have been armored with stone rip-rap. These areas were not considered to be suitable habitat for sea turtle nesting. The central and western ends of this shoreline (Station 4336+06 to Station 4385+00) do include some sandy expanses with natural vegetation above the mean high water line. Hawksbill turtles have been known to utilize similar areas for nesting.

- 2) A schedule for the monitoring program shall be submitted to the US Fish & Wildlife Service (USFWS), Boquerón Field Office, at least 15 days prior to commencement of the activities.
- 3) The area to be surveyed shall be clearly marked with flagging and shall encompass an area of 50 meters at each side of the excavation area. An additional 200 meters shall be established on both sides as buffer zones. The survey shall be performed along the entire area. Special care in observance shall be given to the construction site.
- 4) Nests and any evidence of crawls shall be mapped and noted on standard daily field sheets provided by the Department of Natural and Environmental Resources (DNER). A final report summarizing the monitoring activities shall be submitted to the USFWS.
- 5) If a nest occurs within the footprint of the area to be affected by the proposed installation and/or excavation activities, nest relocation shall be conducted the same morning at the same beach. Tracks shall be erased and nest camouflaged in order to avoid possible poaching. Any signs of poaching shall be immediately reported to the DNER and the USFWS. The area designated for relocation of nests shall be coordinated with the DNER and the USFWS. No personnel or vehicles are allowed to enter to the area designated for relocation.
- 6) No lights, vegetation removal, or impacts to nesting habitat shall be allowed.
- 7) DNER and USFWS shall be notified 48 hours prior to construction.
- 8) During construction, a fence shall be installed at excavated areas so that no turtle can fall into an open excavation. A night security guard shall be posted on site.

6.3.7 Conclusion

Based on the Current information available from DNER and the information within this document, the Project would not affect the Leatherback Sea Turtle.

6.4 *Eretmochelys imbricata*- Hawksbill Turtle

Status: Endangered

6.4.1 General Species Biology

The hawksbill turtle is small to medium size compared to other sea turtle species and weigh ton average 100 to 150 pounds; however they can reach weights up to 200 pounds. The carapace of an adult hawksbill ranges from dark to golden brown with streaks of orange, red, and/or

again in November 2010, the Sierra Club petitioned NMFS to revise the critical habitat designation for leatherback sea turtles to include waters adjacent to a major nesting beach in Puerto Rico. To date, the critical habitat designation for this species has not been revised to include coastal water in Puerto Rico.

6.3.3 Current Conditions

In Puerto Rico, all sandy beaches are considered suitable sea turtle nesting habitat according to NOAA's Environmental Sensitivity Index. The marine beaches associated with the Via Verde Pipeline which border PR-165 (Levittown beachfront) are moderately eroded and have been armored with stone rip-rap. These areas were not considered to be suitable habitat for sea turtle nesting. The central and western ends of this shoreline (Station 4336+06 to Station 4385+00) do include some sandy expanses with natural vegetation above the mean high water line.

The Puerto Rico Department of Natural Resources (DNER) currently monitors and maintains a comprehensive data base for sea turtle nesting sites in Puerto Rico. The DNER maps and data base for the Levittown shoreline area were reviewed on February 21, 2011. No nest sites, false crawls or habitat utilization of this beach front area, Station 4336+06 to Station 4435+10, have been documented. All pipeline laydown and extra work areas in this segment of the Via Verde pipeline project are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

6.3.4 Summary of Impacts

Due to the methods and location of construction activities on or near beaches, impacts to potential sea turtle nesting areas are not expected.

6.3.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.3.6 Conservation Measures and Recommendations

- 1) A turtle monitoring program should be implemented 70 days prior to the commencement of construction activities and will cease once all equipment and personnel have vacated the premises. Monitoring shall be performed daily between hours of dawn and 8:00. The surveys shall be conducted by personnel with appropriate DNER Endangered Species Permit.

6.2.7 Conclusion

Based on the Current information available from DNER and the information within this document, the Project would not affect the Green Turtle.

6.3 *Dermochelys coriacea*- Leatherback sea turtle

Status: Endangered

6.3.1 General Species Biology

The leatherback sea turtle is the largest of all living sea turtles and is the only living species in the genus *Dermochelys*. It is easily distinguished between other sea turtles as it is the only one to have a non-bony shell and its carapace is covered by skin and oily flesh.

Leatherbacks average size is between 3.3 to 6.6 feet long and adults weigh between 500 and 1,500 pounds. The turtle's dorsal surface is colored dark grey to black with white blotches and spots. The hydrodynamic carapace and large flippers are key characteristics that make the leatherback uniquely equipped for long distance foraging migrations.

Leatherbacks' diet consist of soft bodied pelagic prey such as jellyfish and salps; however, they are also known to forage in coastal waters. Unlike other sea turtles, this species feeds in areas of colder water where there is an abundance of jellyfish and other prey. Due to their obligate feeding nature, leatherback turtles help control jellyfish populations.

6.3.2 Distribution and Abundance

Leatherback's have the largest distribution of all extant sea turtles. The leatherback can be found in all tropical and subtropical oceans, and its range extends into the Arctic circle. In the Atlantic Ocean, the leatherback turtle population ranges across the entire region and can be found as far north as the North Sea and as far south as the Cape of Good Hope.

Leatherbacks can be found primarily in the open ocean and follow their jellyfish prey throughout the day. Pacific leatherbacks migrate from nesting sites in Indonesia to the coasts of California to feed on jellyfish.

Nesting grounds for the leatherback sea turtle are found around the world. The largest nesting assemblages are found on the coasts of northern South American and west Africa. In the U.S. Caribbean, Puerto Rico and the U.S. Virgin Islands support minor nesting colonies. These colonies represent the most significant leatherback nesting activity within the U.S.

Critical habitat was designated in 1979 for the leatherback turtle that included coastal waters adjacent to Sandy Point, St. Croix, U.S. Virgin Islands (NOAA website). In February 2010 and

6.2.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.2.6 Conservation Measures and Recommendations

- 1) A turtle monitoring program should be implemented 70 days prior to the commencement of construction activities and will cease once all equipment and personnel have vacated the premises. Monitoring shall be performed daily between 0600 and 1800. The surveys shall be conducted by personnel with an Endangered Species Permit.
- 2) A schedule for the monitoring program shall be submitted to the US Fish & Wildlife Service (USFWS), Boquerón Field Office, at least 15 days prior to commencement of the project. The monitoring area shall be clearly marked with flagging and shall encompass an area of 50 meters at each side of the excavation area. An additional 200 meters shall be established on both sides as buffer zones. The survey shall be performed along the entire area. Special care in observance shall be given to the construction site.
- 4) Nests and any evidence of crawls shall be mapped and noted on standard daily field sheets provided by the Department of Natural and Environmental Resources (DNER). A final report summarizing the monitoring activities shall be submitted to the USFWS.
- 5) If a nest occurs within the footprint of the area to be affected by the proposed installation and/or excavation activities, nest relocation shall be conducted the same morning at the same beach. Tracks shall be erased and nest camouflaged in order to avoid possible poaching. Any signs of poaching shall be immediately reported to the DNER and the USFWS. The area designated for relocation of nests shall be coordinated with the DNER and the USFWS. No personnel or vehicles are allowed to enter to the area designated for relocation.
- 6) No lights, vegetation removal, or impacts to nesting habitat shall be allowed.
- 7) DNER and USFWS shall be notified 48 hours prior to construction.
- 8) During construction, a fence shall be installed at excavated areas so that no turtle can fall into an open excavation. A night security guard shall be posted on site.

6.2.2 Distribution and Abundance

The green turtle is globally distributed and generally found in tropical and subtropical waters along the continental coast and islands between 30° North and 30° South. There are two distinct populations of green turtles: the Atlantic subpopulation and the Indo-Pacific subpopulation.

The Atlantic subpopulation can generally be found throughout the entire Atlantic Ocean. Major nesting sites for this population are found on islands in the Caribbean, along the eastern shores of the continental U.S., the eastern coast of South America, and on isolated North Atlantic islands. In the Caribbean Sea, major nesting sites have been found on Aves Island, the U. S. Virgin Islands, Puerto Rico, and Costa Rica.

Critical habitat was designated in 1998 for green turtles in the coastal waters around Culebra Island, Puerto Rico.

6.2.3 Current Conditions

In Puerto Rico, all sandy beaches are considered suitable sea turtle nesting habitat according to NOAA's Environmental Sensitivity Index. The marine beaches associated with the Via Verde Pipeline which border PR-165 (Levittown beachfront) are moderately eroded and have been armored with stone rip-rap. These areas were not considered to be suitable habitat for sea turtle nesting. The central and western ends of this shoreline (Station 4336+06 to Station 4385+00) do include some sandy expanses with natural vegetation above the mean high water line.

The Puerto Rico Department of Natural Resources (DNER) currently monitors and maintains a comprehensive data base for sea turtle nesting sites in Puerto Rico. The DNER maps and data base for the Levittown shoreline area were reviewed on February 21, 2011. No nest sites, false crawls or habitat utilization of this beach front area, Station 4336+06 to Station 4435+10, have been documented. All pipeline laydown and extra work areas in this segment of the Via Verde pipeline project are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

6.2.4 Summary of Impacts

Due to specific construction methods and location of construction activities on or near beaches, impacts to potential sea turtle nesting areas are not expected.

- (DNER). A final report summarizing the monitoring activities shall be submitted to the USFWS.
- 5) If a nest occurs within the footprint of the area to be affected by the proposed installation and/or excavation activities, nest relocation shall be conducted the same morning at the same beach. Tracks shall be erased and nest camouflaged in order to avoid possible poaching. Any signs of poaching shall be immediately reported to the DNER and the USFWS. The area designated for relocation of nests shall be coordinated with the DNER and the USFWS. No personnel or vehicles are allowed to enter to the area designated for relocation.
 - 6) No lights, vegetation removal, or impacts to nesting habitat shall be allowed.
 - 7) DNER and USFWS shall be notified 48 hours prior to construction.
 - 8) During construction, a fence shall be installed at excavated areas so that no turtle can fall into an open excavation. A night security guard shall be posted on site.

6.1.7 Conclusion

Based on the Current information available from DNER and the information within this document, the Project would not affect the Loggerhead Sea Turtle.

6.2 *Chelonia mydas*- Green Sea Turtle

Status: Threatened

6.2.1 General Species Biology

The green turtles grow to a length of approximately 5 feet long and can weigh up to 690 pounds. The average weight of mature green turtles is around 330 pounds. The green turtle anatomically similar to other members in its family but may be distinguished by its short snout and its unhooked beak. The carapace of the green turtle has variations in color and pattern that change over time. The carapaces' of hatchlings are mostly black with light colored plastrons. Juveniles turn dark brown to olive. As adults, carapaces are largely brown, spotted or marbled with variegated rays.

C. mydas ecology changes drastically with each stage of its life history. Hatchlings are carnivorous pelagic organisms. As juveniles and adults, green turtles are commonly found closer inshore in seagrass meadows and are herbivorous grazers.

Nesting/mating season varies between populations. The Caribbean population has a nesting season from June to September.

turtle nesting. The central and western ends of this shoreline (Station 4336+06 to Station 4385+00) do include some sandy expanses with natural vegetation above the mean high water line.

The Puerto Rico Department of Natural Resources (DNER) currently monitors and maintains a comprehensive data base for sea turtle nesting sites in Puerto Rico. The DNER maps and data base for the Levittown shoreline area were reviewed on February 21, 2011. No nest sites, false crawls or habitat utilization of this beach front area, Station 4336+06 to Station 4435+10, have been documented. All pipeline laydown and extra work areas in this segment of the Via Verde pipeline project are located landward of the mean higher high water mark and the pipeline will be embedded at a depth of 55 feet below ground surface in this area.

6.1.4 Summary of Impacts

Due to the methods and location of construction activities on or near beaches, impacts to potential sea turtle nesting areas are not expected.

6.1.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected.

6.1.6 Conservation Measures and Recommendations

- 1) A turtle monitoring program should be implemented 70 days prior to the commencement of construction activities and will cease once all equipment and personnel have vacated the premises. Monitoring shall be performed daily between hours of dawn and 8:00. The surveys shall be conducted by personnel with appropriate DNER Endangered Species Permit.
- 2) A schedule for the monitoring program shall be submitted to the US Fish & Wildlife Service (USFWS), Boquerón Field Office, at least 15 days prior to commencement of the activities.
- 3) The area to be surveyed shall be clearly marked with flagging and shall encompass an area of 50 meters at each side of the excavation area. An additional 200 meters shall be established on both sides as buffer zones. The survey shall be performed along the entire area. Special care in observance shall be given to the construction site.
- 4) Nests and any evidence of crawls shall be mapped and noted on standard daily field sheets provided by the Department of Natural and Environmental Resources

et al, Oral presentation). In addition to these species, this section will also cover Kemp's ridleys turtle (*Lepidochelys kempii*).

6.1 *Carretta carretta*- Loggerhead sea turtle

Status: Threatened

6.1.1 General Species Biology

The English common name for this species, Loggerhead, was termed because of their relatively large head. An adult loggerhead sea turtle weighs approximately 300 pounds and approximately 84 inches long. Its skin color ranges from yellow to brown and carapace is typically reddish-brown.

Adult loggerheads are omnivorous, feeding mainly on bottom dwelling invertebrates such as gastropods, bivalves and decapods. It's large and powerful jaws are used to crush hard-shelled prey, such as whelks or conch. Other food items include, sponges, corals, sea pens, polychaete worms, sea anemones, cephalopods, barnacles, brachiopods, isopods, insects, bryozoans, sea urchins, sand dollars, sea cucumbers, starfish, hatchling turtles, algae, and vascular plants. During migrations through the open ocean, this species is also known to consume jellyfish, floating mollusks, floating egg clusters, squid, and flying fish.

6.1.2 Distribution and Abundance

Loggerhead recovery plan- The loggerhead occurs throughout temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. The Atlantic subpopulation is commonly found in the North Atlantic including the Gulf of Mexico, the northern Caribbean, and the Bahamas archipelago (Dow et al 2007). It is also found in West Africa, the western Mediterranean, and the west coast of Europe.

Nesting in the U.S. occurs from Texas to Virginia. Loggerheads are not known to nest in Puerto Rico. During non-nesting years, adult female loggerheads from U.S. beaches are found in waters off the eastern U.S., The Bahamas, Greater Antilles, and Yucatan, and throughout the Gulf of Mexico.

6.1.3 Current Conditions

In Puerto Rico, all sandy beaches are considered suitable sea turtle nesting habitat according to NOAA's Environmental Sensitivity Index. The marine beaches associated with the Via Verde Pipeline which border PR-165 (Levittown beachfront) are moderately eroded and have been armored with stone rip-rap. These areas were not considered to be suitable habitat for sea

40 feet apart and the pipeline will be located several feet above ground to avoid impact to the habitat. The structural racks may impact (due to the diameter of the pilings) approximately 350 square feet of total area along this 770-foot stretch. These impacts are being coordinated closely with the NMFS Habitat Conservation Division staff and the U.S. Army Corps of Engineers. Field surveys along this small section of the pipeline confirmed no critical habitat and no T&E species present in this area.

A spill response plan for HDD was submitted to the U.S. Army Corps of Engineers.

6. Details of all sediment and control measures and their maintenance schedules to be employed as part of pipeline construction.

Response: A detailed sediment control plan was provided to the U.S. Army Corps of Engineers.

7. An analysis of alternatives, including different routes, placement of the pipeline on pilings rather than burial, and alternatives to the construction of a natural gas pipeline, such as the use of solar energy, as well as assessment of the environmental impacts of each alternative.

Response: A detailed alternatives analysis was submitted to the U.S. Army Corps of Engineers.

8. An evaluation of the potential impacts on listed sea turtles and corals and their habitat. Please see the review of potential impacts on listed sea turtles and corals and their habitat below.

Response: A detailed review of the pipeline alignment location, coordinated with the DNER, confirmed no potential threat or impact to listed sea turtles and corals, and their habitat. The pipeline will not be located in any way that poses a realistic threat to either of these species. Please see the review of these species below:

The most abundant sea turtles found either nesting or in feeding areas of Puerto Rico and its adjacent islands are the leatherback (*Dermochelys coriacea*), the hawksbill (*Eretmochelys imbricata*) and the green turtle (*Chelonia mydas*) (Status of Marine Turtles at Puerto Rico, Diez

depths and have been designed to specifically minimize any risk to the aquatic resources being crossed.

4. Information regarding proposed access to the pipeline route and ROW for construction and maintenance activities during initial installation of the pipeline and throughout the expected lifetime of the project, especially in the area of coastal water bodies.

Response: *As discussed at the interagency PDT meetings, routine maintenance will take place using pipeline inspection gauge (PIG) technology. This technique avoids the need for maintenance roads and access to remote sections of the pipeline. At no time during construction or maintenance will any activity take place in or near areas that are designated critical habitat for marine or anadromous species.*

5. A detailed description of the methods to be employed during the installation of the pipeline, including maps of construction areas and descriptions of excavation, backfill, HDD, spill response plans for HDD, and any other techniques to be employed during pipeline installation.

Response: *Information on construction techniques have been provided to the U.S. Army Corps of Engineers. In forested wetland areas, i.e. mangrove habitat, the pipeline will be placed using HDD technology that will result in no impact to the aquatic resource. In palustrine wetland areas, i.e. previously disturbed wetlands that were converted to ranching or farming activities, etc., the pipeline will be placed in an open trench excavated using equipment that will maintain, wherever possible, vertical walls to minimize the width of the requisite trench and construction footprint. Excavated hydric soils will be temporarily stockpiled next to the trench and immediately placed back into the trench to bury the pipeline once it is in place. The construction ROW in these areas where the pipeline will be placed in Palustrine wetlands will be restricted to 60-feet, or less. All hydric soil overburden (displaced by the pipe) will be removed to pre-identified, approved upland sites and surface topography will be restored to pre-construction conditions. All wetland habitat to be temporarily impacted will be restored and revegetated. At the southern terminus of the pipeline, near the EcoElectrica facility, approximately 770 linear feet of estuarine habitat will be crossed. At this location, to further minimize impacts, the pipeline will be suspended above ground using a structural rack system. These racks will be spaced approximately 30-*

(EFH). Upland areas will be used to the maximum extent practicable to stage equipment and, in those locations where the pipeline will cross Palustrine Emergent wetlands, pipeline sections will be connected and placed within the authorized construction zone, always distanced from any open shoreline.

2. Information regarding the size of the proposed right of way (ROW) for the pipeline and expected maintenance activities within this ROW over the lifetime of the project.

Response: *As previously discussed at the Project Delivery Team meetings hosted by the U.S. Army Corps of Engineers, the construction right-of-way will be 100-feet wide in uplands and no more than 60-feet wide in Palustrine Wetlands. One hundred percent of the wetland ROW will be restored to preconstruction conditions after placement of the pipeline. Only in the upland locations will a 50-foot wide ROW be maintained to restrict the return of deep rooted vegetation (to ensure pipeline safety). Within this 50-foot ROW, scrub-shrub and grass communities will be allowed to reestablish naturally (but for the identified deep rooted species). Removal of suspect species will be done periodically (multiple year periods) using manual labor in the vicinity of all waterways, i.e. small streams in the interior sections, and light equipment, i.e. select mowers, in locations away from any surface waterways. Appropriate erosion control methods will always be incorporated during maintenance activities to ensure no erosion occurs into open streams or waterways.*

3. A copy of the geologic analyses that have been conducted to determine whether soils are adequate for use of the proposed horizontal directional drilling (HDD) technology to install the pipeline in wetlands and other water bodies, including information regarding projects that have successfully employed HDD in coastal mangrove wetlands and the length of crossing constructed using HDD in mangrove wetlands.

Response: *The geologic information obtained from the HDD core borings is being provided to the Corps of Engineers for the administrative record. These borings confirm that the pipeline will be located in dense clay layers that are optimal for HDD techniques (and minimize the risk of any frac-out) All proposed HDD crossings have been designed using approved industry techniques and standards. The depths of all crossings (all greater than or equal to 40-feet below the bottom elevation of any waterbody) go beyond normal crossing*

5.2.10.7 Conclusion

Based on current research and known distribution of the Antillean manatee, and the information contained herein, the Project would not affect the Antillean Manatee.

6 NMFS Listed Species

In a letter dated March 24, 2011, NMFS requested they be provided with details of the project in order to evaluate potential project impacts to listed corals, sea turtles, and ESA-designated coral critical habitat, along Puerto Rico's north coast. Additionally, in the same letter, NMFS requested that the following information be provided:

1. The final pipeline route, including the distance of the pipeline from sea turtle nesting beaches, sea turtle refuge and foraging habitat, listed coral colonies, and designated coral critical habitat, and information regarding the location of the proposed staging areas along the pipeline.

Response: *The final pipeline route was provided to the Corps (96 pages depicting aerial plan views of the pipeline corridor). The only location where the route was possibly located near sea turtle nesting beaches was at Levittown near Punta Salinas. To ensure no effect would occur to potential nesting habitat, a decision was made to place the pipeline 55-feet below ground at this area using Horizontal Directional Drilling (HDD) to place the pipe. All temporary HDD workpads will be positioned landward of the beach area and no activity will occur within the beach habitat. In addition to this decision to use HDD, the DNER was consulted to determine if any of the beach was identified as sea turtle nesting habitat. DNER confirmed that no sightings have ever been made of nesting sea turtles at the subject stretch of beach at the Levittown area. At no point will the pipeline extend waterward of the mean-high-waterline (MHW) where sea turtle refuge or foraging habitat is located. The pipeline will not be located waterward of the MHW nor positioned in any way to affect designated coral critical habitat. At the major river systems along the northern shoreline the pipeline will cross these waterways using HDD to ensure no impact will occur to marine or anadromous habitat. The crossing locations are all well inland from the mouth of any of these river systems (the closest crossing occurs at Rio Hondo where the pipe will be 80-ft below the bed of the river and 1,500-feet inland from the mouth of the river to the Atlantic Ocean). No staging areas are proposed near marine habitat or Essential Fisheries Habitat*

Panama, Costa Rica, Nicaragua, Honduras, Guatemala, Belize, Mexico, Cuba, Haiti, Dominican Republic, Jamaica, and in the U.S. (Puerto Rico).

The USFWS 2007 Manatee 5-Year Review indicates that "...spatial distribution of manatees in Puerto Rico was described by several researchers and is based primarily on manatee sighting locations during aerial distribution surveys". The studies referenced in the review all indicate that manatees in Puerto Rico are more commonly observed in coastal areas of San Juan, eastward to the east coast, and then south and west to the west coast to Rincon. Manatees are not as common along the north coast. This is thought to be the case because of a lack of secluded embayments, freshwater sources, and shallow seagrass beds.

USFWS reports that in a 2009 survey, the Antillean manatees in Puerto Rico were thought to include about 350 animals. In this survey, stock was deemed to be stable and potentially increasing in certain areas.

Manatees are under threat from increasing human-related threats that include watercraft, habitat loss, and other activities. Historically, Antillean manatees were hunted by local natives and sold to European explorers for food. Poaching and entanglement in fishing gear still remain a threat.

5.2.10.3 Current Conditions

Manatees are known to heavily utilize areas along the southwestern coast of Puerto Rico. Coastal waters from Ponce to Guayanilla have been identified as areas of distribution and movement for the Antillean manatee.

5.2.10.4 Summary of Impacts

No direct impacts to the Antillean manatee or its habitat are expected to occur as a result of the proposed action. The proposed pipeline will be installed landward of the coastal waters in this region and canals in this area will be crossed using Horizontal Directional Drilling; therefore **no impacts will occur to manatees or their habitat.**

5.2.10.5 Indirect, Interdependent, Interrelated and Cumulative Effects

Due to the location and methods of pipeline construction, there are no expected interdependent, interrelate or cumulative effects to the Antillean manatee.

5.2.10.6 Conservation Measures and Recommendations

No specific conservation measures are proposed for this species.

Additionally, the applicant has recommended that the construction ROW corridor be reduced to 70 feet from 100 feet in this species' potential habitat.

5.2.9.7 Conclusion

Conservation measures for the Puerto Rican crested toad have been adopted to reduce any potential impacts associated with clearing and construction of the proposed pipeline. With these conservation measures in place and restoration of all potential habitat within the project area, the Project may affect, but is not likely to adversely affect this species.

5.2.10 *Trichechus manatus manatus*- (Antillean manatee)

Status: Endangered

5.2.10.1 General Species Biology

The West Indian manatee is the largest surviving member of the order Sirenia. The Antillean manatee or Caribbean manatee is a sub-species based on genetic and morphological studies. The average West Indian manatee is approximately 3 meters long and weighs between 400 and 600 kilograms. The manatee is generally gray to brown in color. These marine mammals are uniformly dark gray to brown in color, wrinkled, sparsely haired and rubber like. Manatees have paddle like forelimbs, no hind limbs, and a spatulate, horizontally flattened tail (USFWS 2001 Florida Manatee).

Manatees are herbivorous, feeding opportunistically on marine, estuarine, and freshwater plants. Manatees can tolerate a range of salinities and can travel between marine and freshwater habitats but do require a source of freshwater that can be obtained from both natural and anthropogenic sources. Manatees are cold sensitive and require water temperatures above 68 degrees Fahrenheit to prevent thermal shock.

Reproduction generally successfully occurs between the ages of seven and nine and gestation lasts from twelve to fourteen months. Mating activity can occur throughout the year. A single calf is normally born; however, two calves have been recorded on rare occasions. Calving intervals range from two to three years.

5.2.10.2 Distribution and Abundance

The Antillean manatee is sparsely distributed throughout the Caribbean. This species can be found from Mexico, east to the Greater Antilles, and south to Brazil. They are found in the following countries: French Guiana, Suriname, Guyana, Trinidad, Venezuela, Columbia,

impacted. It is estimated that approximately 18.5 acres of potential habitat for the Puerto Rican crested toad would be temporarily impacted (see maps in Appendix 3). All impacts will be temporary in nature and the entire ROW will be restored to preconstruction conditions in any areas known to be potential crested toad habitat.

5.2.9.5 Indirect, Interdependent, Interrelated and Cumulative Effects

No indirect, interdependent, interrelated or cumulative effects are expected due to the fact that all areas within potential crested toad habitat will be completely restored to preconstruction conditions.

5.2.9.6 Conservation Measures and Recommendations

The Puerto Rican crested or Concho toad is very difficult to detect due to its small size and secretive habits. However, due to the potential for occurrence of this species in the project corridor right-of-way, the following conservation measures will be implemented:

- (1) During the initial establishment and clearing of the construction right-of-way, two biologists will conduct daily sampling for detecting the concho toad in every area of construction before work begins.
- (2) These monitoring activities will be carried out daily, concurrent with the monitoring required for the Puerto Rican boa and will be focused on cover areas (cracks in rocks and trees species) that are regularly used by these species.
- (3) All monitoring events will be incorporated into and will be carried out in coordination with the work plan of the contractor; daily changes to these work plans shall be considered in planning the work.
- (4) Monitoring events will be carried out between 5:00 a.m. and 7:30 a.m. on days when major equipment will be operated within the construction right-of way.
- (5) When a species is detected, established capture and relocation protocols (similar to those identified for the boa) will be implemented. Data regarding all species identified within the ROW, captured and/or relocated, will be incorporated into the daily environmental monitoring logs.
- (6) All collections, relocations and data transmissions will be coordinated with the appropriate local, state, and federal regulatory agencies.

proposed project corridor was reviewed for potential habitat as well. All potential habitat was documented.

No crested toads or tadpoles were observed or heard during any of the site visits. However, eight (8) potential areas of habitat for the species were identified during the survey. Potential habitat was identified in all three focus areas:

South Section

Three areas were identified as potential habitat for the crested toad. Two areas hold water intermittently and are both surrounded by dry forest. The third area consists of two permanent ponds surrounded by dry forest.

Vega Baja Section

Two areas were identified as potential habitat for the crested toad in the Vega Baja section. The first area is a permanent artificial pond that is located in a flat area approximately 75 meters away from the nearest haystack hill and is surrounded by pastures. The second area has the greatest potential for occurrence of the species. This area consists of a sinkhole that flows into an intermittent streambed that forms small temporary ponds during rain periods. This area is located within a part of a limestone forest that is in good condition and is characterized by a large number of cavities and leaf litter. Additionally, this forested area is part of the limestone area where individuals of crested toad have been observed in the past.

Manati Section

In this focus section, three areas were identified to have potential habitat for the crested toad. The first area consists of a sinkhole that collects runoff water that is surrounded by limestone forest, which contains cavities that can serve as a retreat for the species. The second area is a small permanent pond surrounded by both limestone forest and open area. The third area is another sinkhole that collects runoff water forming intermittent ponds. This area is adjacent on one side to a haystack hill and on the other, an abandoned agricultural field.

5.2.9.4 Summary of Impacts

Adjustments and realignments of the proposed pipeline corridor has reduced the potential direct impacts of potential reproductive habitat for the Puerto Rican crested toad. As a result of these actions, a single potential reproductive site may be directly

DNER biologists have monitored and counted 1339 males, 389 females, 201 amplexus, and 39 rows of hatched eggs.

Funding for recent studies has been provided by USFWS along with the consulting and labor from the Texas Fort Worth Zoo. DNER's efforts to construct artificial ponds for toad reproduction in Manglillo Pequeño continue to provide positive results. Initial monitoring of the artificial pond site indicated that the pond was used by two pairs of Concho toads for reproduction. Additional efforts in the Finca Gabia in Coamo and El Tallonal, have demonstrated that observed adult toads who grew up in other artificial ponds have also demonstrated reproductive success.

The Puerto Rican crested toad is the only toad endemic to the island. In the past, populations could be found along the northern coast from Arecibo to Isabela and the southern coast between Coamo and Guánica. The northern population was observed for the last time in 1992. The only known reproductive populations are currently found in the Guánica State Forest. Appropriate collaborative management between state, federal and private agencies have resulted in positive population increases of this endangered species.

5.2.9.3 *Current Conditions*

The habitat of *P. lemur* is associated with humid, arid or semiarid limestone forests, characterized by a high content of cavities and cracks in soil with good drainage and diverse vegetation. Areas of runoff accumulation or permanent ponds that serve for breeding are essential habitat components for the species.

A survey was conducted for the crested toad within three focus sections within the project corridor that are considered part of the historical range of the species. The three focus areas were located in the municipality of Penuelas, Manati, and Vega Baja. The results of a flow accumulation model were used to identify areas where accumulation of water would occur within the project corridor. Those areas identified were visited and the search was narrowed to 100 feet to each site of the propose project corridor. All areas were visited during the day, allowing for identification of landscape and potential habitat. Visits were also carried out at night to detect the species. During these visits, substrates such as small caves and rock shelters were searched. Additionally, tadpoles were searched and identified in all areas where pools were identified. All site visits occurred between November and December 2010. The survey was not only conducted to determine presence or absence of the crested toad, but the