2 DESCRIPTION OF THE EXISTING ENVIRONMENT

Chapter 2 describes existing environmental conditions in the Project area, such as topography, geology, soils, water resources, water quality, ecological resources, land use and zoning, infrastructure, cultural resources, aesthetics, air quality and climate, noise, safety and heath, traffic and transportation, socioeconomics, environmental justice, and public services.

2.1 Topography

2.1.1 Regional Topography

The North Coast of Puerto Rico contains a karstic belt region underlain by limestone. This region, located in the north-central and northwestern portion of the Island, is known as the Northern Karstic Zone. It extends from Aguadilla to Loiza, spans 75 miles and has a width of 14 miles in the Arecibo area. This fringe constitutes 65 per cent of the Northern Karstic Belt and reaches top elevations of 530 meters above mean sea level (msl).

The USGS geologic map, Arecibo quadrangle (Briggs, 1968) shows a regional topography that varies from typical karst physiographic features such as karst hills or karst haystack hills (*mogotes*), sinkholes, buried karst, and low rolling hills to irregular plains with minor karst features, river valleys, flood plains and coastal rolling lowlands, cemented dunes or eolianites and Caño Tiburones, which is an expansive coastal type marsh.

Variations in climate have influence over factors that affect the formation of topographic features on karst terrain, such as depositional environment and diagenesis, among others. A large portion of the topographic features illustrated on the quadrangle are covered by relatively flat alluvial deposits. These are derived from sediments that have been discharded by the RGA and Tanamá Rivers under flood conditions and which originate in the interior mountains, on scarped topography. Therefore, topographic features that dominate the topographic landscape on the quadrangle map are alluvial flood plain deposits of the RGA, Caño Tiburones, the discontinuous coastal plain that is interrupted by irregular karst hills and cemented dunes, among others.

Karstic hills or karstic haystack hill topography is represented on the center of the quadrangle map, whereas classical, well-developed karstic phisiography is illustrated to the west and south.

Typical karstic hills reach 50 meters in elevation above valley plains and inter karstic hill valley elevations. The foot of *mogotes* spans 100 to 150 meters in diameter (Briggs, 1968). Nevertheless, steeper relief can be observed towards the southern sector of the quadrangle where short chains of *mogotes* reach maximum altitudes of 250 meters msl.

The lower RGA valley is located approximately 45 miles west of San Juan and occupies an area of 31.5 square miles (Quiñones-Aponte, 1986). The Atlantic Ocean borders it to the north; the City of Arecibo, karstic depressions and steep hills border the western and southern limits of the valley; Caño Tiburones is adjacent to the north/northeast and karstic mogote topography limits it to the East.

The lower valley of the RGA is one of the most prominent features on the Arecibo quadrangle. Topographic gradients on this alluvial valley vary from almost vertical cliff walls at elevations of 180 meters above the level of the river flood plain, up to 250 meters above msl towards the southern sector of the quadrangle where abrupt topography dominates. River banks contain irregular, moderately developed karstic features which are found on both sides of the alluvial valley and represent the transition zone with adjacent terrain. Both river banks exhibit a gradational decrease in elevation towards the nort, where the river mouth is found, and to the northeast until reaching Caño Tiburones.

The RGA has several abandoned river channels and large meanders. Part of its flow volume is lost underground until it surfaces in the form of springs on the southern side of Caño Tiburones (Monroe, 1976). The river valley exceeds 5 kilometers at its widest which is located on the northern portion of the quadrangle.

Towards the southeast, the RGA merges with the Tanamá River. The banks of the Tanamá River are almost vertical and attain elevations of 125 meters msl. In some parts the river flows underground through nine tunnels and, in some segments when it surfaces, flood plains have been formed. The widest sector of the flood plain is found east of La Esperanza and measures 150 meters in width (Briggs, 1968).

Caño Tiburones is one of the most relevant topographic features on the topographic map. It occupies an extensive swampy area extending from the oriental valley of the RGA until it reaches the Municipality of Barceloneta, is 15 kilometers long, has an average width of 1.5 kilometers, and occupies approximately 152 square kilometers of practically flat topography near the Atlantic Ocean close to the coast, until reaching 984 metes msl towards the interior. Caño Tiburones contains swamp and peaty marsh deposits at mean sea level or near mean sea level. Floodplain alluvial deposits from the RGA adjoin Caño Tiburones to the east.

2.1.2 Local Topography

The Site is located on the western segment of the coastal plain or coastal flat land and on a portion of the RGA's alluvial floodplain in Cambalache Ward, in Arecibo, Puerto Rico.

The Site lies on the North Karst Zone of Puerto Rico, within the discontinuous coastal plain and the lower alluvial valley of the RGA. Topography within the Site and surrounding areas is dominated by the RGA floodplain and is therefore leveled with elevations that vary from 1 meter up to 7.5 meters msl. The topography is typical of floodplains which are associated to waterways. **Figure 2-1** shows the existing topography within the Site.

The Wetland Jurisdictional Determination Study (**Appendix E**) shows the topography of the areas where the infrastructure for the Project is proposed.

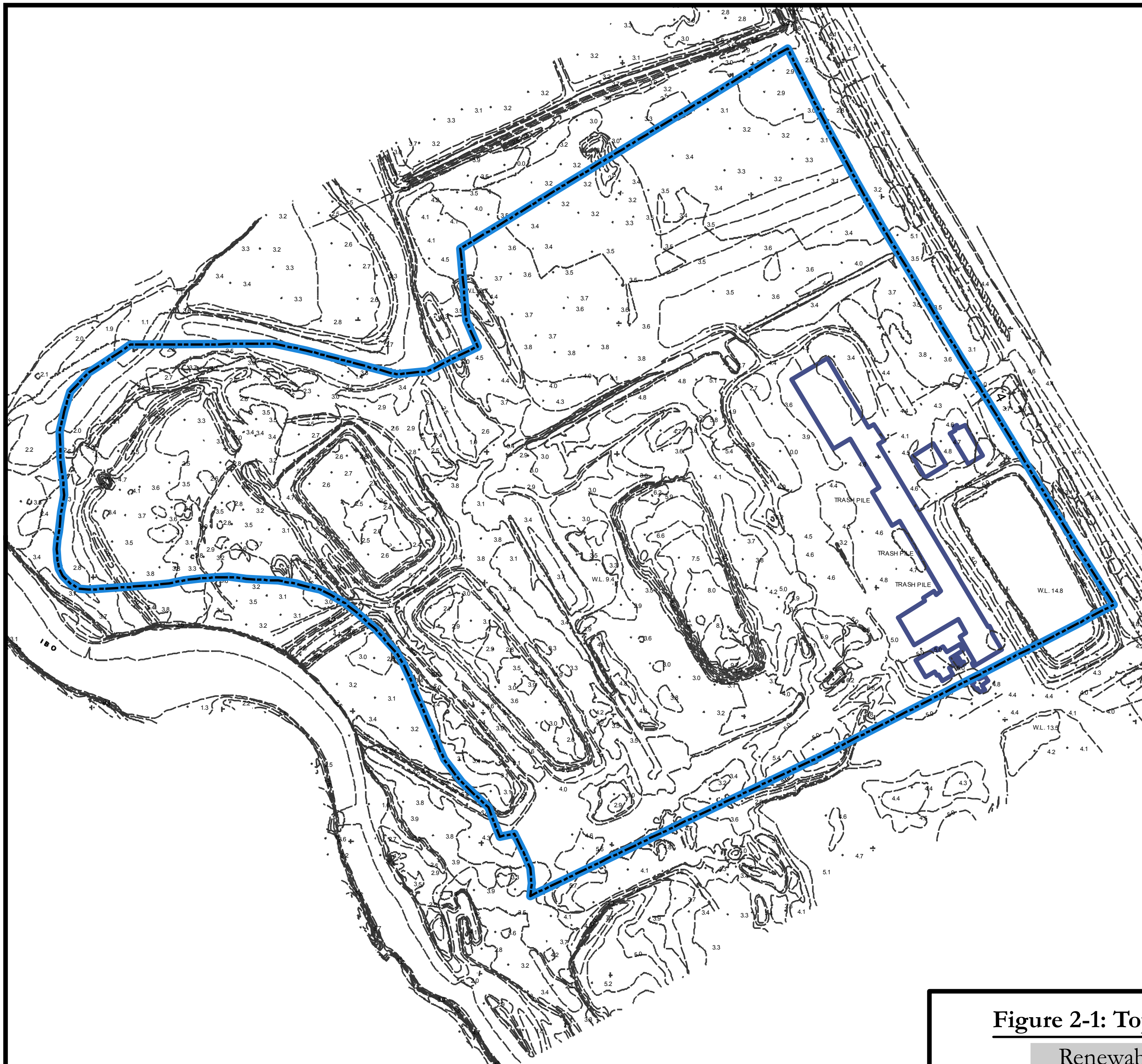
The alluvial valley formation began with the erosion and dissolution of limestone bedrock around the Middle Miocene Epoch, due to abrasion and acid rain (Monroe, 1976). This process gave way to the development of a canyon with steep slopes, which turns narrower inland and to the south.

Local topography at the Site has been previously impacted by the industrial activities of a paper mill that ceased operations in 1996 and was known as Global Fibers Paper Mill. Currently, several steel frame structures still stand at the Site.

The Site occupies an area of 82 cuerdas and has an irregular geometry. It extends from RGA that borders it to the west, until State Road PR-2 that borders it to the east. Vacant land property of the Puerto Rico Land Authority borders the Site to the north, where a portion of the land is used to grow hay, and to the south.

Five (5) artificial ponds are part of local topography. One of them, located on the southeastern portion of the Site, was used as a retention pond to store water from the paper mill process, and the four remaining ponds on the western side of the Site were used as infiltration ponds to store storm water and discharged it by percolation to the RGA.

Approximately 1,191 lineal meters of artificial channels flow throughout the Site, and were created as part of the stormwater and process water drainage system. They, in turn, connect to another channel that flows along the north boundary of the Site and discharges to the RGA. One of the meanders of the RGA constitutes one the west boundaries of the Site; its banks have steep slopes.



N
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Legend:

Topographic Contour Line[1]

Existing Buildings[2]

Property Boundary

Sources:
1. 1. Spot Elevation (Meters). Drawing provided by Energy Answers and topography topography by Alexis Ocasio CSA Group.
2. Municipal Revenue Collection Center (CRIM, by its acronym in Spanish).

Coordinate System: State Plane NAD83 Puerto Rico & Virgin Islands FIPS 5200 (Meters)

CSA Group

Figure 2-1: Topography Map of the Site

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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2.2 Geology and Soils

2.2.1 Regional Geology

The North Coast of Puerto Rico contains a large territorial extension underlain by limestone bedrock known as North Karstic Zone. It occupies approximately 24% of the surface area of Puerto Rico (approximately 75 miles form east to west) and extends from Aguadillla to Loíza. The Site is located on the RGA floodplain and on the western area of a discontinuous, low lying coastal corridor; nevertheless, underlying formations belong to Camuy limestone. The coastal corridor is formed by the area of low to moderate topography located between the coast and Caño Tiburones, the RGA floodplain, and the hills and irregular plains to the south.

The main development of limestone on Northern Puerto Rico dates back to the Oligocene and the Miocene. The sequence of limestone formations from the late to the mid Tertiary is the result of wind dynamics and intermittent oceanic regressions and transgressions that occurred between the Oligocene and Miocene. It is during this epoch that the oldest tertiary strata emerged and the North Coast of Puerto Rico sank as a result of on-going orogenic processes in the Caribbean region, culminating with deposits of consolidated sand dunes and deposits of sand that date from the Pliocene and Holocene, that are followed (overlained) by recent sedimentary deposits.

East and west of the Project site and outside the RGA floodplain, aligned and discontinuous low-lying outcrops of limestone belonging to the Camuy Formation are present, eroded by sea action. This geologic formation appears to have been fragmented as a result of tectonic activity causing periodic uplifting and subsidence and activating episodes of marine transgressions and orogenic processes. To the southeast and southwest of the Project site, short ranges of karstic hills and *mogotes* from the Aymamón Limestone Formation are evident, showing typical karst topographic features.

Geologic formations within the Project site and surrounding areas are described below based on the USGS Geologic Map, Arecibo Quadrangle:

- Aymamón Limestone (Tay)-it consists chiefly of fine to medium grained limestone, white to light gray with mixed moderate tones of orange, contains a high degree of purity. In some places it can be mottled with light brown streaks, light gray and light reddish brown. Commonly chalky, locally coarsely fragmented. It can reach 216 meters in thickness. Karstic mogote phisiography was developed along the base and middle parts of the formation.

- Camuy Limestone (Tca)-fine to medium grained, with different tones of orange, yellowish and light brown. Ranges in composition from a pure limestone to a somewhat clayey limestone interbedded with light gray chalk, clayey chalk and marl. Approximately 171 meters in thickness.

- Floodplain alluvium (Qa)-moderately well-sorted, gradational stratified sand, gravel, silt and clay. Largely composed of quartz, feldspar and plutonic rock fragments sand grains but silicified plutonic-rock and volcanic-rock pebbles and cobbles are common. The thickness of these deposits varies from 0-70 meters.

- Swamp deposits (Qs) adjacent to meanders of RGA on its floodplain, tributaries and Caño Tiburones east/northeast of the Project site. Sediments consist of mixed clay, sandy clay, and silty clay, black, gray, and blue gray in color. Water saturated, contains a high degree of organic material. Thickness varies from0-3 meters.

- Beach Deposits (Qbq)-chiefly quartz sand, coarse to medium grained, well-sorted with minor concentrations of feldspar, plutonic rock fragments and calcium carbonate.

- Sand dunes (Qd) medium grained sand. 0-10 meters thick.

- Transitional Deposits (Qdt) wind blown sand from dunes and beaches mixed by natural government agencies or by cultivation with blanket deposits, lagoonal or swamp deposits.

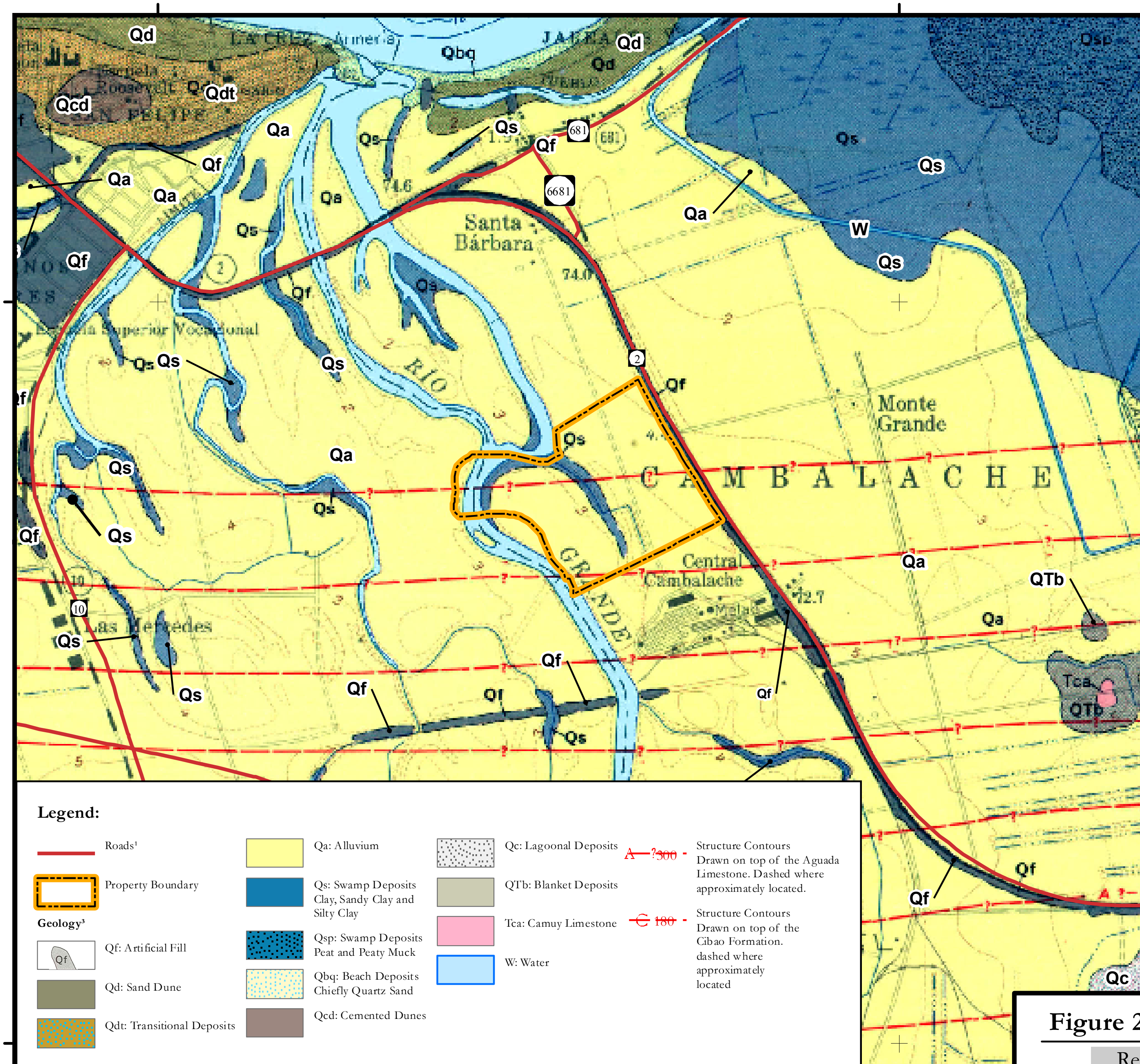
- Cemented dunes (Qcd) friable to well indurated calcite-cemented, thin bedded, commonly cross-bedded, locally fossiliferous, sandstone with interbedded conglomerates.

- Blanket Deposits (QTs)-quartz sand, medium to fine grained, white to light gray, contains less than 2% impurities.
- Fill Deposits or (Qf) Artificial Fill (Af) -consists of a mixture of poorly sorted sediments of calcite, sand, and clay fragments that reach an average depth of 0 to 4 meters from surface grade.

Figure 2-2 shows the geologic formations within the Project site, while the Jurisdictional Determination Study **(Appendix E)** illustrates the existing geologic formations present at areas proposed for infrastructure development.

2.2.2 Local Geology

Subjacent geologic formations and geomorphology confirm that the Project site and the areas surrounding it are dominated by Tertiary limestone outcrops such as the Camuy Formation, to more recent deposits such as alluvium deposits. As a result of chemical and mechanical weathering processes this flat coastal corridor dominates over the landscape where sporadic karstic hills protrude, both of which belong to the RGA floodplain.



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Scale: 1:20,000

0 250 500 1,000 Meters

Sources:
1. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish), June 2006
2. Puerto Rico Planning Board
3. US Geological Survey. Geologic Map of the Arecibo Quadrangle, Puerto Rico. Prepared by Reginald P. Briggs, 1968. Map I-551

Coordinate System: State Plane NAD83 Puerto Rico & Virgin Islands FIPS 5200 (Meters)

CSA Group

Atlantic Ocean
Caribbean Sea

Figure 2-2: Geology of the Study Area

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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The geologic composition of the Site consists mainly of organic material deposits mixed with sandy, silty and clayey fine sediments that consist predominantly of RGA alluvial deposits and swamp deposits composed of organic clayey sediments, dark, generally found near meanders of RGA.

The description of the geologic formations within the Site is based on the USGS Geologic Map, Arecibo Quadrangle, Briggs, 1968. Geologic deposits that underlie the Project site consist of 70-meter thick RGA flood plain alluvium (Qa), and 3-meter thick swamp deposits (Qs).

Formation Qa consists chiefly of moderately well-sorted gradationally bedded sand, silt and clay. These sediments are composed of unconsolidated material that was deposited during RGA's periods of flood and discharge. Swamp deposits (Qs) were deposited in areas adjacent to the RGA and are composed of clay, sandy clay, silty clay, black, gray and blue gray in color. These sediments are water saturated and have a high organic content.

As part of the preparation for this environmental document a Preliminary Geotechnical Evaluation of the Site was performed by Geoconsult **(Appendix A).** The subsoil exploration confirms the alluvial origin and depth of these deposits, since perforations penetrated the substrate to maximum depths of 150 feet.

A description of stratigraphic units found as a result of the subsoil exploration is provided below:

The soil exploration performed throughout the Site consisted of drilling 15 borings to depths between 100 and 150 feet. **(See Appendix A, Figure 2 Boring Location Plan, Preliminary Geotechnical Recommendations).** As a result, it can be inferred that alluvium deposits are consistently found to maximum depths of penetration. Ground water level was detected at depths between 4 and 7 feet (see Generalized Subsurface Profiles Figures 3, 4, 5, 6 and 7, Appendix A-**Preliminary Geotechnical Recommendations)** for corresponding borings.

The lithology of material found varies between fat clays and clayey sands where the sand content is variable, and depends on the energy level of the active depositional environment when the material was deposited. This variation is not gradual along the boring; it is rather heterogeneous, with thin layers of sandy silt found between thicker layers of fat clay. This was observed in all 15 borings drilled, with the peculiarity that no two borings were found to be alike. This fact also shows the heterogeneity found in the deposits in the aerial extension, which will impact the type and characteristics of the foundation solution that will be used for the different Project structures that will be located on the Site.

In general, the alluvial material found indicates the presence of a desiccated crust with a thickness of approximately 20 feet. The clay found within this desiccated crust is generally stiff to very stiff, while the coarser material is poorly cemented with relative densities that qualify as very loose to loose. Material found deeper than 20 feet generally shows the opposite. Clays tend to be soft and medium, whereas sands tend to become denser. A uniform and consistant lithologic profile could not be found in any of the drilled borings.

2.2.3 Structural Geology

The Preliminary Geotechnical Recommendations Report includes preliminary recommendations for the Project, which are described as follow:

Alluvial deposits are not competent to bear the proposed loads imposed by the proposed structures. Using the values provided for the expected loads, and assuming an allowable bearing capacity of 3,000 pounds per square foot, settlement calculations considered a subsurface profile with compressibility parameters that follow the model presented in **Appendix A, Figure 8**, which was based on consolidation tests for undisturbed samples as included in the Geotechnical Investigation.

As a result, differential settelements up to 6 inches are anticipated after considering the aggravating factor of aerial heterogeneity or the porosity of sand content in different subsurface strata; it was estimated that the time in which this settlement would be achieved could vary over short distances, causing large differential settlements to proposed structures. These differential settlements tend to be temporary since over time (years) total settlements would be similar, but still would cause damage to structural elements. Therefore, a deep foundation system (piles) is required.

Taking into account the different soil conditions within the area, a static analysis was performed for every boring to determine the required depths of piles to be used. Also, thirteen types of piles were analyzed for each boring. The different piles and their corresponding working loads are summarized in **Table 2-1, Appendix A-Preliminary Geotechnical Recommendations.**

Table 2-1: Allowable Compression Capacity of Piles

Type of Pile	Allowable Compression Load (tons)
10" Fuentes precast concrete circular pile	60
12" Fuentes precast concrete circular pile	100
10" Unfilled steel pipe pile (0.188" wall)	50
12" Unfilled steel pipe pile (0.250" wall)	80
18" Unfilled steel pipe pile (0.312" wall)	140
24" Unfilled steel pipe pile (0.375" wall)	200
30" Unfilled steel pipe pile (0.500" wall)	250
10" Filled steel pipe pile (0.188" wall)	80
12" Filled steel pipe pile (0.250" wall)	120
18" Filled steel pipe pile (0.312" wall)	200
24" Filled steel pipe pile (0.375" wall)	250
30" Filled.steel pipe pile (0.500" wall)	300
14x73 Steel H pile	150

Two types of steel pipe piles were considered: piles without any type of fill (unfilled section) and piles with a concrete core and a steel plug at the toe (filled section).

The results of the static analysis can be found on **Table 2, Appendix A-Appendix A-Preliminary Geotechnical Recommendations**. This analysis was performed considering a safety factor of 2.5; however, this factor can be reduced as more data is obtained and further analyses are performed. The extent and depth of fill is still uncertain and will have to be defined in the final report. For detailed findings and recommendations of the Preliminary Geotechnical Recommendations please refer to **Appendix A**.

2.2.4 Sismicity

Puerto Rico and the Virgin Islands represent the eastern edge of the Greater Antilles region and are composed of volcanic and sedimentary rocks that were formed during the last 100 million years.

Puerto Rico is located on the northeastern tectonic block known as the Caribbean Plate in a seismic region of the Caribbean, and is considered also to be located on a microplate between the obliquely subducting North American and Caribbean Plates and on the zone of convergence with the North American Plate, where displacement between the two plates is more lateral. On the past, it has been determined that the relative speed of movement of the North American Plate is 3.7 cm/year with respect to the Caribbean Plate, in a west/southwest direction (Sykes et al., 1982).

Seismic activity is concentrated in the following zones: the Puerto Rico Trench to the north, along the subduction zone to the south and the zone of 19°N, Northeast of *Zona del Sombrero,* to the southeast where Anegada and the Virgin Islands depressions are found, Muertos Trough to the south, to the west at Mona Canyon and Mona Passage, and Southeast of the interior of Puerto Rico.

Of all mentioned features, the most outstanding is the Puerto Rican Trench, the axis of which is located approximately 100 kms north of the Puerto Rican and Virgin Islands Platform and corresponds to the convergence zone of the North American Plate with the Caribbean Plate. The 19° N Zone is associated to it and contains the slope faults in the North and South of Puerto Rico. Puerto Rico is located at approximately 60 km south of the southern slope of the Puerto Rican Trench. This zone is considered to have the potential to produce earthquakes with magnitudes of 8-8.25 on the Richter scale (McCann, 1984). Nevertheless, the greatest seismic activity that has been recorded in this region is located on the western edge near Mona Passage and towards the eastern edge at the point of intersection between the Main Ridge and the Oriental Margin of the Virgin Islands.

Among the most relevant features of the Mona Passage are grabens that strike north/northwest and extend from Muertos Trough to the south of the Puerto Rican Trench to the north. The most important of these grabens is the Mona Canyon, which appears to have been the focus of the 1918 magnitude 7.5 earthquakes, and a tsunami that flooded the coast causing extensive damage on the west coast of Puerto Rico. Vertical offset of bordering faults on both sides of the Canyon appear to have originated the earthquake.

Anegada Passage is located to the east of Puerto Rico and is another focal source of seismic activity which is mostly associated to the Virgin Island basin. The rupture of one fault on the northern flank of this trough appears to have been the focus of the 1867 earthquake (Reid and Taber, 1920).

Muertos Trough is located 75 kms south of Puerto Rico, in a less seismic zone than the Puerto Rican Trench, and extends from the Dominican Republic to St. Croix's ridge. According to McCann (1984) it constitutes the southern boundary of the rigid block upon which Puerto Rico and the Virgin Islands lie.

The earth's regions that are located in seismic zones entail seismic risks, which in essence is the probability risk of occurrence of an earthquake in a region within a determined period of time. The Federal Emergency Management Agency (FEMA) has classified Puerto Rico as a high seismic risk zone. Earthquake-induced hazards can produce tsunamis, slope failure, amplification and liquefaction, among others.

The interior island shelf is the location of the Great Southern Puerto Rico Fault Zone (San Marcos Fault and El Madrigal Fault) and the Great Northern Puerto Rico Fault. The latter is located approximately 5 km south of the Project site. Earthquakes in Puerto Rico occurred in the years 1670, 1787, 1867, 1918 and 1943; therefore, seismic activity on the Island has been scarce in the past. This is attributed to the arching structure of the islands that form the Antilles and the superficial interior structural complexity of Puerto Rico.

The Project site is located on the alluvial flood plain of the RGA and on the discontinuous coastal plain; therefore, it is near the coast and has the possibility of being exposed to geologic hazards like liquefaction due to the soft composition of its substrate (sand and silt), which is of recent deposition, and the phreatic level is found near the surface at 10 feet or less. The loss of load capacity of soils is a result of liquefaction as well as structural damage. This effect is directly related to other factors like magnitude of an earthquake, intensity, peak ground acceleration of soil (%/g), wave velocity (cm/s), amplitude, and lack of lateral support of soils among others.

Although the Preliminary Geotechnical Study performed by Geoconsult recommends a deep pile foundation system for structures at the Project site, a final geotechnical study will determine specific vulnerability to liquefaction of soils within the study area and include recommendations for structural foundation design.

Due to the proximity of the Project site to the coastal shore, it could be adversely affected by other earthquake hazards such as tsunamis, which can also be produced by landsliding. When tsunamis are produced by fault offset on the ocean bottom, a series of waves are produced which, if located in the deep sea, can travel as fast as 500 mph, and if located in the open sea, can generate waves that are only inches high. Tsunamis can evolve in three phases: generation, propagation and inundation. The last of these phases can be expressed as a crested wave inundation that can reach considerable heights. Nevertheless, tsunami intensity depends of other factors including magnitude of the earthquake, velocity, duration of offset and depth of sea bottom. Thus, as part of the preparation of this EIS, a search in the tsunami inventory was conducted at the following programs: Alert and Mitigation Program against Tsunamis in Puerto Rico; Seismic Network of Puerto Rico; and the Sea Grant Program of the University of Puerto Rico, Mayagüez Campus. As a result of these searches, it was found that the Tsunami Atlas and Tsunami Flood Maps for Puerto Rico show that the Project site is located outside the limits of tsunami inundation. **Figure 2-3.**

2.2.5 Soils

According to the Arecibo Area Soil Survey: North Area of Puerto Rico, which was prepared by the Natural Resource Conservation Service, the soils found at the Project site are soils of the Toa-Coloso-Bajura Association: Toa silty clay loam (To) and Coloso silty clay (Cn). These soils are directly associated to the RGA alluvial valley and therefore are typically flat with pooly developed slopes. They have been used historically to grow sugar, food crops and cattle grazing and have a good farming potential. Toa-Coloso-Bajura Association soils are described below:

- Toa-Coloso-Bajura Association contains deep soils, almost flat, well to poorly drained, clayey and loamy. Theese soils cover approximately 4% of the survey study area. Toa soils cover about 37%, Coloso soils cover 34%, Bajura soils 9% and minor soils cover 10% of the survey area.

- Toa soils occupy the steepest topography and are well-drained. Coloso soils have poor drainage and occupy intermediate elevation areas.

- According to the USDA soil survey, the western portion of the Project site is covered by silty clay belonging to Coloso (Cn) soils. These are deep soils, nearly leveled, moderate to poorly drained, found on flooding plains. The areas of the soil range between 50 to 500 acres.

- Bajura Clay (Ba) - deep soils, nearly level, poorly drained with low permeability. Found on flood plains, and available water capacity is high, runoff is slow, natural fertility and organic matter is high. Availability for crops depends on fertility conditions due to water availability. The areas of the soil range from 50 to 800 acres.

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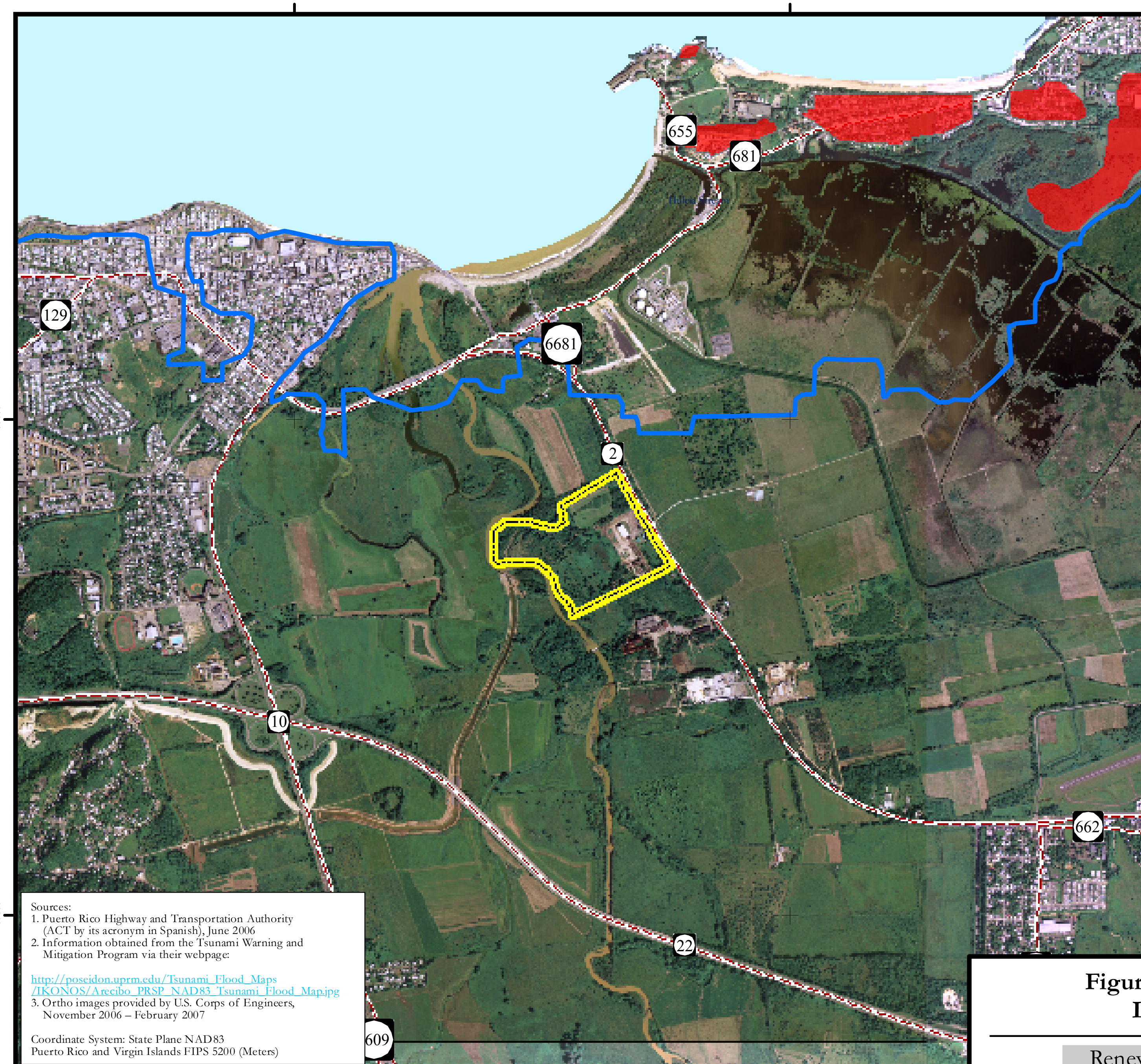

Sources:
1. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish), June 2006
2. Information obtained from the Tsunami Warning and Mitigation Program via their webpage:

http://poseidon.uprm.edu/Tsunami_Flood_Maps/IKONOS/Arecibo_PRSP_NAD83_Tsunami_Flood_Map.jpg

3. Ortho images provided by U.S. Corps of Engineers, November 2006 – February 2007

Coordinate System: State Plane NAD83
Puerto Rico and Virgin Islands FIPS 5200 (Meters)

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Scale: 1:30,000

0 250 500 1,000 Meters

Legend:

- Roads[1]
- Tsunami Flooding Limits[2]
- Isolated Areas not flooded by Tsunamis
- Property Boundary

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Figure 2-3: Tsunami Flooding Limit Map in Arecibo

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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- Marga Caracoles (CcD y CcE) soils with 0-20% slopes (CcD) and slopes from 20%-40% (CcE), vary from shallow to deep, well drained, available water capacity is poor due to moderately rapid permeability and the root zone is shallow.

- Toa Soils (To) silty clay soils occupy the oriental sector of the Project site. Deep soils, nearly level, well drained and a thickness of 91 inches. Permeabilty is moderate with a high water capacity. Surface runoff is slow with a high content of organic matter. Reaction throughout the soil is neutral.

Figure 2-4 shows the distribution of soils at the site according to the Arecibo Soil Survey.

CSA conducted a subsoil exploratory investigation (Phase II Environmental Site Assessment) for soil and ground water sampling in 2010. The exploratory investigation was conducted throughout the area of the Site previously occupied by paper mill boiler and in the area occupied by four (4) retention ponds.

The exploratory investigation followed all parameters established by standard guidelines, and federal and state regulations which were in effect at the time. As part of the investigation, ten (10) borings were drilled and six (6) ground water monitoring wells were installed where some of the borings were drilled. In addition, twenty-eight (28) soil samples and eleven (11) ground water samples were collected.

Soil and ground water samples were tested using EPA-approved methods of analysis for total hydrocarbons parameters. Laboratory results were negative for these parameters; therefore, no remedial action will be required for the Site.

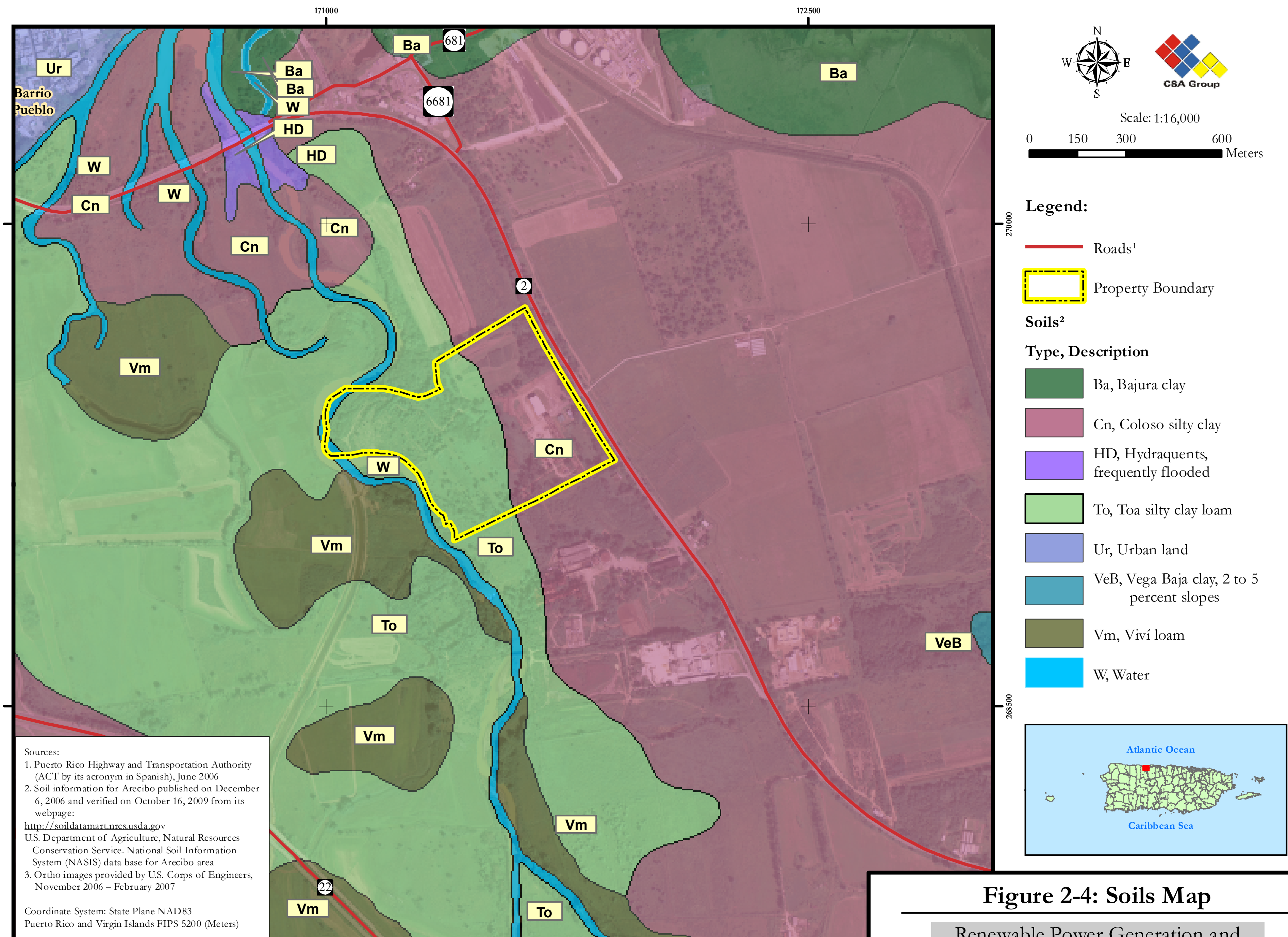

Figure 2-4: Soils Map

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

2.3 Hydrological Systems

The North Karstic Zone hydrological resources include surface and underground rivers and creeks, springs, aquifers, cascades, lagoons, dams, ponds and a variety of wetlands. This section discusses surface and underground hydrological resources found on the RGA floodplain and the North Karstic Zone where the proposed action will be located. Additionally, this section discusses the water bodies found at the Project site.

2.3.1 Surface Waters

The principal water bodies found on the RGA alluvial valley are the RGA and Tanamá Rivers, Caño Tiburones and a water channel that transmits water from the San Pedro Spring.

Existing bodies of water within a 400 radius around the Project site include artificial channels within the Project site; the RGA that borders it on the west; an artificial channel located at approximately 199 meters further west; an abandoned RGA riverbed 170 meters to the northwest; and a separate abandoned RGA channel that flows at approximately 304 meters further west of the Site. The following water courses are found beyond 400 meters around the Project site: Tanamá River (3.84 km), Caño Tiburones (1.57 km) and Arecibo Bay (0.84 km). **Figure 2-5** shows the hydrography and water bodies within a radius of 400 meters from the limit of the Site, which is located on the RGA basin.

As previously mentioned on Chapter 1- Project Description, five (5) ponds are located within the west-northwest portion of the Site, which were used to store stormwater and process water from the operation of the old paper mill. The ponds are currently not in use and do not store water. In addition to the ponds, there is a system of channels that were developed to direct stormwater and process water. There are no rivers or creeks across the site. RGA borders the Project site to the west, approximately 428 to 630 meters from the structures located on the western sector of the Site.

The RGA is the most important water body on this alluvial valley. It is 42 miles long, has a flow volume of 348,160 acres/foot per year and its basin occupies an intake area of 257.0 square miles from the Central Range in Jayuya to Adjuntas to the coastal alluvial valley near Arecibo. The

RGA drainage basin produces the largest amount of stormwater per square mile, 1,357 acres/foot per year. Some of the tallest peaks arise in this basin such as *Cerro de Punta* (4,390 feet), *Monte Jayuya* (4,280 feet), *Cerro Rosa* (4,157 feet) and *Tres Picachos* (3,953 feet). The west side of the RGA and the east side of the Caonilas River are the main tributaries in this basin. A few minor dams interconnect to Caonillas River through tunnels. Dos Bocas and Caonillas Dams were built within the channels of these rivers and represent the main potable water source in this basin. These dams provide up to 100 mgd of water to the North Coast Superacueduct, besides being a source of hydroelectric energy and providing partial flood control down stream of Dos Bocas Dam, which has a water storage capacity of 22,000 acres/feet (Quiñones-Aponte, 1986).

Other important tributaries contribute to this water runoff volume, the largest on the Island. (Integral Water Plan for Puerto Rico, 2004).

The RGA channel originates on the west area of the basin, on the Central Range in the Municipalilty of Adjuntas. It has large meanders and abandoned channels throughout its course. The existing riverbed has migrated east. Approximately one third of the basin is limestone bedrock. It flows from its source at elevations higher than 800 feet for approximately 60 kilometers into the Atlantic Ocean. RGA flows for approximately 23 kilometers on limestone bedrock , undergoing an abrupt change from volcanic/plutonic bedrock to limestone bedrock just down stream of Lake Dos Bocas (General Technical Report WO-65 Federal Department of Agriculture), where it forms a semi-deep canyon carved by the erosive forces of the river discharge and extends until Tanamá Ward, which is the approximate area where the valley starts. The RGA has the most abundant average annual discharge of all Puerto Rican rivers, which has been calculated to be 527 cubic feet/second in 13 years of compiled data (Quiñones-Aponte, 1986). Nevertheless, the USGS has calculated an average discharge flow of 475 feet/cubic second (ft^3/sec) from monitoring station number 50029000 in the RGA in the last 21 record years.

Nonetheless, the RGA loses part of its annual flow to the Upper Aquifer near the former Central Cambalache Sugar Mill during part of the year. This water infiltration from the RGA into the groundwater system, which has been calculated to be approximately 11.6 mgd, probably constitutes the main contribution to water resources in the Arecibo area. At the same time, the

USGS estimates that approximately 36 inches of net precipitation (rain minus evapotranspiration) percolates underground through sinkholes and cavities found on the limestone belt south of Lake Dos Bocas. On this segment of the river, part of the water that percolates emerges back to the RGA and Tanamá River channels as abundant springs, including the San Pedro Spring near Charco Hondo, which assists in keeping minimum flows.

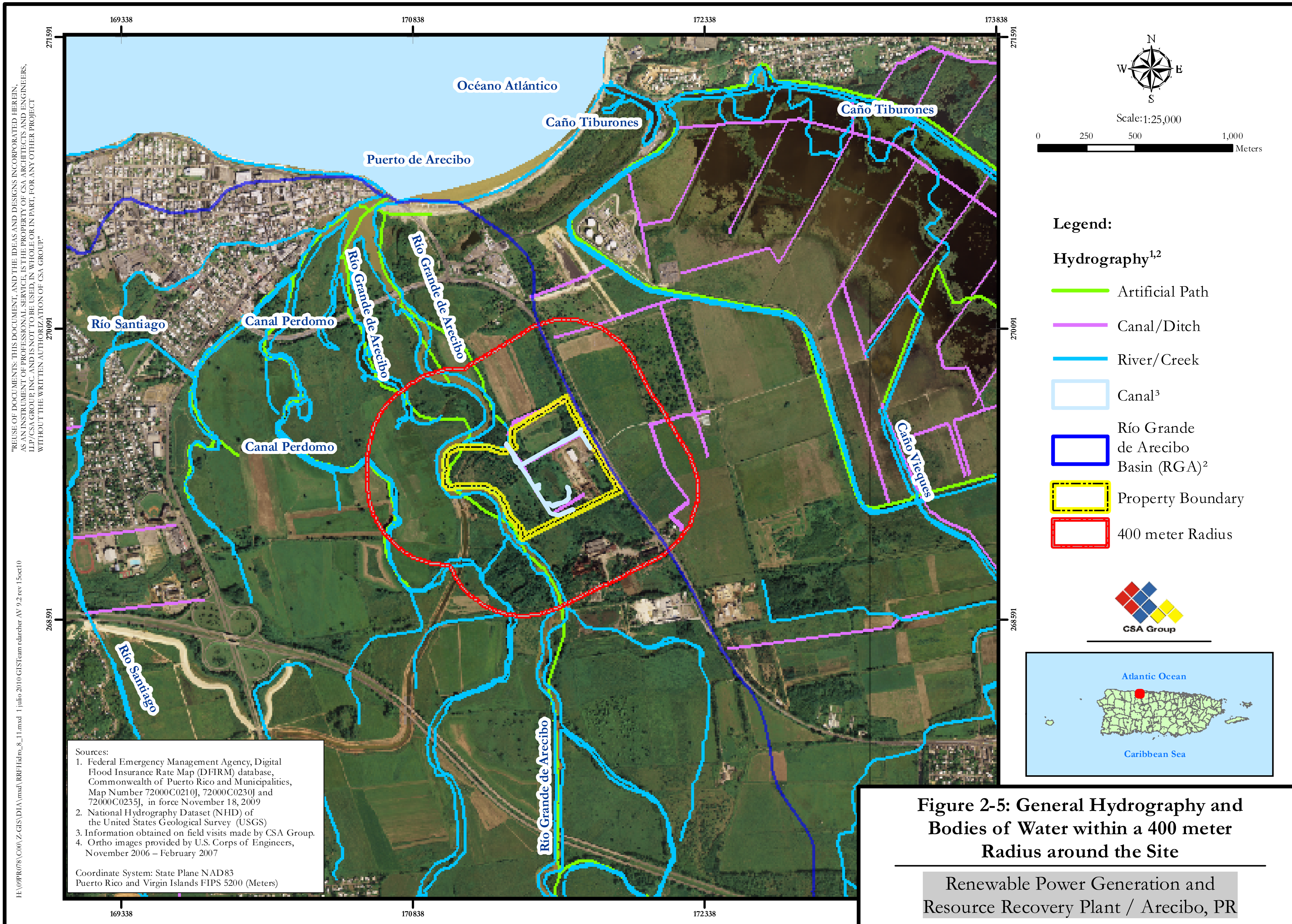

Figure 2-5: General Hydrography and Bodies of Water within a 400 meter Radius around the Site

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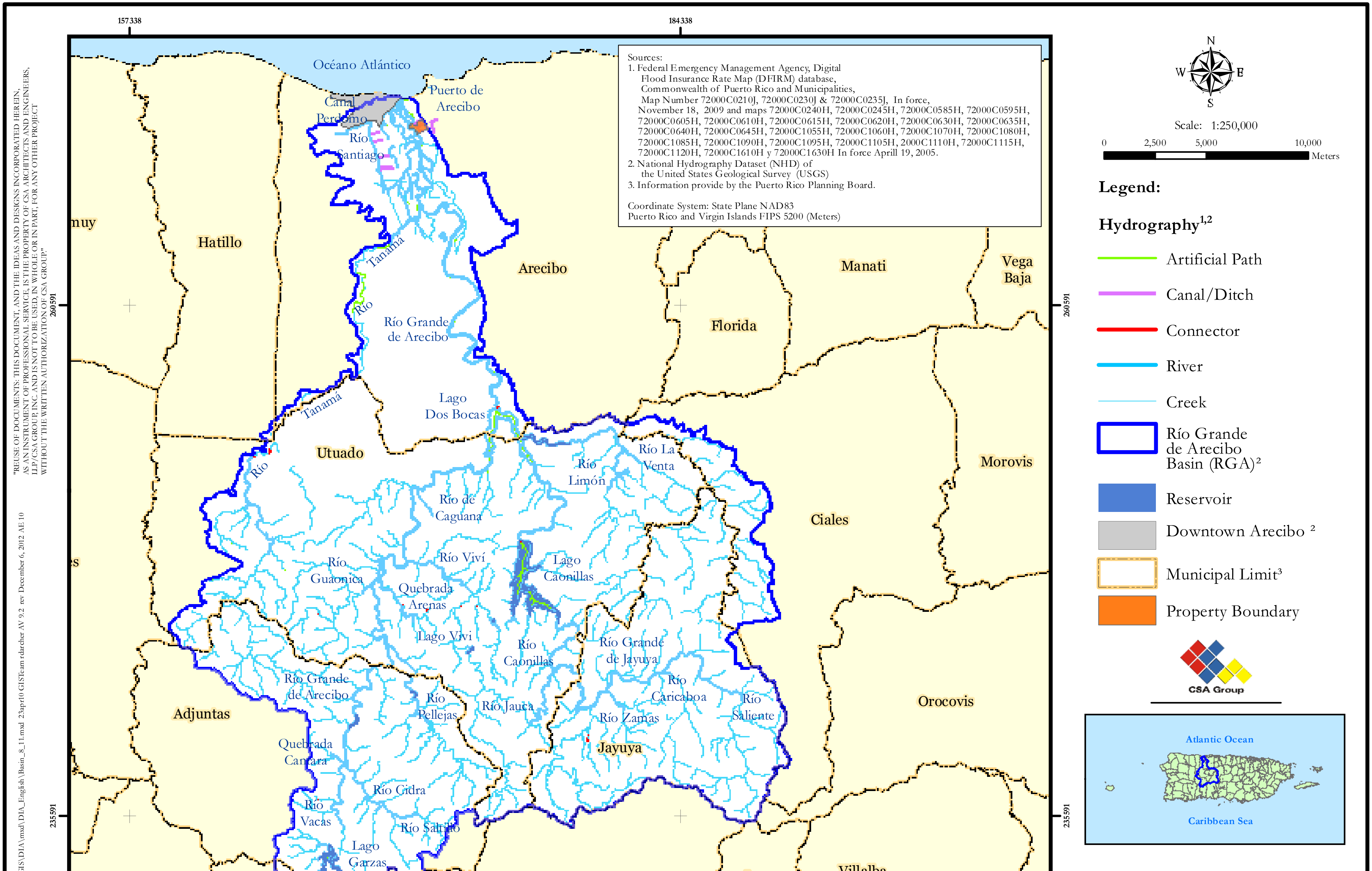


Figure 2-6: Rio Grande de Arecibo Basin

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

One of the RGA meanders borders the site to the west. However, it is approximately 130 to 360 meters form the proposed construction area.

The Tanamá River originates on the mountain region of Utuado and is the main tributary to the RGA, their confluence is located on the flood plain of RGA near Tanamá Ward and 7.3 kilometers form the RGA delta. The Tanamá River flows through some 19.6 kilometers on limestone and partially flows underground until it emreges at the San Pedro Spring near the border of the RGA valley, upstream of the former Central Cambalache Sugar Mill. The Tanamá River has an average discharge rate of 67,000 acres-foot per year towards the RGA, from where it feeds water to the Arecibo Estuary.

Both rivers have typical flows similar to those of most rivers in Puerto Rico. Recess in base flow volume occurs between January and April, July and August; followed by a short increase from May to June, which is then followed by a second rise from September to December. Water flow for the Tanamá River gets interrupted by a detouring structure used for public water located 2.08 kilometers upstream from the river mouth that produces 1.60 mgd for the Arecibo Filtration Plant. The Tanamá River belongs to the hydrographic basin of the RGA and is located at approximately 3,848 meters (3.84 km) from the existing structures at the Project site.

Caño Tiburones is one of the largest estuarine wetlands in Puerto Rico and covers a surface extensión of 7,000 c*uerdas.* It is bordered by the RGA on the west and by the Río Grande de Manatí on the east. Approximately 46.6 square kilometers of its area lies on limestone belonging to the Aymamón Formation. The Caño Tiburones has a semi-flat topography and reaches elevations of 984 feet to its south, descending to almost sea level on the coast. Caño Tiburones is located at 1.57 km from the nearest structure at the Project site and does not belong to the RGA basin.

In the past, Caño Tiburones received water from several sources – rain, multiple springs from the Superior Aquifer, from RGA and *Río Grande de Manatí* runoffs, and runoff from the RGA hydrographic basin – eventually discharging its waters into the Atlantic Ocean (Giusti 1978). Becaue of this continuous influx of fresh water, the Creek was naturally above sea level, thus the conduits were originally fresh water springs that discharged below the level of the ocean. As a result of human intervention, the existing surface of the Creek is below sea level, thus the conduits function as salt water “springs” (Zack y Class-Cacho, 1984).

In recent years (±1949), the hydrology of Caño Tiburones changed as a result of the construction of a diversion channel system that redirects water for agricultural uses and pumping. The system consists oh three main channels that flow from east to west, and hundreds of lateral channels that flow from north to south, measuring 60 miles long. The system directs the water flow to the main channel, which runs from east to west on the northern portion of the Creek between Barceloneta and Arecibo. A pumping system operated by DNER in El Vigía Sector decreases the hydraulic gradient and diverts water to the west. Pumping causes the water level in the channels to be lower than sea level (Giusti, 1978; Díaz, 1973; y Torres-González, 1996).

A portion of the surface runoff is diverted by pumping, which lowers the level in the wetland thus causing saline intrusion (Zack et. al., 1984) and reduces the freshwater concentration, which has caused that Caño Tiburones loose its original freshwater coastal lagoon characteristics. More than 70 mgd of fresh water are pumped from Caño Tiburones to the Atlantic Ocean, which makes it an important component of the regional hydrologic balance. Nevertheless, USGS records indicate that the daily volume of water that is pumped to the ocean varies form 106 mgd to 177 mgd depending on the season. Due to the reduction in agricultural activity and re-flooding of extensive areas of the wetland, especially after tropical storm Georges in 1998, an ecologically important diverse and large wetland system was established. At present, it provides habitat to marine, estuarine and riparian native and migratory species.

The water sources that contribute to this wetland are: storm water runoffs, storm water from its basin, and freshwater springs. La Cambija and Zanja Fría are specifically noted because they are the most extensive and underground conduits that connect to the ocean. At present, *El Vigía* pumping system contributes to the restoration of Caño Tiburones by minimizing saline intrusion into the wetland, thus keeping and increasing the number of wildlife species that use it. To serve this purpose, water levels fluctuate between 37.9 and 49.7 and regular pumping rate does not exceed four inches in 24 hours. The compiled salinity level data indicates that brackish water content in the wetland is composed of 66% freshwater y 34% salt water from the ocean.

Caño Tiburones Natural Reserve was designated as such on October 16, 1998. All 3,805 acres of this reserve and its buffer zone, which consists of the land around it, are part of Caño

Tiburones, although the total extension of the Creek is not part of the reserve. The parameters that were used to designate and delineate the reserve were its flora, fauna, location and presence of critical species, the types of soil, hydrology, geologic formations, existing land use and land holding or tenancy. As previously indicated, a few fresh water springs emerge on the southern area of the Reserve, whereas others surface in the northern sector.

2.3.2 Ground Water

The North Coast Aquifer is part of the North Limestone Zone **(See Figure 2-7 and Figure 2-8),** which contains two of the most productive aquifers in the Island. These cover 19.7 percent of Puerto Rico (905 square miles) or the equivalent to 64 percent of the total area occupied by all aquifers in the Island (Molina Rivera 1997), extending from Luquillo to Aguadilla. Both aquifers are named the Upper and Lower Aquifers, and are also known as Shallow Aquifer or Phreatic Aquifer and Deep Aquifer or Artesian (Lower).

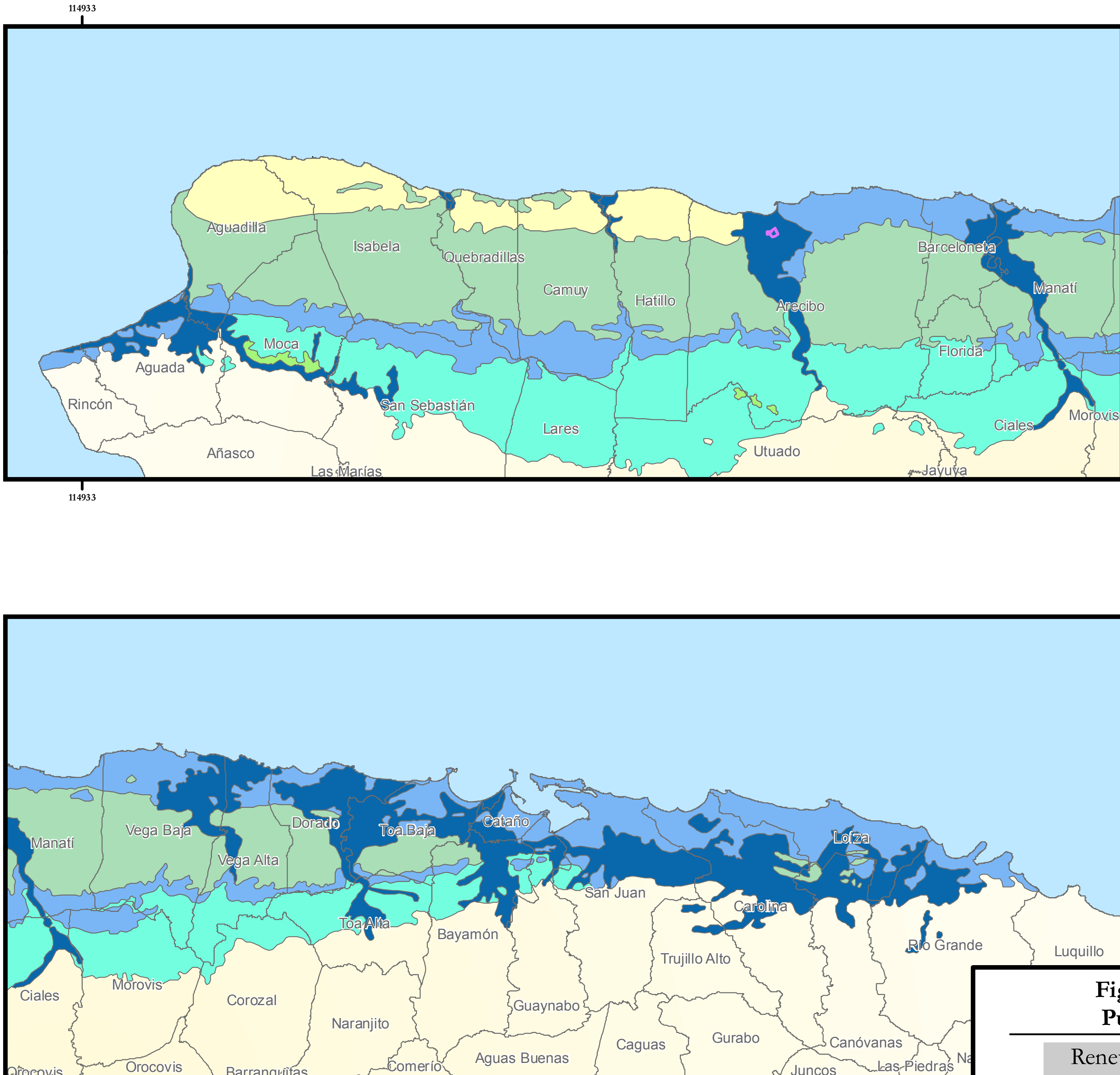
The Upper or Superior Aquifer is mainly non-confined within the Aguada and Aymamón Limestone Formations and the coastal alluvial deposits in the Manatí-Arecibo area, which have a combined thickness of 600 feet that decrease progressively to the north, and is 15 miles wide from north to south. Phreatic level fluctuations in the Upper Acuifer range from 15 feet from land surface in alluvial areas until 300 feet deep in limestone rocks located in steep topography found adjacent to the valley. Groundwater is deeper on the west side of the alluvial valley than on the east side. The Aquifer extends between the municipalities of Río Grande and Aguada, covers an area of 600 square miles, has a maximum thickness that varies depending upon its location, and is considered an important source of water. In 2002, 52 mgd were extracted from the aquifer (DNER, 2004) for domestic, industrial and agricultural uses.

The Lower Aquifer is located near the coast and is formed by two deep aquifers, one that lies within the Montebello Limestone Member of the Cibao Formation and the other which is found in the Lares Formation (Giusti and Bennett, 1976, p. 17). Its confining unit is composed of calcareous clayey rock, marlstone, chalky and siliceous limestone and clayey sandstone, but its extension west of the RGA is unknown (Rodríguez Martínez 1995). The highest estimated transmissivity levels are located on the central north coast, where the Lares y Montebello Limestone have values of 46.5 y 334 square meters per day, respectively (Rodríguez Martínez

1995).

Phreatic levels fluctuate between 2 and 5 feet in dry and wet months. These small variations represent an almost constant recharge from the RGA towards alluvium deposits where the Phreatic Aquifer forms (currently called the Upper (Superior) Aquifer from the North province).

Besides providing a moderate amount of water for consumption, the Lower Aquifer is the main source of water for industrial uses from Manatí to Barceloneta. Extraction from this aquifer was 7 mgd during 2002 (DRNA, 2004). At the same time, groundwater extractions beneath the clay unit reduce pressure on this deep aquifer, which causes water to filtrate to the lower semi-permeable clay layer. Furthermore, it is suspected that an amount of water from alluvial deposits and limestone formations seeps through the eastern valley wall. Vertical hydraulic equilibrium is difficult to reach in this alluvial valley, where water is constantly added to alluvial sediment deposits that overlye the clay confining unit and flows down gradient above it.



N
W E
S

Scale: 1:480,000

0 5,000 10,000 20,000 Meters

Legend:

Municipal Limit[1]

Property Boundary

Main Aquifers[2]

Alluvial-Valley Aquifer

Confining Unit

North Coast Limestone Aquifer System Lower Aquifer

North Coast Limestone Aquifer System Upper Aquifer

Not a Main Aquifer

Volcaniclastic, Igneous, and Sedimentary-Rock Aquifers

Sources:
1. Information provided by the Puerto Rico Planning Board.
2. United States Geologival Survey, 2003

Coordinate System: State Plane NAD83
Puerto Rico and Virgin Islands FIPS 5200 (Meters)

CSA Group

Figure 2-7: North Coast of Puerto Rico Aquifer Map

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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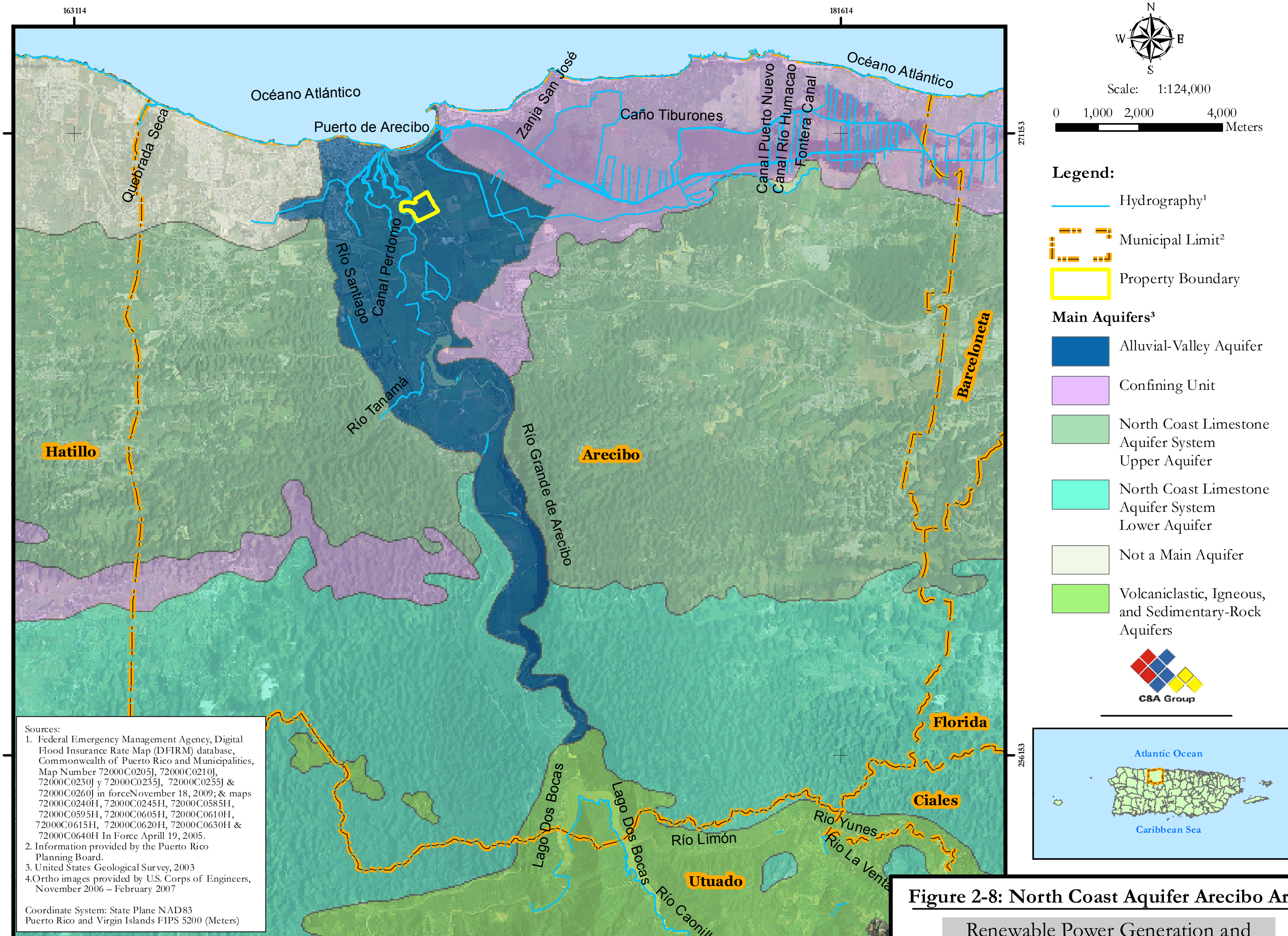


Sources:
1. Federal Emergency Management Agency, Digital Flood Insurance Rate Map (DFIRM) database, Commonwealth of Puerto Rico and Municipalities, Map Number 72000C0205J, 72000C0210J, 72000C0230J y 72000C0235J, 72000C0255J & 72000C0260J in forceNovember 18, 2009; & maps 72000C0240H, 72000C0245H, 72000C0585H, 72000C0595H, 72000C0605H, 72000C0610H, 72000C0615H, 72000C0620H, 72000C0630H & 72000C0640H In Force Aprill 19, 2005.
2. Information provided by the Puerto Rico Planning Board.
3. United States Geological Survey, 2003
4. Ortho images provided by U.S. Corps of Engineers, November 2006 – February 2007

Coordinate System: State Plane NAD83
Puerto Rico and Virgin Islands FIPS 5200 (Meters)

Figure 2-8: North Coast Aquifer Arecibo Area

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

At the same time, groundwater lost from the alluvial valley to the eastern wall of the valley reduces the pressure on sediments that underlie the clay layer (Quiñones-Aponte, 1986).

Transmissivity values greatly vary from 18.6 to more tan 26,012 square meters per day and usually increase between La Plata and the RGA Rivers, where values greater tan 9,290 square meters have been calculated in some locations.

Underground water discharge of all the aquifer system occurs in several ways. Water may flow towards areas of low topography, from the southwest heading north and northeast until it discharges into the Atlantic Ocean and the Caño Tiburones, respectively. Another way is by water extractions from the aquifer located beneath the clay layer, through water wells for domestic, agricultural and industrial uses. Discharge due to evapotranspiration on the edge of the capillary aquifer constitutes the third way.

Saline intrusion is an adverse impact that results from groundwater exploitation on the location of the Project site. The fresh groundwater lens flows from recharge zones towards the coast until it reaches discharge points such as river bottoms, springs and the sea bottom through filtration. Aquifers near the ocean have freshwater and saltwater lenses. Because freshwater is less dense than saltwater, it occupies the upper portion of the aquifer, while saltwater is found at greater depths. The mix zone of both kinds of water is known as interfase, and its location depends on the flow of freshwater and the hydraulic conductivity. The flow of freshwater into the ocean decreases due to extraction activities caused by demand in water consumption. This also causes a reduction in the extension on the aquifer's freshwater lens, which in turn re-locates the interfase zone further inland to higher levels within the aquifer, where saline intrusion occurs.

The migration of saltwater towards the upper parts of the aquifer can also occur as a result of fluctuations of phreatic level during periods of drought. Another factor that influences saline intrusion is the surface reduction of recharge zones of the aquifer, which in turn causes closure of water wells, thus reducing the aquifer's productivity.

Springs are a form of groundwater discharge that emerge to the surface of aquifers. There are a few springs on the western portion of the lower alluvial valley, at the base of limestone formations that surround it. The largest of them is the San Pedro Spring, which has an average discharge rate of 13 cubic feet per second (8.6 million gallons per day), which represents 94 percent of the alluvial valley springs. The San Pedro Spring emerges from the Montebello Limestone Member of the Cibao Formation (Briggs, 1968). In this area the RGA appears to have eroded the limestone bedrock enough to liberate the artesian pressure within the Montebello Limestone.

Lastly, the Zanja Fría Spring is located in Caño Tiburones and has a discharge rate of 7.5 to 9.9 cfs. Compiled hydrogeologic data indicates there is a high permeability zone that directs water from the lower valley of the RGA towards the Zanja Fría Spring (Quiñones-Aponte, 1986). This has been evidenced in exploratory borings and geophysical investigations which show that alluvium depths are greater on the southeaster side of the valley. There is an abandoned river channel flow which is believed to be the conduit to the Zanja Fría Spring. In 1982, a study measured a loss of 18 cubic feet per second of filtration between fluvial miles 4.8 y 6.3 in the RGA. In addition, the spring flow has not been affected by the decrease in water level due to pumping of groundwater from the limestone aquifers south of this spring.

Figure 2-9 shows the location of wells within a 460 meter radius from the Project site limits. No wells were identified within the Project site.

2.4 Water Quality

The EQB regulates statewide permitted uses as established on the Water Quality Standards Regulation (WQSR) in order to comply with Section 305 (b) of the Clean Water Act (CWA). To this end, the agency prepared the Integrated Water Quality Report of 2006. This report contains an evaluation of the quality of surface water, groundwater and coastal waters of Puerto Rico.

2.4.1 Surface Water Quality

The USGS manages the network of surface water monitoring through a cooperative agreement with the Government of Puerto Rico, and includes quality monitoring stations in the basins of 25 major rivers located in the north, south, east and west regions of Puerto Rico. The designated uses for water bodies under the WQSR include: drinking water supply, preservation and propagation of desirable species (aquatic life), primary contact recreation (direct contact) and secondary contact recreation (indirect contact).

The monitoring is conducted quarterly. Analyses of samples for fiscal year 2006, collected at monitoring station number 50029000 located in the RGA at 500 feet upstream from the former Central Cambalache Sugar Mill near State Road PR-2, showed the following results:

- Fecal coliform, arsenic, cyanide, turbidity, copper, lead and surfactants (MBAS) were within maximum allowable concentrations. Lead and copper concentrations were within the maximum allowable concentrations.

- Data from the cycle between November 25, 2008 to August 18, 2009 show that arsenic concentrations and turbidity were above allowable limits. The other parameters were within the standards.

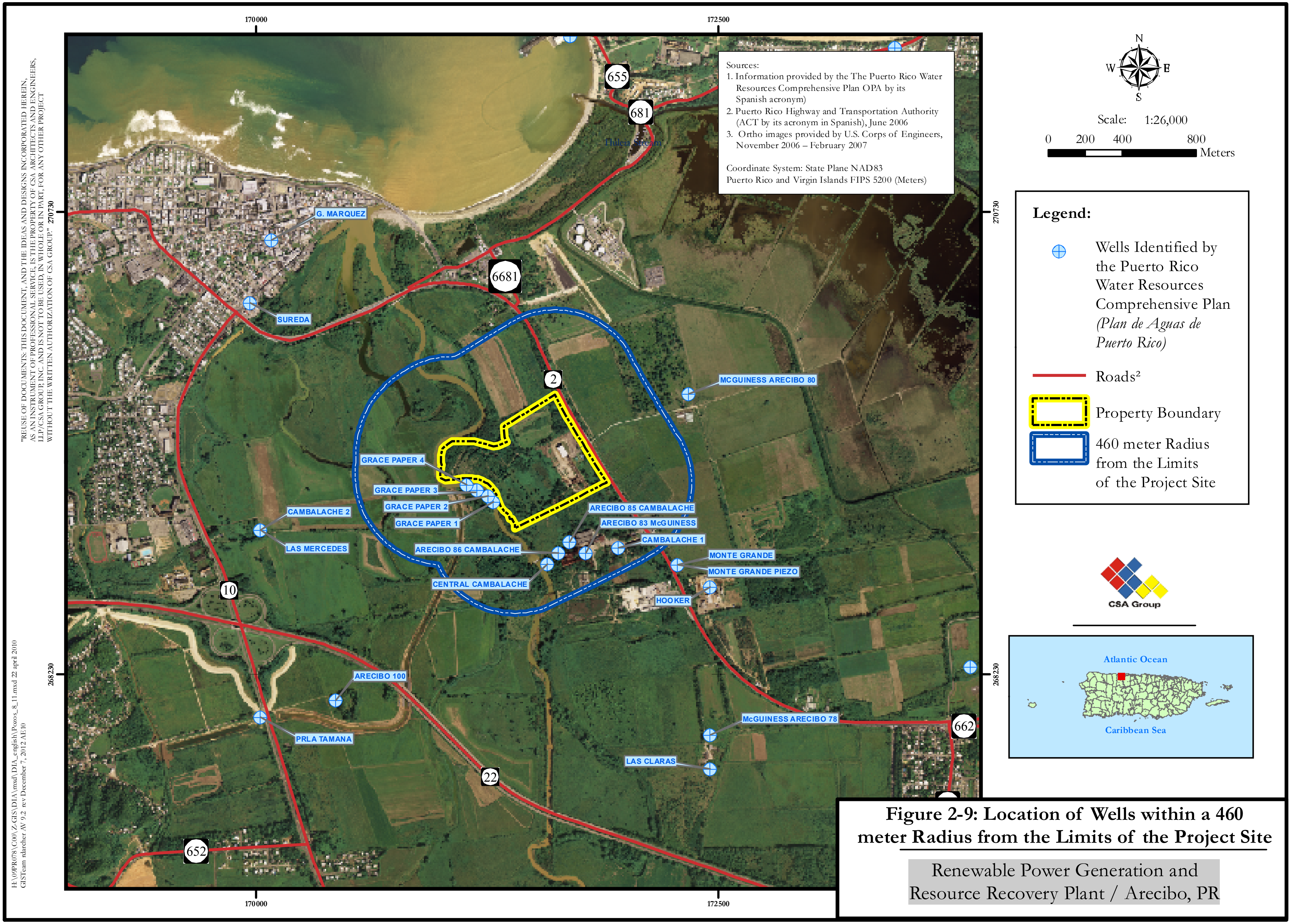


Figure 2-9: Location of Wells within a 460 meter Radius from the Limits of the Project Site

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

Characterization of the water quality at Caño Tiburones is available only for saltwater for. Water quality tests conducted by PRASA in 2006 for the area of Caño Tiburones show the following results:

- Barium = 0.03 mg; Calcium = 108mg / L; Potassium = 36 mg / L; Sodium = 890 mg / L; sulfate = 180 mg / L; Chloride = 1.400 mg / L; Total Organic Carbon = 6.7 mg / L; pH = 7.8; Total Dissolved Solids 3,000 mg / L; Alkalinity = 200 mg / L as CaCO3; Fecal Coliform = CFU/100 mL = Excessive Value for Count; Total Coliforms CFU/100 mL = 2.400; Escherichia Coli = 730 CFU / 100 mL; Lead 0.0032 mg / L; Nitrate = 0.17 mg / L; Nitrite = 0.02 mg / l; Specific Conductance = 6.300 = umhos / cm; VOCs, Pesticides and PCBs recorded values were below the allowable limit.

- Values from field sampling yielded the following results: pH = 7.6; Turbidity = 9.7 NTU; Temperature = 27.1 º Celsius. Bacteriology tests gave results of 140.000 colony forming units of bacteria associated with iron; sulfate reducing bacteria 700,000 cfu/ml; slime forming bacteria 350.000 cfu/mL.

Furthermore, 43.5 miles of the Tanamá River upstream from its confluence with the RGA, is on the 303 (d) list, 2010 Cycle of Rivers and Streams of EQB's Evaluation and Strategic Planning Area. According to monitoring station number 50028000 at Tanamá River, in 2004 the maximum levels of cyanide, copper and fecal coliforms were above the maximum permitted levels. In 2006, the levels of arsenic and fecal coliforms were above the maximum permitted levels. In 2008 the fecal coliform and turbidity were found in excess of the maximum permitted levels. In the 2010 sampling event, arsenic, turbidity and fecal coliforms were recorded within permitted levels.

2.4.2 Ground Water Quality

In 2000, Morris and Associates drilled a groundwater test well (EAC-PR) to a maximum depth of two hundred sixty (260) feet within the Project site, penetrating alluvial deposits up to the upper hydrogeological layer of limestone. Two pump tests were performed to characterize water quality and productivity. The results show that the estimated production capacity of the well is about 1 MGD without adversely affecting the performance of the aquifer. The elevation of the water table was recorded approximately at 14 feet deep.

Results of water quality analysis showed that brackish water is circulating within this geologic formation. The groundwater evaluation measured temperature, pH, total dissolved solids (TDS) and specific conductance. Field samples yielded the following results: variations in water temperature of 25.2 ° C to 24.9 ° C between the first and second pump test; and a pH of 7.1 with little variability between both tests in the well (EAC-PR). However, conductivity and TDS tend to increase with pumping: an average of 25.0 to 28.7 mS/cm, where S = Siemens between the first test and second pumping test respectively. TDS concentration is 15,000 ppm and the ionic concentration of the well water is approximately 50% of that of seawater.

2.5 Flood zones

Flood zones for the Project area have been defined by FEMA and adopted by the PRPB. The RGA borders the Project site to the west. The RGA was studied by FEMA for the Flood Insurance Study in 1980, which determined its maximum discharge, the base flood elevation and floodway boundaries up to a distance of seventeen (17) miles upstream of the mouth the RGA.

The dike that runs south of the mouth of Caño Tiburones and parallel to State Road PR-2 for approximately 11 kms was established as the boundary for the study, as shown in the Flood Insurance Rate Map (FIRM) 230J panel of November 18, 2009, **see Figure 2-10**. The map shows that the Project site is located within a Zone AE 100-year floodway, with a base flood elevation of 5.2 meters (17.06 feet) above mean sea level, which essentially means that floods have a 1% annual probability of matching or exceeding that value.

FEMA determined peak discharge using rainfall-runoff modeling, and hydrographs were routed to and through the Dos Bocas Dam. For more details see the hydrologic and hydraulic study in **Appendix B**.

2.6 Meteorology and Air Quality

The following sections describe the specific characteristics of the Project site that constitute important factors in the selection of the methodology and the models described in **Section 3.4**, which discusses atmospheric resources and air quality.

2.6.1 Climatology

The historical patterns of rainfall precipitation, temperature and winds, used to characterize the weather conditions in Puerto Rico, particularly in Arecibo, are described below. These conditions, although not constant, tend to be repeated in a reasonably ordered way. Periodically, considerable deviations from the average occur, which does not mean a change in the climatologic patterns of the study area. The National Oceanic and Atmospheric Administration (NOAA) operates stations that record the climatologic data of the Island. The climatological station that is closer to the Project is located in Arecibo (660410). The data were obtained from the website www.sercc.com for the 1971-2000 period. The data of the Arecibo station were used to describe the rainfall precipitation and temperature pattern in the area.

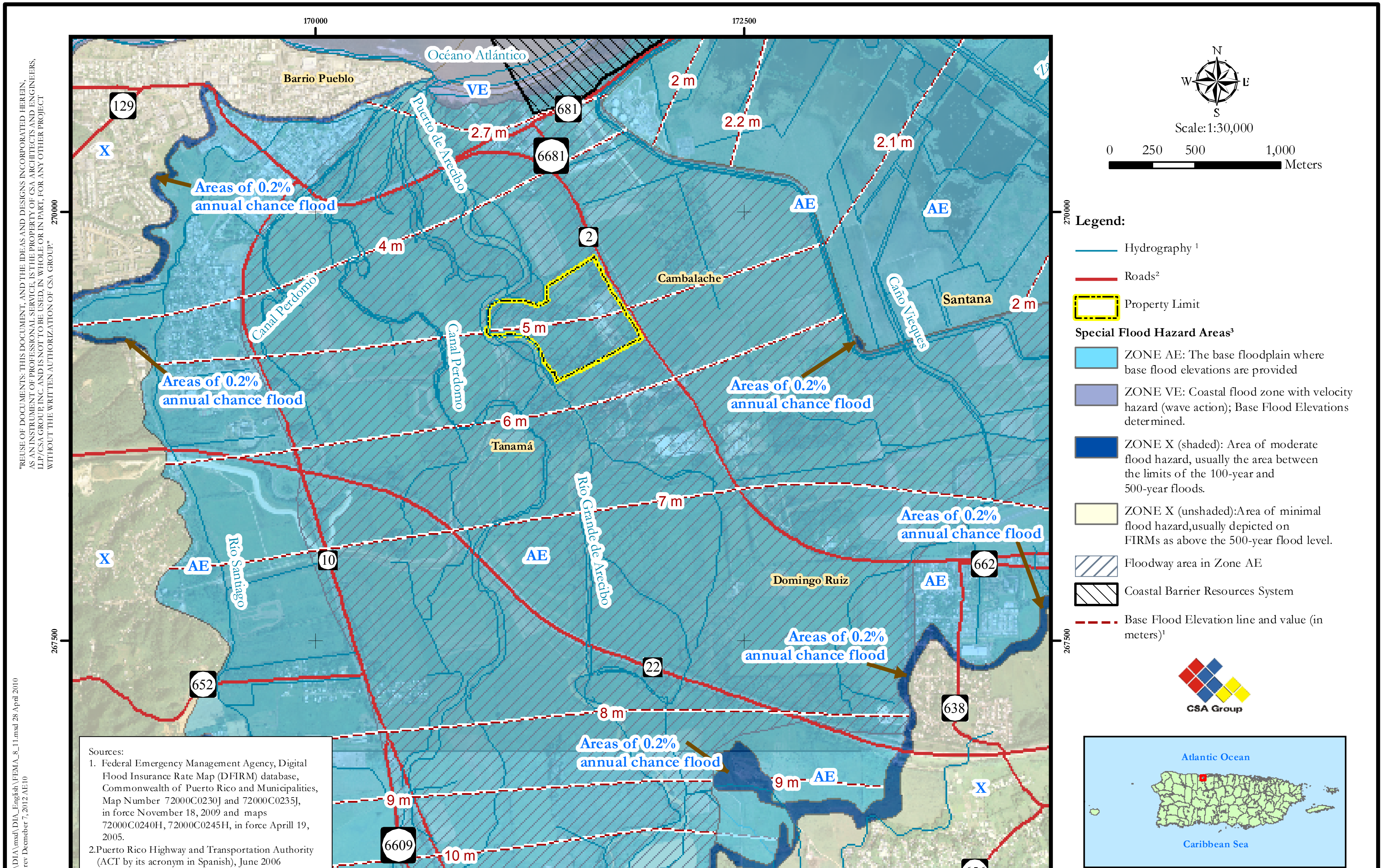


Figure 2-10: Flood Zones Map (FEMA)

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

Precipitation

Because of the topography of the Island, the rainfall patterns vary markedly among regions. In general terms, the rainfall occurs when trade winds push the moist air from the coast to the higher areas in the Central Range (*Cordillera Central*). Once there, the air gets cool, is condensed as water vapor and finally precipitates as rain. Puerto Rico has an average annual precipitation of 70 inches (177.8 cm), with a variation of approximately 60 inches (152.4 cm) along the North Coast and close to 30 inches (76.2 cm) in the South. **Figure 2-11** illustrates a map of Puerto Rico showing the average annual precipitation in the Island.

According to NOAA, the “normal” rainfall is the average precipitation in a 30 consecutive year period. Current normal rainfall represents the average rainfall from 1971-2000. The precipitation measurement recorded in the Arecibo station vary from 2.83 inches to 5.95 inches (from 7.19 cm to 15.11 cm) per month, resulting in a total average rainfall of 53.01 inches (134.65 cm) per year, as illustrated in **Table 2-2**. The months of February, March and June had low rainfall activity. In May the activity increased, but it declined again during the summer. The months of October and November were the periods with more rainfall activity.

Table 2-2: Normal Precipitation (inches) in the Arecibo Station, 1971-2000

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4.50	3.03	2.83	4.28	5.56	3.64	3.49	4.27	4.75	5.33	5.95	5.37	53.01

Source: NOAA (2007).

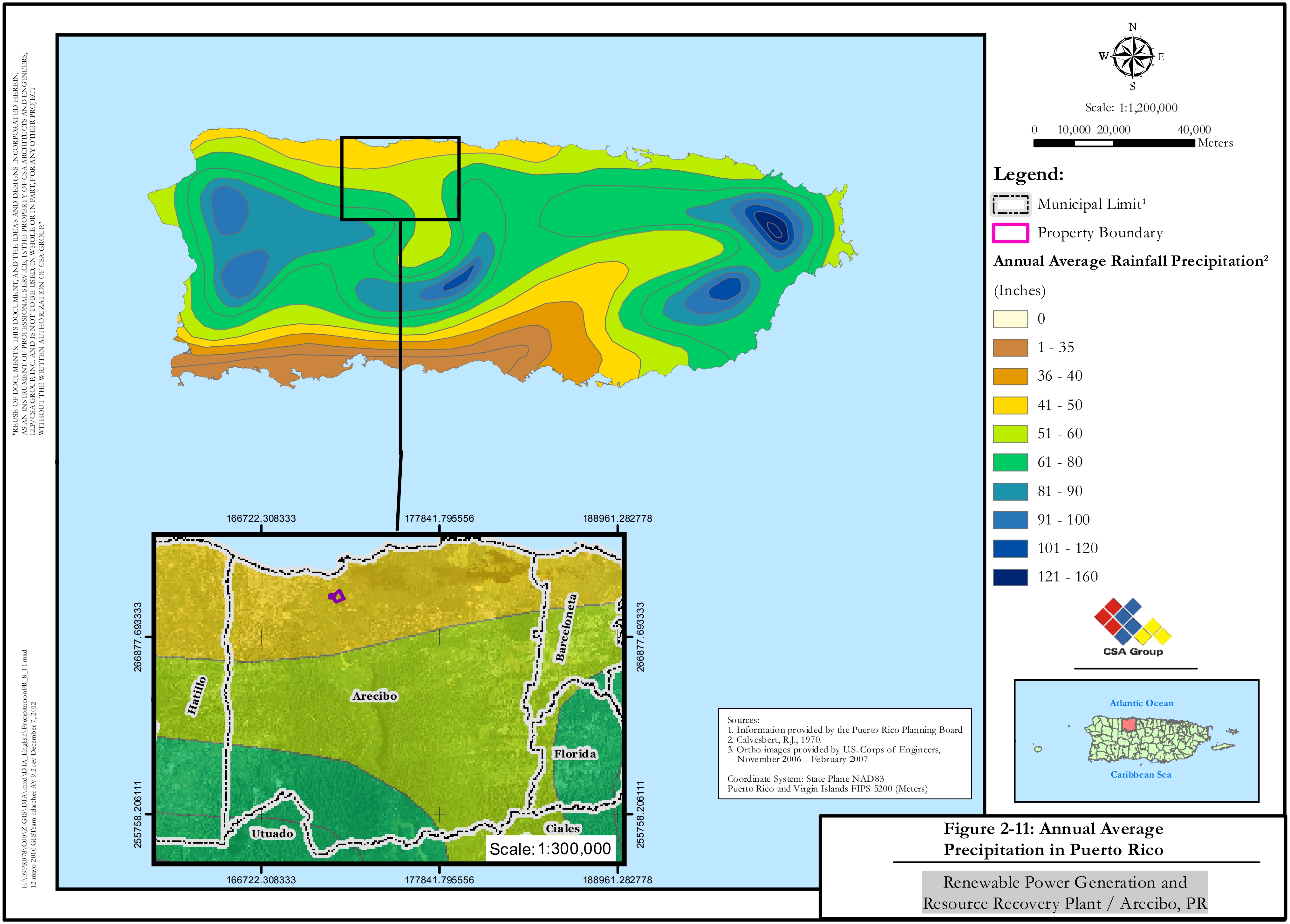


Figure 2-11: Annual Average Precipitation in Puerto Rico

Temperature

In the Northeast Coastal Region the typical annual temperature slightly varies, from five (5) to six (6) degrees of difference between the warmest and the coolest months. The temperatures of the sea water vary from approximately 78 degrees Fahrenheit (ºF) equivalent to 25.6 Centígrades (ºC) in March to approximatly 83 ºF (28.3 ºC) in September, which contributes to keep this little variation from month to month. In the interior areas of the Island, the afternoons are warmer and the evenings are cooler. These areas show sligthly higher variability than in the coastal areas. The remainder of the Island has similar temperatures, except for the pronounced drop in temperature at the highest ground elevations that ranges from 2,953 to 3,937 feet (900 to 1,200 m). At elevated areas of the Central Range, the average temperature is around 14 ºF lower than in the coast, 13.7 miles south.

The annual average temperature in the zone of the Project site is closer to 77.9 ºF (25.5 ºC) and normally only varies a few degrees from winter to summer. The minimum and maximum average temperature fluctuate between 87.7 ºF (30.9 ºC) and 68.0 ºF (20.0 ºC) for the Arecibo station, as illustrated in **Table 2-3.**

Table 2-3: Maximum, Average and Mimimum Temperature (ºF) in the Arecibo Station, 1971-2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max.	84.5	84.4	85.6	86.7	88.4	89.9	90.1	90.2	90.2	89.6	87.8	85.5	87.7
Average.	74.7	74.4	75.2	76.6	78.6	79.9	80.3	80.5	80.3	79.8	78.1	75.9	77.9
Mín.	64.9	64.3	64.8	66.5	68.7	70.0	70.6	70.8	70.4	70.1	68.4	66.4	68.0

Source: NOAA (2007).

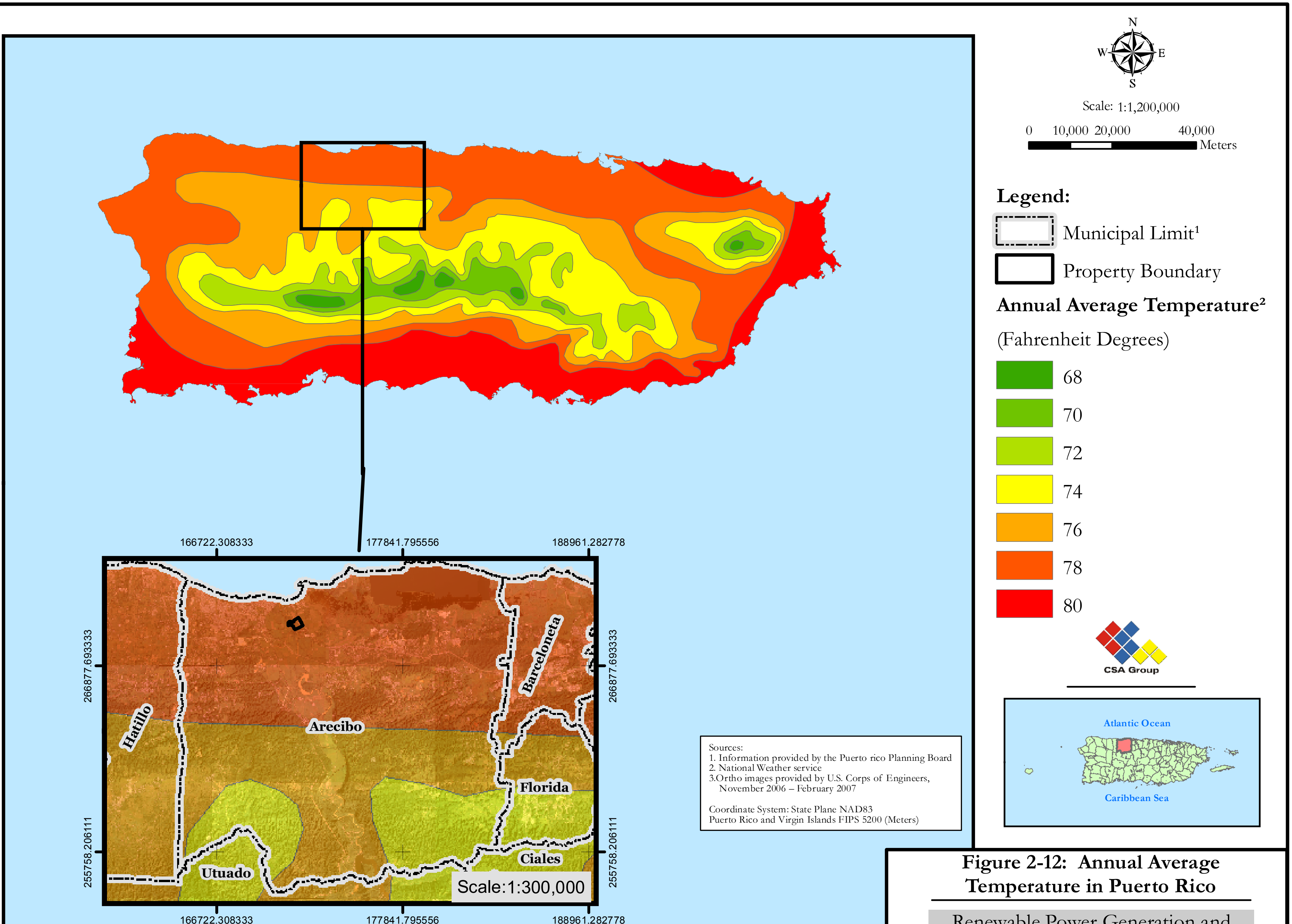
The hottest months are from July to September when average temperature reaches 90.1 ºF (32.2 ºC) and 90.2 ºF (32.3 ºC), respectively, while the coolest months are January and February when the average temperatures are approximately between 74.7 ºF (23.7 ºC) and 74.4 (23.6 ºC), respectively. **Figure 2-12** illustrates the average annual temperatures in the Island of Puerto Rico. The months with the highest temperatures are from May to October and the months with the lowest temperatures are from January to April and November to December.

Prevailing Winds

The eastern trade winds, originated in the high presure system of the Azores Islands, west of Africa, blows in Puerto Rico during most part of the year. In the mountainous areas of Puerto Rico, the movement of the trade winds is modified, since the winds can be accelerated, channelized through narrow paths between mountains or deviated around high terrains. Along the coastline, the orographic influence over the movement of the trade winds is slight. The winds have components from the east in almost all months of the year with an average speed that varies from six (6) to nine (9) miles per hour (9.7 a 14.5 km/h).

An important characteristic of the coastal areas is the temporary adjustment of the eastern trade winds caused by the daily breeze from the land and the sea, which regulary form in the coastal perimeter of the Island. The breeze from the sea is developed when the temperature of the air that is over the coastal plain turns significatively warmer than the air that is over the ocean. Normally this ocurrs daily from mid morning to the end of the afternoon,when terrain surface warms enough. This daily warming effect produces the expansion of the air over the terrain since the pressure over it is less than the pressure of the closest water. On the surface, the air flows from high pressure to low pressure, originating the sea breeze.

The sea breeze continues spreading inland until the friction with the terrain or the prevailing wind flow compensates for the breeze that is about to come inland. During the afternoon, when the solar radition decreases as the sun sets or as the clouds that are estimulated by the sea breeze protect the terrain from the solar rays, the sea breeze debilitates and cease. The breeze from the mountain develops during the night when the difference between the air temperature over the terrain and the air temperature over the ocean inverts each other. The typical pattern is that during day hours the wind blows almost constantly from the ocean to the land and after the sunset the wind direction changes off the land, it is, from the mountains to the sea.



Sources:
1. Information provided by the Puerto rico Planning Board
2. National Weather service
3.Ortho images provided by U.S. Corps of Engineers, November 2006 – February 2007

Coordinate System: State Plane NAD83
Puerto Rico and Virgin Islands FIPS 5200 (Meters)

Figure 2-12: Annual Average Temperature in Puerto Rico

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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The Puerto Rico Island is subject to three (3) wind regimes: the trade winds, the sea breezes and the land breezes. The meteorological conditions of the North region, where the Site is located, are determined by the trade winds that come most of the time from east-northeast (ENE). The wind patterns vary from east-northeast to east-southeast, depending on the season of the year.

2.6.2 Meteorology

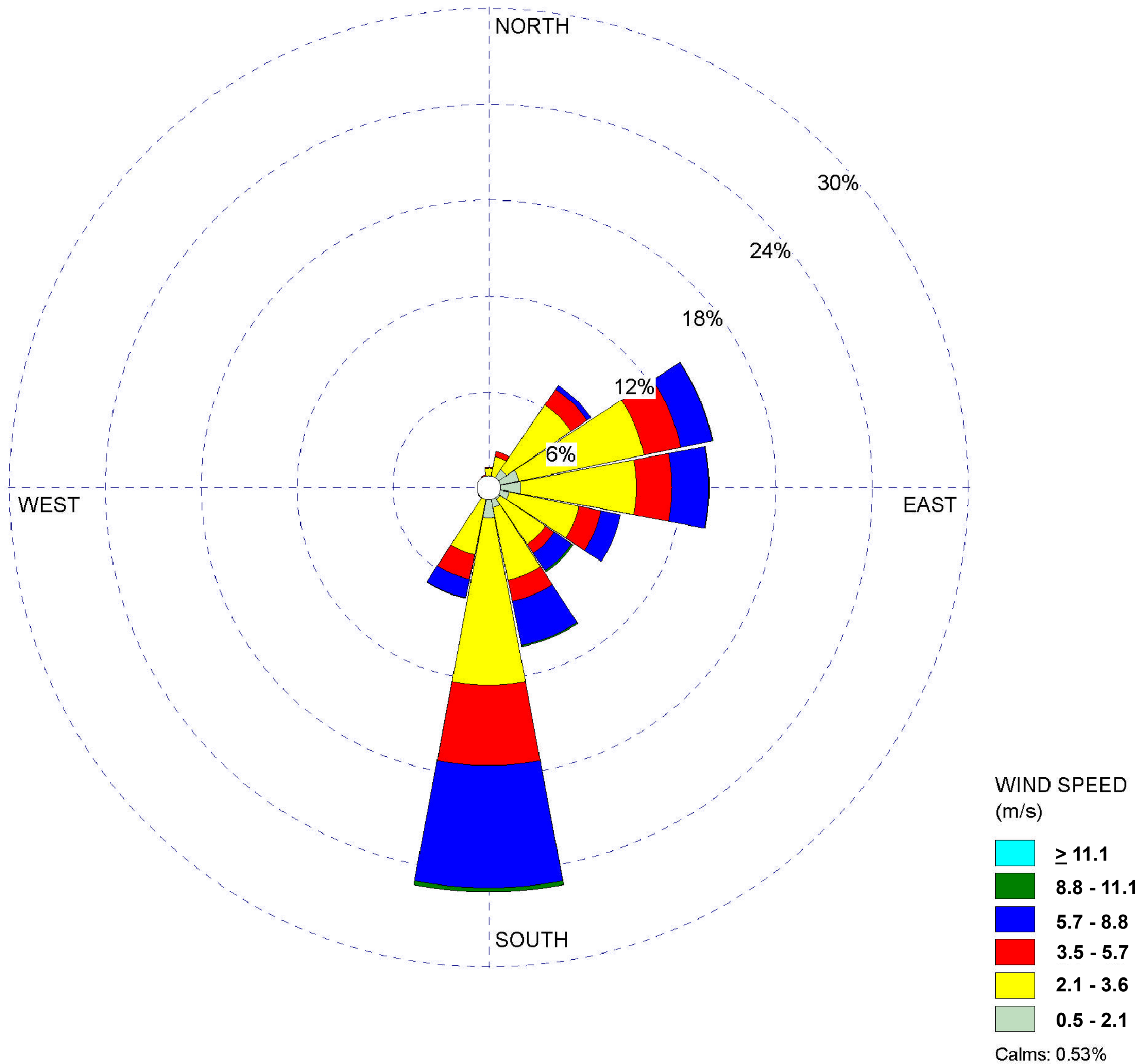
Meteorological data were obtained from the meteorological station of the PREPA's Cambalache power generation plant for the period of August 1992 to August 1993. This plant is located almost one (1) mile (Northeast) from the Project site and the meteorological station of San Juan. The data of the Cambalache power generation plant station are summarized in the Wind Rose shown in **Figure 2-13**.

2.6.3 Ambient Air Quality

The Clean Air Act regulates the air quality establishing the NAAQS for airborne compounds that cause degradation or deterioration of the ambient air quality. The NAAQS – are defined as the primary and secondary standards related to ambient air quality established by the EPA in Title 40 C.F.R. Part 50.

These compouds are generally referred to as "criteria" air pollutants since their concentration in the ambient air quality are used to measure the quality of the ambient air. The NAAQS are the máximum concentration levels for various average time periods under which the air quality is established for the public health and welfare with an adequate safety margin.

The NAAQS primary standards are intended to protect public health, while the secondary standards are intended to protect public welfare from any anticipated adverse effects associated with the presence of air pollutants, such as damage to soils, vegetation and wildlife.



Source:
PREPA Cambalache 1992-1993

CSA Group

Figure 2-13: Wind Rose for the Cambalache (PREPA) Station

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

The criteria air pollutants are carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter with an aerodinamic diameter of 10 microns or less (PM10), particulate matter with an aerodinamic diameter of 2.5 microns or less (PM2.5), ozone (O3), sulfur dioxide (SO2), and lead (Pb). Recently, EPA revised the NAAQS for NO2 and SO2 to include a new standar, which is measured in one-hour average. The NAAQS are presented in **Table 2-4**.

Table 2-4: National Ambient Air Quality Standards (NAAQS)

Pollutant	Type of Standard	Averaging Time	Concentration ($\mu g/m^3$)	Concentration (ppm)
Carbon Monoxide de (CO)	Primary	8-hours (1)	10,000	9
	Primario	1-hour (1)	40,000	35
Nitrogen Dioxide (NO_2)	Primary and Secondary	Annual (Arithmetic Mean)	100	0.053
	Primary	1-hour (2)	188	0.1
Ozone (O_3)	Primary and Secondary	1-hour (3)	235	0.12
		8-horasr (1997 std) (4)	156	0.08
		8-hours (2008 std) (4)	147	0.075
Particulate Matter (PM_{10})	Primary and Secondary	24-hours (5)	150	-
Particulate Matter ($PM_{2.5}$)	Primary and Secondary	Annual (Arithmetic Mean)	15.0	-
	Primario and Secondary	24 hours (1)	35	-
Sulfur Dioxide (SO_2)	Primary	Annual (Arithmetic Mean)	80	0.03
	Primary	24-hours (1)	365	0.14
	Primary	1-hour (6)	195	0.075
	Secondary	3-hours	1,300	0.5
Lead (Pb)	Primary and Secondary	Quarterly Average	1.5	-
	Primary and Secondary	Rolling 3-months Average	0.15	-

(1) Not to be exceeded more than once per year

(2) 3-year average of the 98th percentile of the daily maximum 1-hour average

(3) Applies only in Early Action Compact Areas

(4) 3-year average of the fourth-highest daily maximum 8-hour average

(5) Not to be exceeded more than once per year on average over 3 years

(6) 3 year average of the 99th percentile of the daily maximum 1-hour average

The origin, characteristics and some potential effects of each of the criteria pollutants are briefly described below:

Carbon Monoxide – is a gaseous, odorless, colorless, flamable and toxic substance. It is produced when fuels, such as gas, gasoline, kerosene, carbon, petroleum, tobacco and wood are burned in lean oxygen environments. Chimney, boilers, water heaters and domestic appliances that burn fuels such as stoves or gas heaters, may also produce it if they are not functioning well. Vehicles standing still with the motor on may also emit it and can be observed in areas where its concentration is higher, like congested traffic intersections, multi-level parkings and urban areas where buldings and other features inhibit dispersion, in industrial boilers and electric generatores. It is a reducing agent, withdrawing oxigen from many compounds in industrial processes (forming CO_2), like in the production of iron and other metals. It is also used in the synthesis of several organic compunds, like tico acid (Monsanto process), plastics and methanol.

Nitrogen Dioxide (NO_2) - Nitrogen dioxide is a chemical compund formed by oxygen and nitrogen elements, one of the main contaminants among several nitrogen oxides. The nitrogen oxide (IV) is yellow brownish color. It forms as a subproduct in the combustion processes at high temperatures, such as in motor vehicles and electric generators. Nitrogen in combustion air and fuel is oxidized to nitrogen dioxide. The formation of NOx (NO and NO_2) has been found to be in function of combustion temperatures which as temperature rises, greater NOx emissions are generated. The atmospheric NO_x has been associated to ozone effect. .

Particulate Materia (PM_{10}, $PM_{2.5}$) – Are solid or liquid particles suspended in the air with a size of up to 10 microns or 2.5 microns or smaller diameter: these are dust, soot, etc. They come from sources as burning of fossil fuels in generation plants, motor vehicles, including diesel, fertilizers and pesticides, the construction industry, agricultural burning and industrial processes.

Ozone (O_3) – Oxygen form in which the molecule consists of three atoms. Used as an oxidant, bleach and water purifier. It is an unstable, blue, strong odor gas. This gas is a secondary contaminant formed by atmospheric reactions that involve volatile organic compounds (VOCs) and NO_x. Its formation is extremely complex and it is influenced by variables that depend on the intensity and the distribution of the light spectrum, atmospheric mixing, among others. It is a colorless gas, acrid odor, found in natural form in two layers of the atmosphere: in the stratosphera and in the troposphera and it acts as a protective layer of the Earth against the adverse effects of ultraviolet radiation on the health and the environment.

Sulfur Dioxide (SO_2) – Sulfur oxide is also known as sulfur dioxide, sulfurous gas and sulfurous anhydride, is a colorless gas with a characteristic asfixiant odor. It is a reducing substance that, with time and in contact with air and moisture, turns into sulfur oxide. Sulfur oxide is the main cause of the acid rain since in the atmosphere it is transformed in sulfuric acid. It is released in many combustion processes since fuels such as coal, petroleum and diesel contain some amounts of sulfured compounds. For these reasons, it is intended to eliminate these compounds previous to their combustion, for example by means of hidrosulfuration of petroleum derivates or with natural gas wash turning it more "sweet". If large cuantities of the gas are still generated, even after these efforts, basic washes can be applied (*e.g.*, lime t to retain it from the exhaust air or transforming it along with sulphydric in elemental sulfur (Claus process)).

Lead (Pb) – Heavy metal that is found in nature and in manufactured products. Hystoricaly the major sources of emission of lead have been motor vehicles (automobiles and trucks) and industrial sources. As results of the efforts from EPA to remove the lead from the gasolina, their levels have dramatically declined in the last two decades. Today, the highest lead levels are found in lead smelting plants. Other stationary sources are, energy generation plants and lead – acid batteries manufacturers. Its use in paints and plumbing has been restricted by means of laws and regulations.

Arecibo and nearby areas are classified as attainment areas in the National Ambient Air Quality Standards for criteria pollutants. The EPA and the EQB maintain air quality monitoring stations that measure ambient air concentrations of the criteria pollutants. Based on the recorded data collected at several ambient air monitors for Puerto Rico, the following lists shows the actual monitored values recorded for the area as reported by the EPA database (EPA AirData database).

Table 2-5 provides the Ambient Air Quality data for several monitoring stations.

Table 2-5: **Ambient Air Quality Data**

Monitoring Station	**Year**	**Municipality**	**Pollutant**	**Average Period**	**Concentration (µg/m3)**	**NAAQS (µg/m3)**
721270003	2008	San Juan	PM-10	24-hour	78	150
720010002	2008	Adjuntas	PM-2.5	24-hour Annual	10.5 5.21	35 15
720330008	2005	Barceloneta	SO_2	1-hour 3-hour 24-hour Annual	86.5[(a)] 70.7 55.0 7.86	195 1300 365 80
72033008	2006	Cataño	NO_2	Annual	18.9	100
721270003	2008	San Juan	CO	1-hour 8-hour	4255 2645	40,000 10,000
721270003	2008	San Juan	Pb	3-months average	0.05	0.15

(a) Value represents the maximum recorded concentration in 2005, however, the NAAQS is the 3-year average of the annual 99th percentile of daily maximum 1-hour measurements. The 1 hour SO2 standard was recently finalized by USEPA in 2010. Official ambient monitoring values for the 1 hour SO2 standard have not yet been published.

(b) Value represents the maximum recorded concentration in 2006, however, the NAAQS is the 3-year average of the annual 98th percentile of daily maximum 1-hour measurements. The 1-hour NO2 standard was recently finalized by USEPA in 2010. Official ambient monitoring values for the 1-hour NO2 standard have not yet been published.

2.7 Ecological Resources

2.7.1 Natural Ecosystems in the vicinity of the Site

The Project site adjoins to the west with the RGA, which is an important source of potable water and for economic activities such as commercial and recreational fishing. At approximately 1.6 km to the east lies the Caño Tiburones swamp, which is the most extensive wetland in Puerto Rico covering an area of 5,665 *cuerdas* and which delimited to the east by the *Río Grande de Manatí* and to the west by the RGA. As part of the conservation efforts for this natural system, the Caño Tiburones Natural Reserve was established at approximately 1.5 km from the eastern limit of the Project area. The parcels included within the reserve are property of the Puerto Rico Land Authority but are managed by the DNER. **Appendix D** presents a figure showing the spatial relation between the reserve and the Site. **Figure 2-14** shows the ecosystems in the vicinity of the Project. **Table 2-6** identifies the natural systems that are found within the Site and up to a 400 meter radius from the Site perimeter.

It must be pointed out that the Arecibo landfill, known as the Caño Tiburones landfill, lies along the periphery and within the Caño Tiburones Natural Reserve.

Table 2-6: Existing Natural Systems within the Site and Adjacent Areas up to a Distance of 400 meters from the Property Limits.

	Natural Systems	Within a 400 m Radius	Outside a 400 m Radius
Rivers	RGA	X	
Creeks			X
Wetlands	Artificial stormwater canal and overflow area	X	
Mogotes			X (approximately 1-3 miles SE;2-5 miles SO)
Caves			X
Sinkholes			X
Nature Reserves			X
Forests			X

2.7.2 Terrestrial Flora and Fauna

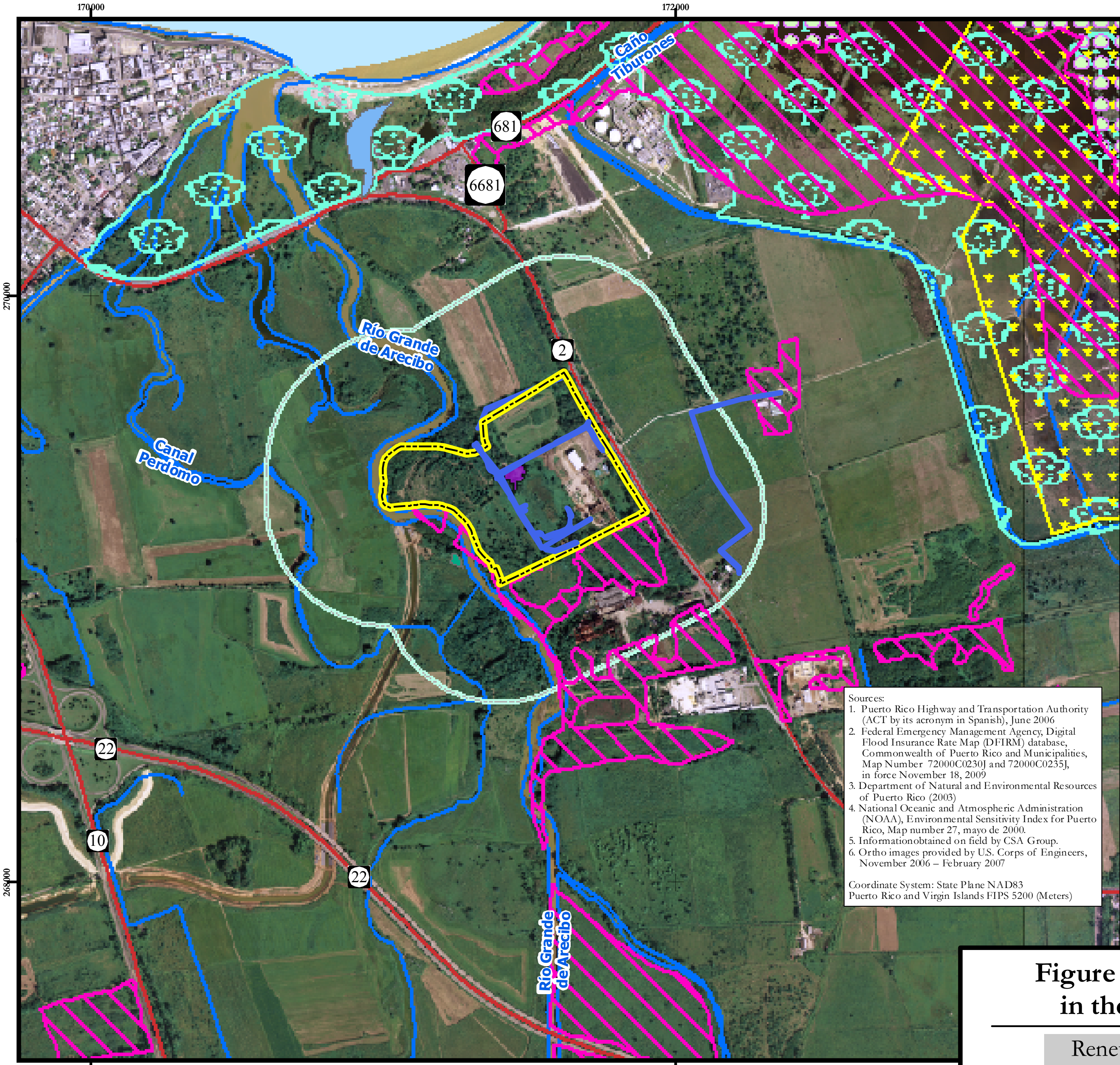
The Site presents typical vegetation of abandoned industrial areas dominated by herbaceous species, mostly grasses and vines, and the invasive shrub black mimosa (*Mimosa pigra*). Woody species are found on small patches throughout the property, especially along the southern and western borders of Site and along the RGA and the existing (abandoned) stormwater canals. In addition to the flora and fauna study conducted in the Project site, two other off-site areas associated to the Project were evaluated. These areas are: 1) the former Central Cambalache Sugar Mill, whose land adjoins the southern border of the Project site and through which the interconnection power line will transmit the power produced by the Project to the Central Cambalache substation; and 2) the right of ways of State Roads PR-2, PR-6681, and PR-681, through which a raw water line will be installed to obtain water from the pump station in Islote Ward and sent to the Site. A total of 159 species of flora were identified in the Project site and the former Central Cambalache Sugar Mill, all common and of ample distribution in lands near large rivers in the Island. **Appendix D** includes a list of the species of flora identified in the

Project area.

Pastures extend through most of the proposed Project site and show the highest species diversity. These areas are dominated by grasses (Poaceae family) such as Guinea grass (*Megathyrsus maxima*), African Bermuda grass (*Cynodon nlemfuensis*), Bermuda grass (*Cynodon dactylon*), railroad track grass (*Dichanthium annulatum*), and to a lesser degree species such as bur grass (*Cenchrus echinatus*), goose grass (*Eleusine indica*), and several species of *Paspalum.* In isolated areas where the ground remains relatively humid or with surface water, para grass (*Urochloa mutica*) forms almost monotypic patches. Among the grasses and other herbs the shrub black mimosa forms dense thickets, especially within the five abandoned ponds in the Project site. Along the bank of the RGA and borders of the ponds the exotic wildcane (*Gynerium sagittatum*) has become established. Also, vines abound forming dense and extensive aggregations dominated by moon vine (*Ipomoea alba*).

Tree cover is relatively scarce and dominated by African tulip tree, tall albizia and Panama berry (*Muntingia calabura*). The entrance to the site via State Road PR-2 has several trees planted for landscaping purposes that include Indian almond (*Terminalia catappa*), fish tail palm (*Caryota urens*) and Benjamin ficus (*Ficus benjamina*).

The terrain at the former Central Cambalache Sugar Mill, owned by the Puerto Rico Land Authority, presents a similar flora to that described for the Project site. Areas near the substation show a mixture of shrubs and herbaceous species with common and invasive trees characteristic of impacted landscapes. In the junction between the former Central Cambalache Sugar Mill and State Road PR-2, where the proposed power line interconnection will be installed, Guinea grass and talquezal grass (*Paspalum virgatum*) dominate the landscape. Other shorter grasses such as Mexican crown grass (*Paspalum fasciculatum*) and hilo grass (*Paspalum conjugatum*) abound in the area.



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N W E S

Scale: 1:20,000

0 150 300 600 Meters

Legend:

- Roads[1]
- Hydrography[2]
- Property Boundary
- 400 meter Radius
- Priority Conservation Areas[3]
- Caño Tiburones Natural Reserve[3]

Wetlands[4]

- Freshwater Marshes
- Freshwater Scrub/Shrub
- Freshwater Swamps
- Salt- and Brackish-Water Marshes
- Canal Overflow[5]
- Canal[5]

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Figure 2-14: Natural Ecosystems in the Vicinity of the Project

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

The flora where the proposed brackish water pipeline will be installed along roads PR-2, PR-6681 and PR-681 is composed of common species found along the edges of roads and impacted areas. Along this section of State Road PR-2, the vegetation consists primarily of grasses with Guinea grass dominating along Southern crab grass (*Digitaria ciliaris*) and hilo grass. Some large tall albizia trees, royal poinciana, monkey pod (*Pithecellobium dulce*), golden apple (*Spondias cytherea*), and coconut palm (*Cocos nucifera*) are found along the green fringes. At the junction with Road PR-6681, common species associated to humid areas, such as umbrella flatsedge (*Cyperus involucratus*) and jungle rice (*Echinocloa colona*), mix with other herbs that prefer open areas like wild balsam apple (*Momordica charantia*), blue day flower (*Commelina erecta*), shepherd's needle (*Bidens alba*), and ocean blue morning glory (*Ipomoea indica*).

Along Road PR-681 dominance of herbaceous and vine species continues by forming hedges along the green fringes of the road. Behind the hedge, there is a canal parallel to Road PR-681 which is lined with trees of white mangrove (*Laguncularia racemosa*), red mangrove (*Rhizophora mangle*) and a few black mangroves (*Avicennia germinans*). Besides the mangrove trees, the banks of the canal also show scattered inland leathern fern (*Acrostichum danaeifolium*). Other species found between the mangroves and the road include coconut palms, Spanish cork (*Thespesia populnea*), Indian almond, royal poinciana, mahogany (*Swietenia mahagoni*), and coin vine (*Dalbergia ecastaphyllum*). At the end of the route in the proposed water extraction site at El Vigía pump station, white mangrove, cattail (*Typha domingensis*) and water lilies (*Nymphaea ampla*), indicative of wet areas, abound.

In respect to the fauna in the Project area, a total of 56 species of vertebrates were observed, most of which are birds of which 44 species were identified. **Appendix D** includes a list of all the species of fauna identified in the Project area. The most common bird species in the Site are Bananaquit (*Coereba flaveola*), Greater Antillean Grackle (*Quiscalus niger*), Rock Pigeon (*Columba livia*), Common Ground-Dove (*Columbina passerina*), Northern Mockingbird (*Mimus polyglottos*), Gray Kingbird (*Tyrannus dominicensis*), Smooth-billed Ani (*Crotophaga ani*), Black-faced Grassquit (*Tiaris bicolor*) and Orange-cheeked Waxbill (*Estrilda melpoda*). Other observed vertebrate groups include two (2) mammals and ten (10) species of amphibians and reptiles. Among these are worth mentioning the Small Indian Mongoose (*Herpestes auropunctatus*), and several species of coquí frogs (*Eleutherodactylus* spp.) and anoles (*Anolis* spp.).

The fauna in the former Central Cambalache Sugar Mill and along the proposed raw water pipeline is very similar to what was described for the Project site. It is likely that other species be reported in the near future, specially birds, including migratory species thus increasing the faunal diversity, particularly in areas that adjoin the Caño Tiburones Natural Reserve.

2.7.3 Critical, Threatened or Endangered Species

Prior to the field work for the flora and fauna study, the available scientific literature associated to studies conducted in the Project area was reviewed. In addition, the Critical Species List of the DNER's Natural Heritage Division was reviewed. This list includes all species protected by state and federal laws because these are considered threatened or endangered, as well as other species whose populations are small or that are indicative of the presence of specific habitats within the Commonwealth of Puerto Rico.

The DNER did not show in their data base reports of species considered as critical species, threatened or endangered for the Project site. The information was validated in the field with a visiti to the Project area by a scientific team. None of the species of flora or fauna identified in the study area are considered as critical species, threatened or endangered by state or federal laws or regulations.

2.7.4 Wetlands

The U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory shows areas identified as wetlands within the Site (**Figure 2-15**). These areas identified by the USFWS were determined through a geospatial information analysis using satellite images without field verification.

To determine the validity of the inventory of wetlands in the Site, a study was conducted to verify that any wetland present complies with the requirements for federal jurisdiction (hydrophytic vegetation, hydrology and hydric soils) as presented in Section 404 of the CWA.

The Jurisdictional Wetland study (**Appendix E)** concludes that the wetlands identified by the USFWS do not comply with the three criteria to be considered as jurisdictional.

Notwithstanding, the field analysis reflects that there are approximately 2.49 *cuerdas* (2.42 acres) of jurisdictional bodies of water in the Site that include 1,191.1 linear feet of abandoned artificial channels, covering 1.52 *cuerdas* (1.48 acres) and 0.97 *cuerdas* (0.94 acres) of an area that receives the overflows water from the channels. These channels where part of the water management system associated to the paper manufacturing processes and stormwater management. At the moment these channels are abandoned and covered by exotic vegetation. **Figure 2-16** shows the bodies of water within the Site considered as jurisdictional. Both the channels and the overflow area drain into the RGA through a short channel located on the north-central part of the Site.

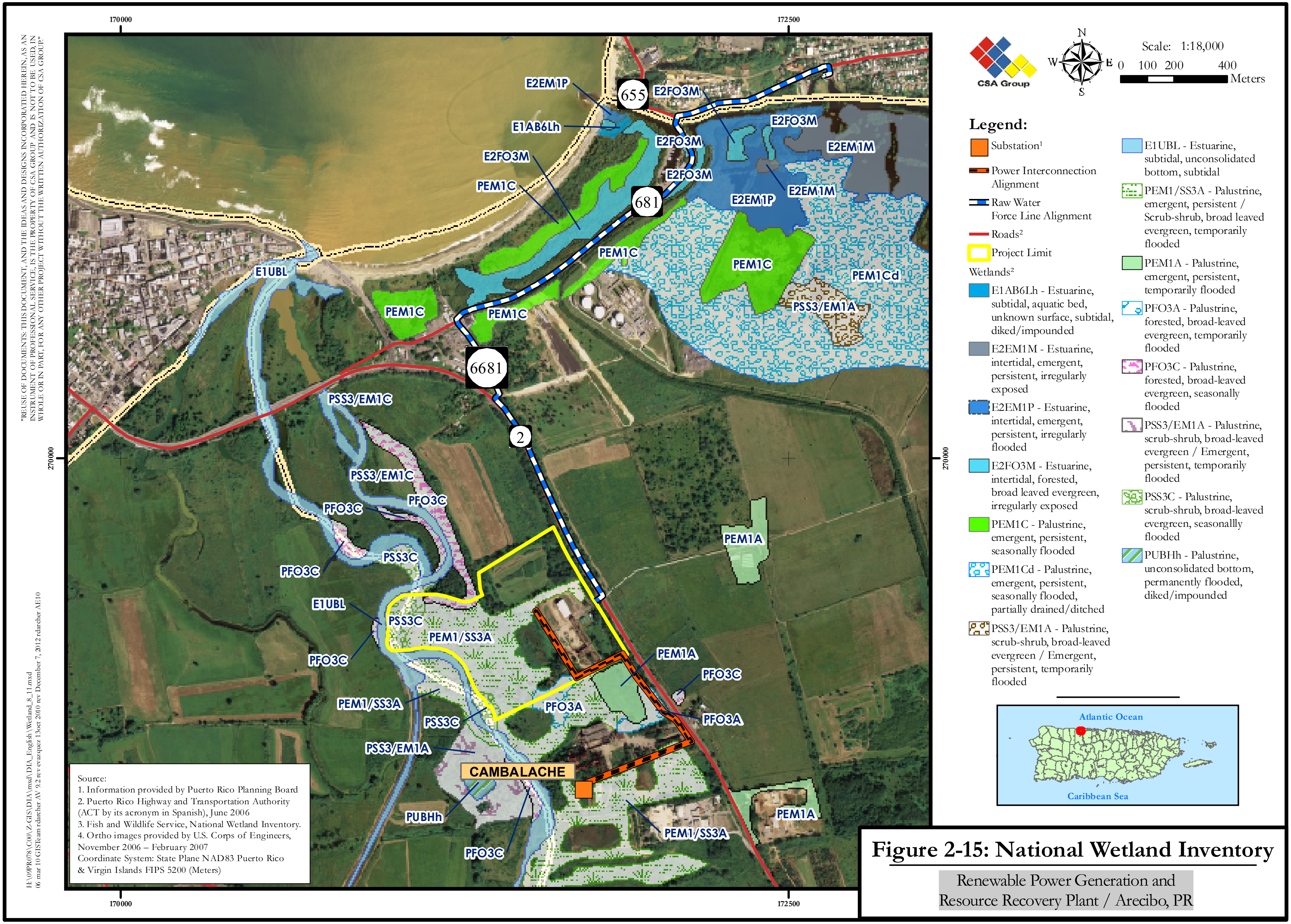
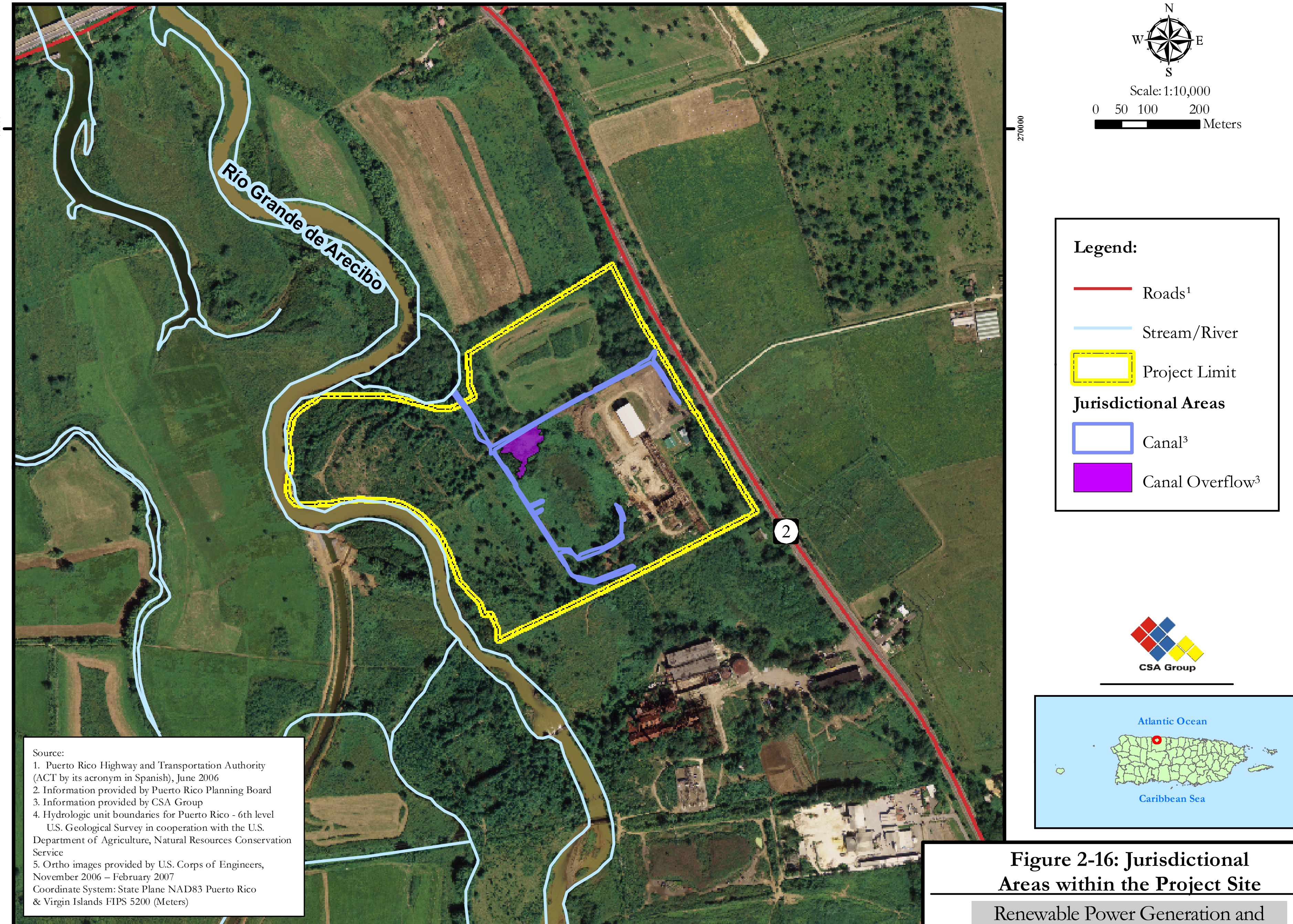


Figure 2-15: National Wetland Inventory

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR



Source:
1. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish), June 2006
2. Information provided by Puerto Rico Planning Board
3. Information provided by CSA Group
4. Hydrologic unit boundaries for Puerto Rico - 6th level U.S. Geological Survey in cooperation with the U.S. Department of Agriculture, Natural Resources Conservation Service
5. Ortho images provided by U.S. Corps of Engineers, November 2006 – February 2007

Coordinate System: State Plane NAD83 Puerto Rico & Virgin Islands FIPS 5200 (Meters)

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Figure 2-16: Jurisdictional Areas within the Project Site

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR