1 DESCRIPTION, LOCATION, NEED AND PURPOSE OF THE PROPOSED ACTION

PRIDCO is the Lead Agency for the environmental planning stage of the Project known as Renewable Power Generation and Resource Recovery Plant, in the Cambalache Ward of Arecibo. The Project and its need and purpose are described in this Chapter.

1.1 Introducción

Energy Answers Arecibo, LLC (Energy Answers), subsidiary of Energy Answers International, Inc. (EAI) is proposing the development of an industrial Project that will be known as Renewable Power Generation and Resource Recovery Facility (Plant or Project). The Plant (see **Figure 1-1**) will have the capacity to: process 2,100 tons per day (based on a seven-day week) of Processed Refuse Fuel (PRF); generate a gross amount of 80 Megawatts of power, recovering and recycling 280 tons per day of ferrous metals (such as iron and steel, among others) and nonferrous metals (aluminum, copper, tin, among others), classifying as an alternative and renewable source of energy.

Figure 1-1: Renewable Power Generation and Resource Recovery Plant

The Plant will be located in a site of approximately 82 *cuerdas* of area. This site had previously been used by Global Fibers, Inc. as a paper mill and is located at Km. 73.1 of State Road PR-2 in Cambalache Ward of Arecibo (Site). Figure 1-3 shows the location of the Site on a USGS map.

The process main components are the following (See **Figure 1-2**):

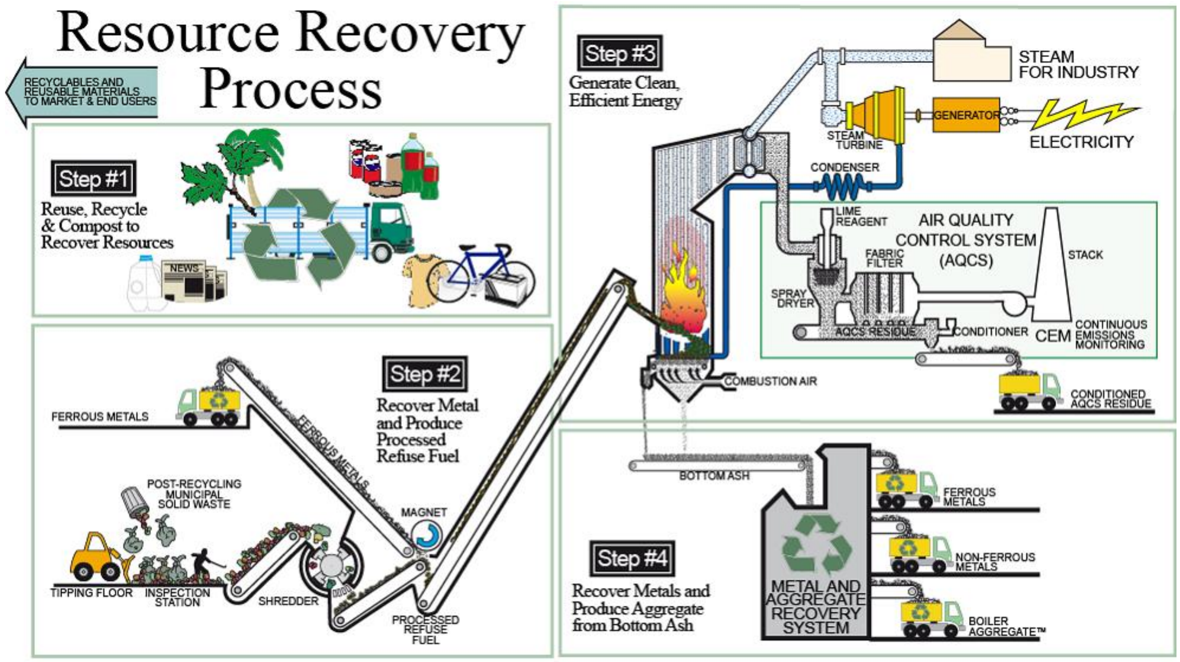

Figure 1-2: Simplified Renewable Power Generation and Resource Recovery Process Flowchart

- **Component 1: Receiving of Solid Waste**
  - A reduction in the amount of solid waste generated from communities, industries and government will be actively promoted through effective programs of reducing, recycling and composting. It is important to note and emphasize that Energy Answers contracts will not include "put or pay" clauses, which financially penalize customers (municipal or private) for reducing the incoming amount of waste for the Plant because of the implementation of recycling initiatives. On the contrary, Energy Answers contracts do not contain this penalty, therefore allowing the municipalities that dispose of their waste at the Plant to have the option of reducing their amount of generated waste through the programs.

- **Component 2: PRF Production**
  - This component consists of the weighing, discharge and inspection of the solid waste that will arrive to the Plant mostly in trucks, which will vary in type and size.
  - In addition, the solid waste that will constitute the PRF is shredded, after an initial

process to recover ferrous metals.

  - In this stage, the PRF is subjected to a process of detection and recovery of ferrous and nonferrous materials through the use of industrial magnets.

- **Component 3: Generation of Renewable Power**

  - In the third stage the combustion of PRF occurs in spreader-stoker type boilers that produce steam and generate electricity in a steam turbine, constituting an alternative and renewable source of energy production.

  - EAI's patented technology includes the use of boiler grates, where a stream of distribution air blows the material into the boiler, resulting in a suspended combustion that is highly efficient and results in a reduction in ash generation.

  - At this stage the Emission Control System that has been evaluated and approved by the EPA is activated. This Emission Control System comprises MACT and BACT (See **Appendix C**).

  - At this stage the fly ash is conditioned for its reuse or safe disposal.

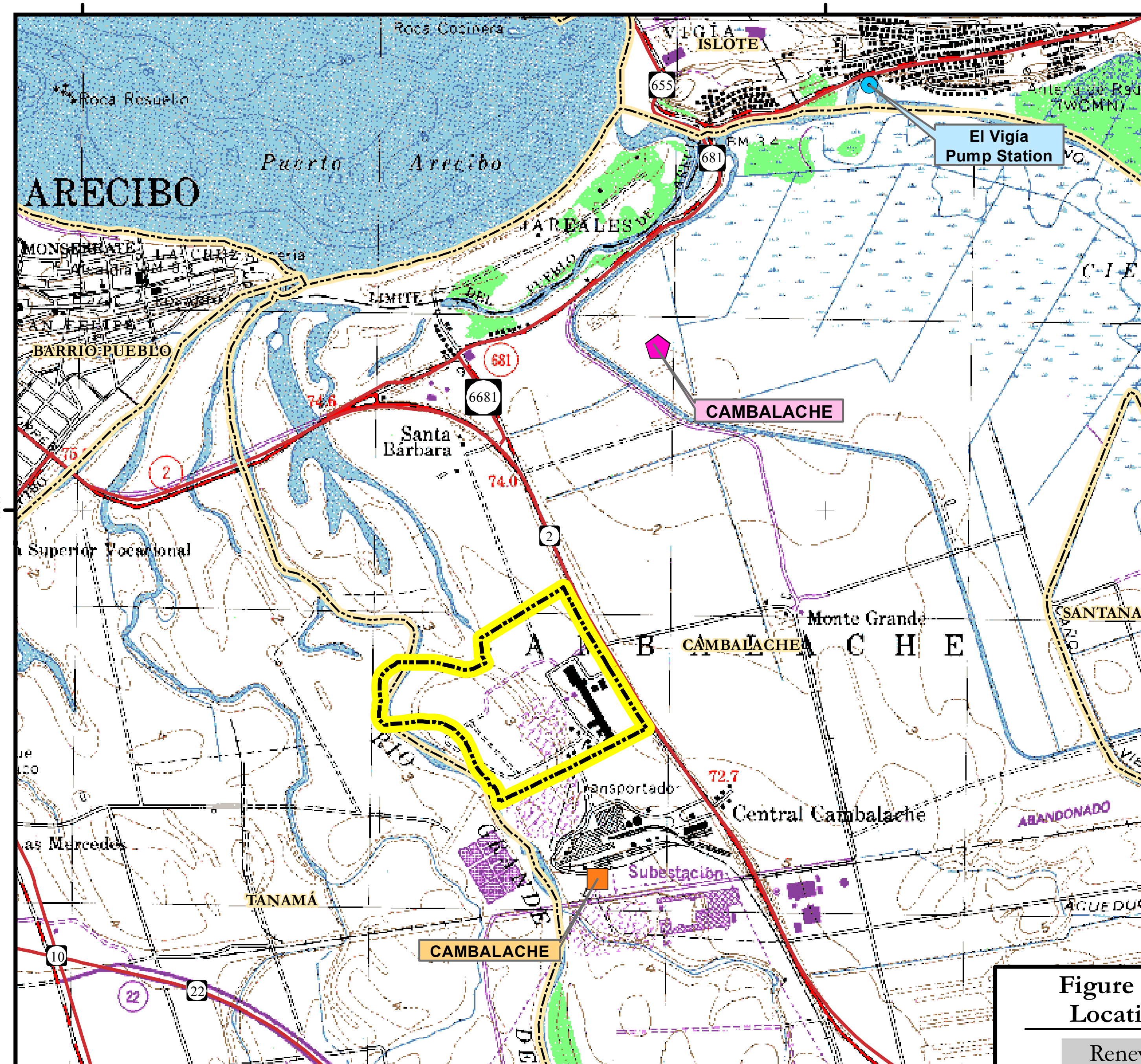

Figure 1-3: Site and Adjacent Lands Location on USGS Map (1:20,000)

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

N
W E
S

Scale: 1:20,000

0 150 300 600 Meters

Legend:

- El Vigía Pump Station[1]
- Substation[2]
- Cambalache Power Plant[2]
- Roads[3]
- Property Boundary
- Ward Limit[2]

Sources:
1. Departament of Natural and Environmental Resources of Puerto Rico
2. Puerto Rico Planning Board
3. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish),
4. United States Geological Survey (USGS) topographic map. Arecibo (1964) fotorevised on 1982. The original map scale is 1:20,000.

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

CSA Group

Atlantic Ocean

Caribbean Sea

H:\09PR078\C00\Z-GIS\DIA\mxd\DIA_English\RRFtopo_8_11.mxd 22 abril 2010 GISTeam rdarcher rev evazquez 17sep2010AV 9.2

- **Component 4: Material Recovery**
    - It is in this last stage that the processing of bottom ash occurs, in which ferrous and nonferrous metals are recovered and Boiler Aggregate™ is produced.

The Plant will have technologically advanced emission control systems, which are subject to and will comply with the most stringent federal and local regulations established for the electric power industry in terms of air permitting.

EAI develops environmentally safe power generation and resource recovery systems and has been owner and operator of these systems. EAI technology for converting waste to energy distinguishes itself from traditional technologies because EAI processes maximize power generation and the recovery of resources from the municipal solid waste stream. Traditional technologies, however, are designed with the primary objective of reducing the volume and disposal of municipal solid waste. The main goal of EAI is to eliminate waste or achieve "zero disposal" through its system of maximum recovery of resources that are perceived as waste. To achieve this goal, EAI designed and developed its system for the production of PRF. In 1989 this system had already been successfully implemented in the power generation and resource recovery plant of SEMASS in Rochester, Massachusetts. This plant was designed and developed by EAI and has proven to be a highly efficient system for power generation and recovery of resources with an excellent record of compliance with emission limits through its 20 years of operation (See **Figure 1-4**).

Figure 1-4: Aerial Photo of SEMASS Plant

Listed below are some of the awards and recognitions obtained by EAI and SEMASS as a result of the design of power generation resource recovery plants.

- In 1994 the ***Smithsonian Institute*** highlighted SEMASS as a "model" power-from-waste production plant in its ***Science in American Life*** exhibit.
- In 1989 was awarded the **Environmental Protection Award** by ***Power*** Magazine.
- In 1996 was awarded the ***Corporate Award for Resource Recycling*** **(SEMASS)** by the ***Ecological Society of America***.
- In 1993 was awarded the Honor Award for Excellence in Environmental Engineering (**Ash Management Program in SEMASS**) by the ***American Academy of Environmental Engineers***.
- In 1993, was awarded the **Corporate Citizen Award** by the Plymouth County Development

Council in Massachusetts.

- In 1989 the Massachusetts Water Supply System extended an **Acknowledgment Letter for their Distinguished Performance and Achievements.**

- In 1989 the Southeastern Massachusetts District for Regional Planning and Development granted an award for great contributions in **Solving the Solid Waste Crisis in the Region**.

- EAI's PRF technology and the SEAMASS plant have been prominently featured in industrial and environmental publications including **Warmer Bulletin, Popular Science, Solid Waste & Power, Waste Dynamics of New England, Power Transmission & Design, Garbage** and in numerous newspapers and magazines from Japan.

- EAI's focus on resource recovery was also presented in the television series **Today's Environment**.

- In 2000 the **SEMASS** plant received the certification as **Star Facility** from **OSHA Voluntary Protection Program** and was recertified in 2003.

When compared to industry data and other plants/waste-to-energy conversion technologies, SEMASS achieved:

- a higher net rate of power generation in kWh/ton;

- one of the lowers tipping fees for municipalities;

- the highest recovery rate of ferrous and nonferrous metals;

- one of the lowest ash production rates;

- the highest ash recovery rate; and

- the lowest ton/day of processed solid waste cost.

It is important to note that the technology that will be used in the proposed Plant is superior to that used in SEMASS, which will result in a higher degree of efficiency.

1.2 Purpose and Process of Environmental Analysis

Environmental documents, including environmental impact statements, are planning tools prepared by agencies as part of their decision-making process regarding the various actions under their consideration. This planning process provides the essential environmental analysis that should be taken into account by those responsible for governmental decisions, thus creating a framework that enables informed decision making.

This document is the Preliminary Environmental Impact Statement (P-EIS) for the Plant. PRIDCO is acting as the Lead Agency for this environmental planning stage. The P-EIS was prepared and processed in accordance with the provisions of:

- Article 4(B)(3) of Law Number 416 of September 22, 2004, as amended, known as the "Environmental Public Policy Act" ("Law 416").

- EQB Resolution No. R-10-26-1 of August 12, 2010 (the "Resolution") which establishes the process for Energy Projects.

- The Environmental Quality Board Regulation for the Process of Presentation, Evaluation and Processing of Environmental Documents, Regulation No. 6510 of August 22, 2002 (the "RPPEPED "), for those issues that are not inconsistent with other applicable provisions.

- The Executive Order issued on July 19, 2010, Administrative Bulletin No. OE-2010-034 (the "Executive Order"), under which the Honorable Governor Luis G. Fortuño declared an emergency regarding the power generation infrastructure in Puerto Rico. The Executive Order triggered the expedited process of Law No. 76 for the development of projects that promote new power generation infrastructure that use alternative sources to petroleum fuels, sustainable renewable energy sources and alternative renewable energy (Energy Projects). The Project addresses the urgent need to develop new power generation infrastructure that uses alternative sources to petroleum-derived fuels to reduce the high cost of electricity in Puerto Rico and stabilize its volatility, in accordance with the public policy set forth in the Government of Puerto Rico Energy Reform. In this sense, the Project qualifies as an Energy Project under the Executive Order as it addresses the need to generate electricity using renewable sources, including the conversion of waste to energy, an alternative renewable energy source, as defined in Law No. 82 of July 19, 2010, known as the " Public Policy on Energy Diversification by Means of Sustainable and Alternative Renewable Energy in Puerto Rico Act " ("Law 82") and Law No. 83 of 19 July 2010, known as the " Puerto Rico Green Energy Incentives Act" ("Law 83"). For these projects, the Executive Order requires the creation of a Fast-Track Interagency Subcommittee on Environmental Compliance, which will be responsible for assessing the environmental documents for Projects submitted under the order. The Sub-Committee shall be comprised of a member of the EQB, the PRPB, the Department of Natural and Environmental Resources (DNER), and any other official designated by the Governor.

- Law No. 76 of May 5, 2000 ("Law 76"). Under this law the Governor of Puerto Rico may declare an emergency due to an event or serious deterioration in the physical infrastructure that provides essential services to the people, or that threatens the life, public health or safety of the population or sensitive ecosystem. Law 76 allows the use of an expedited process to be applied to those tasks closely related to the problem or that are part of an immediate solution to the situation created by the emergency, including the issuance of any permit, endorsement, consultation and/or certification, and government agencies with inherence in the processing of such authorizations will be governed by this expedited process.

1.3 Project Need

Need – Power

The Project addresses several urgent and serious needs in Puerto Rico. First, it responds to the urgent need to develop new power generation infrastructure that uses alternative sources to petroleum fuels; second, it will help to reduce the high cost of electricity in Puerto Rico; third, it will stabilize the volatile high prices of oil and its derivatives; fourth, it will reduce fossil fuel emissions associated with climate change (greenhouse gases); and all this in agreement with the public policy embodied in the Puerto Rico Energy Reform.

Need – Solid Waste

The Project also addresses the urgent need to develop reliable and environmentally safe infrastructure as part of an integrated solid waste management and in agreement with the policy established in the Dynamic Itinerary for Infrastructure Projects (Itinerary) of the Solid Waste Management Authority (SWMA).

The Project will allow Puerto Rico to align its energy and environmental policies with its economic development goals, which are often in competition. In addition, the Project will allow Puerto Rico to manage environmental issues from a new perspective, thus avoiding the traditional practice of burying waste (approximately 2,100 tons per day), with the environmental and health consequences which this practice has brought, and using solid waste as a valuable resource for power generation and as raw material for recycling, so that it can become a source for the creation of "green" jobs and "green" economic development.

Need – Economic Development

The Project is also a source of sustainable economic development that respects the environment. The Project will be a key part of the efforts to establish a model for the future of energy production, leading the Island toward energy independence through the development of clean energy production that generates green jobs.

Need of Protection of the Environment

Through the Project, the practice of burying the solid waste (approximately 2,100 tons per day) in landfills, some of which are in environmental compliance and some that are not, will be avoided, thereby minimizing the impacts to soil, air and surface water and groundwater (aquifers) that are a consequence of this practice. The Project also reduces, among other impacts (a) the uncontrolled air emissions that occur as a result of the operation of landfills, and (b) uncontrolled leachate discharges to soil, surface water and groundwater.

Need for Efficient Land Use

The Project will reuse and revitalize a previously impacted industrial site, resulting in an efficient land use because (a) it prevents land use for landfill operation, and revitalizes a previously impacted area.

1.3.1 Development of New Energy Infrastructure that Uses Alternative Sources to Petroleum-Derived Fuels

Puerto Rico faces an energy crisis. According to the Government of Puerto Rico, the existing power generation infrastructure depends on petroleum-derived fuel to generate approximately 70% of electricity for the country. For the past 28 years the price of petroleum-derived fuel has increased dramatically, even more so in recent years. These prices also are subject to a high degree of volatility which unexpectedly and negatively affects the price of electricity in Puerto Rico. Our dependence on petroleum-derived fuel results in an energy cost that is roughly twice the average cost in the continental United States, and exposes Puerto Rico to the effects of sudden and unexpected international changes that adversely affect the price and the availability of oil. In addition, the gas emissions from petroleum fuels markedly contribute to the greenhouse effect. Finally, the dependence on petroleum-derived fuel ensures the exit of multiple billion dollars a year from Puerto Rico's economy, without any benefit.

For these practical, economic and environmental reasons, the Government of Puerto Rico has determined that the power generation infrastructure urgently needs to be changed and renewed to reduce the dependence on petroleum-derived fuel. Similarly, it is a State priority to promote the development of new power generation infrastructure that uses alternative sources to petroleum-derived fuel, as well as sustainable renewable energy sources or alternative renewable energy, to (a) achieve a reduction and stabilization of energy costs, (b) improve environmental quality and public health, and (c) a stable economic security. These priorities were reflected in the Executive Order. This Order, which is part of the Energy Reform currently under implementation by the Government of Puerto Rico, declared an emergency regarding the power generation infrastructure in the country, and orders expediting the development of projects that meet the objectives of establishing a new power generation infrastructure that uses alternative sources to petroleum-derived fuels, sustainable renewable energy sources and alternative renewable energy, such as Energy Answers Plant presented in this environmental document.

Another component of the Energy Reform is Law 82, which establishes compulsory goals for the reduction of conventional power use and for increasing the use of renewable forms of energy. Law 82 requires the establishment of standards, known as Renewable Energy Portfolio, to promote renewable energy generation, according to compulsory short, medium and long term goals. Under the Renewable Energy Portfolio, Law 82 requires the production of 12% renewable energy by 2015 and 15% by 2020. It also requires the development of a plan to achieve 20% of energy production from renewable and alternative sources by 2035. Similarly, Law 82 created the Renewable Energy Commission to ensure compliance with the objectives of economic development, environmental protection and public health.

Table 1-1: Power Cost in Puerto Rico and USA

Place	Cost on Cents per Kilowatt-hour (July 2010)	
	Residential	Industrial
Connecticut	19.03	14.54
Rhode Island	15.11	15.5
Pennsylvania	13.34	8.03
Illinois	12	7.42
Florida	11.68	9.04
Louisiana	9.19	5.81
Puerto Rico	21.63	18.31
Total USA	12.01	7.31

A third component of the Energy Reform is Law 83, which creates the Renewable Energy Certificates (RECs), which will be awarded to each energy supplier that produces one megawatt-hour of electricity using renewable energy. Law 83 also creates a Green Energy Fund to provide economic incentives to encourage the development of renewable energy projects in Puerto Rico. The Green Energy Fund will receive $20 million in 2011 and will increase to $40 million over five years for a total of $290 million. The Energy Affairs Administration will be the entity responsible for managing the Green Energy Fund, to grant incentives for renewable sustainable and renewable alternative energy projects (together and for incentive purposes, "green energy").

The Executive Order declared an emergency regarding the power generation infrastructure of Puerto Rico, and also orders the activation and use of the expedited process described in Law 76 for the development of projects that promote a new power generation infrastructure using alternative sources to petroleum-derived fuel, sustainable renewable energy sources and alternative renewable energy - Energy Projects. This Project fully complies with the multiple objectives established under this Order. For these projects, the Executive Order requires the creation of a Fast-Track Interagency Environmental Compliance Subcommittee, which will be responsible for assessing the environmental documents for projects submitted under the Order. According to the Order, the Sub-Committee shall be comprised of a member of the EQB, the PRPB, the Department of Natural and Environmental Resources (DNER), and any other official designated by the Governor.

1.3.2 Development of Reliable and Safe Infrastructure for Solid Waste Management in Compliance with Applicable Laws and Regulations

The solid waste management system in Puerto Rico serves seventy-eight (78) municipalities that generate about four (4) million tons per year of residential, commercial and industrial waste. This infrastructure includes programs that promote source reduction/reuse and recycling of these wastes; nine (9) material recovery facilities (MRF), four (4) composting plants, seventeen (17) transfer stations (TS) and thirty (30) Sanitary Landfill Systems (SLS).

EPA Region 2 has said the following about the solid was management in the Island:

- The management and disposal of solid waste in Puerto Rico has long been a challenge.
- The problem is intensified by the limited disposal space available on an island community and Puerto Rico's delicately balanced ecosystem.
- Puerto Rico residents generate more waste than residents of the States, and recycling rates in the Island are lower.
- Much of Puerto Rico's solid waste ends up in one of island's 30 landfills, most of which do not comply with state and federal landfill requirements.
- The solution is a comprehensive and integrated solid waste management plan that calls for a

reduction in the amount of solid waste generated, an increase in the recycling rate, the use of waste to produce energy, and the proper and efficient management of all landfills. See http://www.epa.gov/region2/cepd/solidwaste_in_puerto_rico.html (last accessed October 18, 2010).

Waste to energy plants have been key components in integrated waste management programs in the United States, Western Europe and Asia. In particular, in islands such as Japan, Ireland, Singapore, Hawaii, Bermuda, among others, waste to energy plants have been developed. They offer the following benefits:

- Energy recovery from solid waste which would otherwise be buried in landfills;
- Recovery and reuse of ferrous and nonferrous metals;
- Reduction of up to 90% of the solid waste volume;
- Prevent emissions of methane gas generated by waste disposed in landfills;
    - Methane is over 20 times more effective than carbon dioxide (CO2) at trapping heat in the atmosphere;
- Conservation of land by preventing its use as landfills;
- Avoid the many negative impacts to the environment and public health (environmental footprint) by avoiding burying waste in the ground; eliminate uncontrolled toxic leachate into the soil, surface water and groundwater; prevent landfill fires and uncontrolled and unmonitored air emissions; and prevent odors, visual pollution and conditions that favor rodents and vectors;
- Allow the orderly closure of landfills that do not meet minimum standards of environmental protection and public health and that have reached their useful life; and,
- Some plants are designed to reuse bottom ash as aggregates and as other construction materials.

1.3.2.1 Infrastructure Project Itinerary

SWMA, the government agency created under Law 70 of June 23, 1978, as amended, has the task of establishing and executing public policy with respect to the technical, administrative and operational aspects of the solid waste management system.

State and Federal laws are important factors that impact the Solid Waste Management System in in Puerto Rico. These laws are crucial in identifying those landfill facilities that can continue operating and those that must shut down operations.

SWMA developed the Dynamic Itinerary for Infrastructure Projects, 2008 (Itinerary) with the purpose of developing and implement strategies to responsibly address the development of the appropriate infrastructure needed to manage the solid waste generated in Puerto Rico for the next 25 years, in a technically and environmentally sound manner. The Itinerary incorporated the Public Policy established by the provisions of Article 3 of Law No. 70 of September 18, 1992, as amended, known as the "Law for the Reduction and Recycling of Solid Waste in Puerto Rico". In this law, the hierarchy of solid waste management methods was established, as listed below:

1. Source reduction;
2. Reuse;
3. Recycling/composting;
4. Waste to energy plants; and finally
5. Landfill.

This hierarchy includes waste to energy facilities. In fact, in this hierarchy, the disposal of solid waste in landfills that meet with applicable state and federal laws and regulations is the last of the alternatives.

The development of the Itinerary was completed after other efforts had been undertaken by SWMA: First, in 1995, the Regional Infrastructure Plan for Recycling and Solid Waste Disposal was developed. This plan created mandatory disposal regions and suggested an ambitious list of infrastructure projects. Subsequently, in 2003, SWMA prepared the Solid Waste Management Strategic Plan (SWMSP). The SWMSP included areas that had been virtually ignored in previous plans, such as market development and public participation. In addition to these efforts, SWMA completed two large studies in recent years. One of them, the Solid Waste Characterization Study, 2003, consisted of an analysis of the quantities and characteristics of the solid waste stream. The second study, Assessment, Diagnosis and Recommendations for Landfill Systems, 2004, also known as the Landfill Useful Life Study, provided a detailed analysis of the remaining capacity of all disposal facilities or landfills.

Figure 1-5 shows a summary of the Solid Waste Characterization Study completed in 2003.

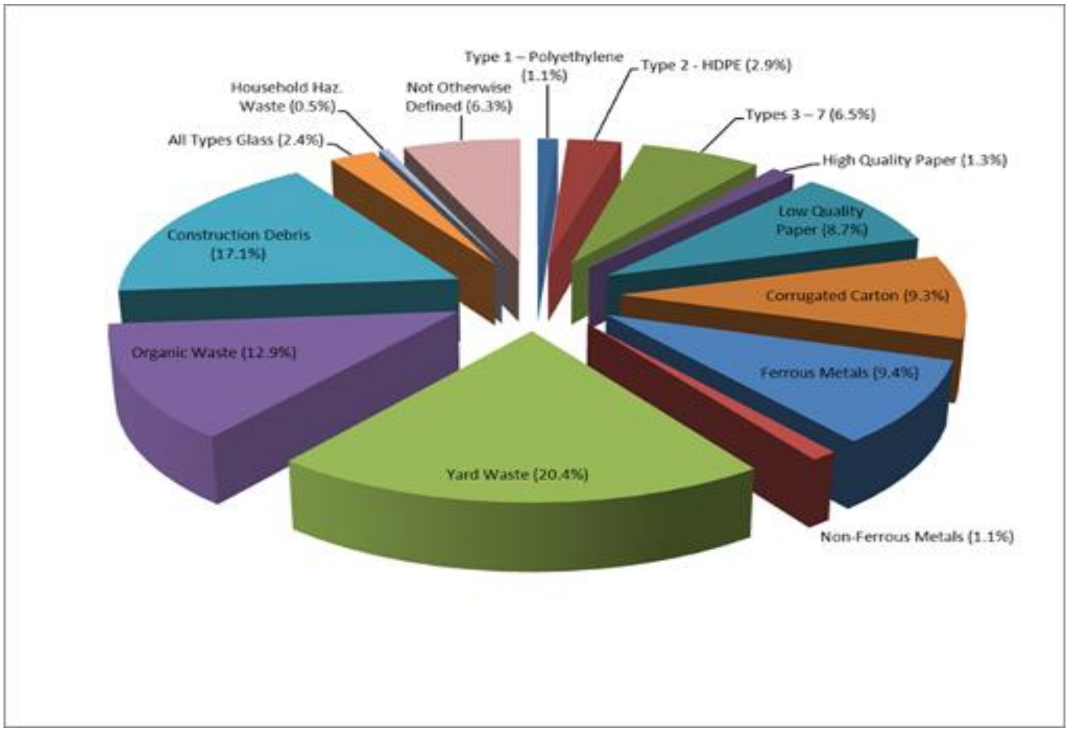

Figure 1-5: Solid Waste Characterization (SWMA 2003)

The Itinerary discusses the development of the disposal capacity model for the different scenarios presented below. This model was used as a planning tool for the management of solid waste:

Do Nothing Scenario

The projections of the disposal capacity model for the "Do Nothing" scenario, where there is no additional disposal or processing capacity added and no growth in the diversion rate is achieved, shows that Puerto Rico would run out of disposal capacity by 2018, as explain in **Chapter 2**, giving the current system a useful life of approximately 8 years. This projection demonstrates the need for urgent action in terms of planning and execution of waste management strategies. These actions should include the diversion of recyclable materials from SLS while providing adequate disposal capacity for solid waste during the development and implementation of the proposed strategies.

Base Case Scenario

The Base Case scenario capacity model projection, where SWMA planned diversion strategies reach the diversion goals, demonstrates that there will be seven (7) landfills in operation with 17.8 years of useful life left at the end of the planning period (2030). The Base Case Scenario establishes the steps that are necessary to reduce the use of SLS as a primary alternative to manage the municipal solid waste. It also defines the initial goals to increase the diversion rate and to incorporate the waste to energy technology.

Back up Case Scenario

The Back up Case scenario capacity model projection shows that the diversion rate goal of 35% will be met in 2030 instead of 2016, assumes that the waste to energy plants will not be developed, and demonstrates that in year 2030 there will be only eight (8) SLS in operation with 7.5 years of useful life left.

1.3.2.2 Solid Waste Generation in Puerto Rico

The projected solid waste generation in the Itinerary was calculated using the latest version of the population projections published by the Puerto Rico Planning Board and assuming that the estimated daily generation rate will remain constant in the future. The Itinerary uses a daily generation rate of 5.56 lbs per person, based on historical solid waste generation data.

A summary of the projected solid waste generation, as presented in the Itinerary, is shown in **Table 1-2.**

Table 1-2: Projected Waste Generation in Puerto Rico

Year	Population Projection1	Solid Waste Generation Projection (Tons/year)[2]
2010	4,030,152	4,089,395
2015	4,110,528	4,170,953
2020	4,172,242	4,233,574
2025	4,214,387	4,276,338

Notes:
[1] Source: Puerto Rico Planning Board, population projections as of August 22, 2006.
[2] Based on projected population and estimated daily generation rate.

1.3.2.3 Recycling Rates for Puerto Rico

SWMA has reported the recycling rates achieved in Puerto Rico for four consecutive years (2004 through 2007). According to the SWMA, these rates are based on the document Measuring Recycling: A Guide for State and Local Government published by the EPA in 1997. In summary, SWMA has reported that recycling rates have increased from 6.81 percent in 2004 to 8.43 percent in 2006 (See **Table 1-3**); and then increased to 10.39 percent in 2007 (See **Table 1-4**). It is important to note that Law No. 70 of September 18, 1992, Law for the Reduction and Recycling of Solid Waste in Puerto Rico, established a recycling rate of at least 35%. Therefore, Puerto Rico continues to be out of compliance with this requirement.

Table 1-3: SWMA Published Standard Recycling Rate Distribution for 2006[1]

Materials Considered for Standard Recycling Rate	2004 (tons)	2005 (tons)	2006 (tons)
Cardboard	83,193.74	85,129.22	109,469.44
Paper	50,659.48	54,647.79	61,096.29
Plastic	10,438.78	14,503.46	17,423.50
Glas	3,274.48	4,669.59	5,971.95
Aluminum	15,645.63	18,698.24	14,000.31
Other Metals	5,169.63	6,161.82	5,904.09
Tires	12,768.94	22,469.60	18,628.36
Yard waste and wood pallets	18,093.70	19,212.97	20,969.53
Electronics	232.25	277.93	717.78
Total	**199,476.63**	**225,770.62**	**254,181.25**
Census	3,905,116	3,929,885	3,948,044
Growth Rate	0.63	0.63	0.46
Disposal	2,731,289.84	2,748,496.97	2,761,140.05
Recovered	199,476.63	225,770.62	254,181.25
Generated	2,930,766.47	2,974,267.59	3,015,321.30
Standard Recycling Rate (%)	6.81%	7.59%	8.43%
Recycling Rate required by Law Number 70	35%	35%	35%

[1]Source: Recycling Rate and Diversion Rate, Final Report 2006, SWMA.

Table 1-4: SWMA Published Standard Recycling Rate Distribution for 2007[1]

Materials Considered for Standard Recycling Rate	2005 (tons)	2006 (tons)	2007 (tons)
Cardboard	85,129.22	109,469.44	126,164.35
Paper	54,647.79	61,096.29	62,941.21
Plastic	14,503.46	17,423.50	18,560.43
Glass	4,669.59	5,971.95	2,387.17
Aluminum	18,698.24	14,000.31	25,025.48
Other Metals	6,161.82	5,904.09	12,227.94
Tires	22,469.60	18,628.36	8,954.99
Yard waste and wood pallets	19,212.97	20,969.53	62,557.15
Electronics	277.93	717.78	946.44
Textiles	184.00	183.00	1,953.67
Fluorescent Lamps	1.20	1.08	4.92
Total	**225,770.62**	**254,181.25**	**321,723.75**
Census	3,929,885	3,948,044	3,966,375
Growth Rate	0.63	0.46	0.46
Disposal	2,748,496.97	2,761,140.05	2,773,841.30
Recovered	225,770.62	254,181.25	321,723.75
Generated	2,974,267.59	3,015,321.30	3,05,565.05
Standard Recycling Rate (%)	7.59%	8.43%	10.39%
Recycling Rate required by Law Number 70	35%	35%	35%

[1]Source: Recycling Rate and Diversion Rate, Final Report 2007, SWMA.

1.3.2.4 Solid Waste Management Capability in Puerto Rico

As part of the Itinerary, SWMA conducted an evaluation of all 32 of the existing SLS in Puerto Rico to identify their individual expansion capacities. The evaluation used the criteria outlined in the 40 CFR Part 258 Subpart B regulation that specifies the construction, operation and closure criteria for SLS. Through this evaluation and based on the public policy that establishes the reduction in the use of SLS as the main method for solid waste handling and disposal in Puerto Rico, a determination of the potential expansion capabilities of these systems was made.

1.3.2.5 Existing Operating Landfills Overview

According to SWMA, Puerto Rico should have 30 operating landfills between 2010 and 2011 (excluding landfills under Compliance and/or Closure Orders by EQB and EPA). These landfills are currently managed by private and public entities. **Figure 1-6** identifies the landfills that are anticipated to be in operation by the end of year 2010. Currently, there are Closure Orders issued by EPA, closure agreements and closure plans, but the landfills have continued their operation because, among other things, there are no viable alternatives for the management of the displaced waste that would facilitate the implementation of these closures. The delays in landfill closures have a negative effect on the environment because of the impacts to soil, surface water, groundwater, air and odors, among others.

Source: SWMA 2010

Figure 1-6: Operating Landfills by the End of 2010

This summary of the projected operating landfills by the end of 2010 could change since it is dependent upon several factors, including the filing of authorizations for new SLS (new or expansions), EPA orders, and activities such as slope stabilization, which are part, in some cases, of the landfill closure plans.

1.3.2.6 Island-wide Landfill Closure Projections

The Itinerary projects the closure of additional landfills over a 25 year timeframe, based on a disposal capacity model that considers the remaining useful life of the landfills documented in the Useful Life Study. The capacity model also assumes disposal rates for each landfill and assumes a potential feasible waste flow transfer scenario from closed landfills to other remaining landfills. According to the Itinerary, the remaining landfills are divided in two categories: 1) non-compliant landfills that will not be expanded for various reasons; and 2) landfills that potentially comply with Subtitle D requirements but will not be expanded.

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1.3.2.7 SWMA Projections for Operating Landfills for Years 2015 and 2020

Figures 1-7 y **1-8** summarize the landfills that are projected to be in operation in years 2015 and 2020.

Source: Itinerary, SWMA, 2008

Figure 1-7: Operating Landfills by the End of Year 2015

Source: Itinerary, SWMA, 2008

Figure 1-8: Operating Landfills by the End of Year 2020

As can be seen from the previous figures, SWMA expects most of the remaining landfill facilities to close in the next decade, including all the facilities in the Northern Region, except for Isabela, which would close within two to four years. This consolidation in the number of disposal facilities creates an urgent need for Puerto Rico to develop alternate ways of managing and disposing of its solid waste, especially in the Northern Region of Puerto Rico.

1.3.2.8 Waste to Energy Projects

In order to successfully implement the waste diversion strategy from disposal in landfills, the Itinerary recommends the development of two thermal processing technology facilities with a combined processing capacity of approximately 2,910 tons per day. Specifically, the Itinerary recommends the development of a 1,350 ton per day facility in the Northwest Region to become operational in 2014 and a 1,560 ton per day facility in the Northeast Region to become operational in 2014.

The Plant has a planned capacity of approximately 2,100 tpd of PRF. A plant of this size would have enough capacity to: (1) meet the estimated municipal solid waste disposal demand required under the Dynamic Itinerary for the Northwest Region; (2) assist with commercial waste management needs of the Region; and (3) substantially add to the existing materials recovery and recycling infrastructure.

The Project PRF technology is reliable, operationally proven and environmentally safe, since the reference plant (**SEMASS**) has efficiently operated for over 20 years in compliance with the most stringent emission control standards of the EPA and the State of Massachusetts.

1.4 Project Description

The Project consists of the construction and operation of a modern Renewable Power Generation and Resource Recovery Plant that will:

- Recover more than 280 tons per day of valuable ferrous and nonferrous recyclable materials;
- Produce PRF;
- Process approximately 2,100 tons per day of PRF in two spreader-stoker boilers to produce

steam;

- Convert more than 700,000 tons per year of solid waste into energy and material recovery;
- Generate a gross amount of approximately 80 MW of electricity, of which approximately 10 MW will be used in the Plant and the remaining 70 MW will be sold to PREPA under the conditions of a purchase agreement;
- Generate electricity at a competitive and long-term stable price:
- Control emissions by using an advance emission control system approved by EPA that includes monitoring systems and the filing of periodical reports;
- Recover additional ferrous and nonferrous metals from bottom ash and produce commercially valuable Boiler Aggregate™;
- Process fly ash for productive reuse or landfill disposal in compliance with the applicable laws and regulations;
- Provide long-term competitive prices for waste disposal;
- Potentially increase by more than 50% the recycling rate and material reuse within participant communities;
- Prevent the burying of 2,100 tons per day of waste (over 700,000 tons per year), thus eliminating the corresponding environmental impacts on air, water, soil and health;
- Reduce the dependence on fossil imported fuels, preventing the burn of approximately 110,000 gallons per day (or more than 35 million gallons per year); and
- The Project will be completely financed with private funds, without the need to use municipal or state public funds.

The Project will be developed in compliance with the environmental protection standards established by the EPA, the EQB and other concerned federal and state agencies. PRF technology is reliable and consistently meets and exceeds EPA emission standards, as shown in tests conducted for decades at the SEMASS plant stack.

Following is a description of the site location; the areas to be served by the Plant; the Plant main components; the preliminary construction schedule; the security controls that the Plant will have; the flood design; the contingency plan for emergency events; and the off-site works that will be necessary to: (1) supply brackish water for the cooling tower and steam production in the boilers; and (2) connect the electricity produced at the Plant to PREPA's distribution network.

1.4.1 Site Location

The Plant will be located in site of approximately 82 *cuerdas* of area, which housed in the past the old facilities of the Global Fibers, Inc. paper mill. The site is located at Km 73.1 of State Road PR-2 of the Cambalache Ward in Arecibo (the Site). **Figure 1-9** shows the site and adjacent land on an aerial photo, **Figure 1-10** shows the Project footprint on an aerial photo, and **Figure 1-11** shows a photo of the entrance to the site. The industrial activity in the site began in the late 1950s and ceased in the mid-1990s. Therefore, the Project proposes the use and revitalization of a previously impacted old industrial facility (Brownfield), thus minimizing the impact associated to the use of new land.

N
W E
S

Scale: 1:20,000

0 150 300 600 Meters

Legend:

- El Vigía Pump Station[1]
- Substation[2]
- Roads[3]
- Property Boundary
- Municipal Limit[2]
- Ward Limit[2]

Sources:
1. Department of Natural and Environmental Resources of Puerto Rico
2. Information provided by the Puerto Rico Planning Board
3. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish), June 2006
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)

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Atlantic Ocean
Caribbean Sea

Figure 1-9: Aerial Photo of the Site and Adjacent Land

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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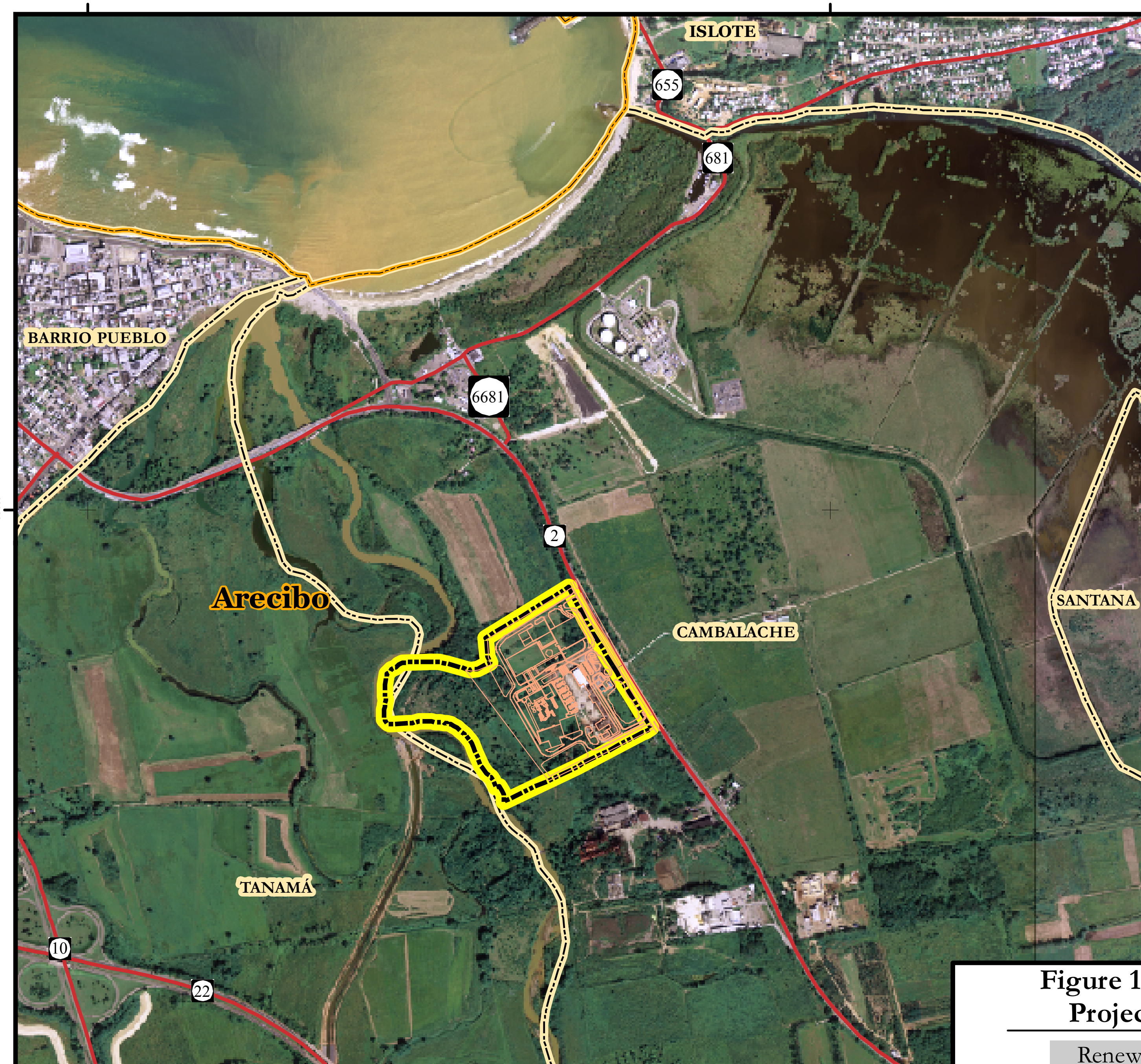
GISTeam rdarcher rev evazquez 16sep 2010 AV 9.2 rev rdarcher December 7, 2012

Figure 1-10: Aerial Photo of the Project and Adjacent Land

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR



Sources:
1. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish), June 2006
2. Information provided by the Puerto Rico Planning Board
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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Figure 1-11: Photo of the Site Entrance

The site is bordered on the north by 71 *cuerdas* of land belonging to the *Finca Santa Bárbara*, owned by the Puerto Rico Land Authority and partly used for growing hay; on the south, with 15 *cuerdas* of vacant land owned by the Land Authority and the site of the former Central Cambalache Sugar Mill; on the west by the *Río Grande de Arecibo* (RGA;) and State Road PR-2 on the east.

The existing structures in the eastern side of the site are basically steel frames. Several structures are abandoned. The existing topography is essentially flat and varies in elevation from 1.0 to 7.5 meters above mean sea level (MSL). As part of the stormwater infrastructure previously used in the site, five (5) percolation ponds were created to the west-northwest and southeast of the site, to store stormwater and process water from the operation of the paper mill. These ponds are ineffective and do not store water. Furthermore, artificial channels that run through the property were created as part of the stormwater and process water drainage system. These connect to another channel that runs along the northern boundary of the site and discharge into the RGA. Currently the channels are not in use.

The Cambalache Ward where the site is located is found within the alluvial valley of RGA, where agricultural uses, industrial activities and sporadic small isolated communities coexist. In the past, land use in the area was dominated by the former Central Cambalache Sugar Mill. In the early 1980s, 55% of the land was used for growing sugar cane, approximately 30% for rice cultivation and 15% for cattle grazing. The main use of the land has remained agricultural (primarily hay), although the former Central Cambalache ceased operations in the early 1980s.

1.4.2 Raw Material for the Production of PRF

The Project will use solid waste as the raw material for the production of renewable alternative energy. Because of its location, it is planned that the Plant will receive municipal solid waste (MSW) from the municipalities along the north-central and north-eastern side of the Island, as well as the mountain region, to produce the PRF necessary for energy generation (See **Figure 1-12**)

Figure 1-12: Planned Area of Raw Material Collection for the Production of PRF

Table 1-5 summarizes the estimated waste generation for the geographical area described above. It should be noted that, even if the region reaches its 35% recycling target, there will still be left a large amount of waste that must be managed in an environmentally responsible and safe way. This estimate does not take into account the quantities of waste that could be available as a result of future landfill closures, commitments with municipalities outside the indicated geographical area, or contracts with private carriers that could potentially use the Plant to dispose of their waste.

Energy Answers plans to establish contracts with municipalities and waste collection companies, enough to ensure the waste volume needed to produce 2,100 tons of PRF that guarantees maximum power generation estimate for the Project.

Table 1-5: Projected Sources of Raw Materials for the PRF

Year	Population Projections	Solid Waste Generation Projection (Tons/year)[2]	Solid Waste Generation Projection (Tons/day)[2]	% Recycling[3]	Amount of Waste after Recycling (Tons/day)
2010	1,546,964	1,546,964	4,301	11	3,828
2015	1,579,234	1,602,449	4,390	32	2,985
2020	1,604,217	1,627,799	4,460	35	2,899
2025	1,620,905	1,644,732	4,506	35	2,929

Reference: Draft Preliminary Material Separation Plan (EAI, August 2010)

Notes:

1. Source: Puerto Rico Planning Board, population projections as of August 22, 2006.
2. Based on population projections and estimated daily generatin rate (seven days/week).
3. Source: Itinerary, SWMA 2008.

1.4.3 Main Plant Components

The Plant will have the following main components:

- MSW receiving and storage
- PRF processing and storage
- PRF combustion in spreader-stoker boilers;
- EPA-approved emission control system, monitoring system and filing of periodical reports;
- Management and recovery of combustion residues;
- Production of alternative renewable energy (electricity and vapor);
- Water use for operation (cooling and boilers);
- Capability to manage alternative fuels;

- Rehabilitation of an industrial site and building construction;
- Process automatic control systems.

Once produced, the PRF will be fed to one of two identical process lines, each with capacity to process of 1,050 tons per day. The process will have the following sequence of units or equipment: (1) PRF feed line; (2) spreader-stoker boiler with a design heat input rate of 500 MM BTU/hr; (3) activated carbon injection system to remove heavy metals and dioxins/furans; (4) Turbosorp® dry scrubber that removes acids by injecting lime in a fluidized bed; (5) fabric filters (baghouse) to control particulate emissions, including metals; (6) ammonium hydroxide injection system followed by regenerative selective catalytic reduction (RSCR) unit to reduce emissions of nitrogen oxides; (7) induced draft fan, and (8) stack.

Steam from the boilers will be used to generate electricity using a turbine generator. As a result, enough electricity will be produced for in-plant usage and for sale to PREPA.

Each boiler will have three auxiliary burners that will use fuel no. 2 (low sulfur distillate) for startup and shutdown, when and if necessary; and to maintain temperature in case of interruptions on PRF feed. In addition to PRF, the Project will have the capacity to handle any of the following alternative fuels: Automotive Shredder Residue (ASR); tires or Tired Derived Fuel (TDF); and Processed Urban Wood Waste. The amount of these wastes that can be used will be confirmed through performance tests, and will be included in the federal and local Plant emission control permits, as applicable. Regular use of these alternative fuels is not expected as part of the regular operation of the Plant.

Table 1-6 provides a summary of the Plant characteristics. **Figure 1-13** shows an architectural rendering of the Resource Recovery Plant. **Figures 1-14** and **1-15** provide architectural renderings of the building interiors and the Plant main process equipment. Finally, **Figure 1-16** shows the Plant floor plan.

Table 1-6: Summary of the Projected Plant Characteristics

Characteristic	Daily	Year Maximum Amount*
MSW Handling Capacity	2,300 tons	839,500 tons
Unacceptable MSW	10 tons	3,650 tons
Ferrous Metals Initial Recovery (before boiler processing)	190 tons	69, 350 tons
PRF Gross Amount	2,100 tons	766,500 tons
Number of Combustion Process Lines	2	
Capacity of Each Combustion Process Line	1050 tons	383,520 tons
Design Heat Input Rate for Each Boiler	500 MMBTU per hour	
Number of Stacks	1	
Number of Steam Electric Power Generators	1	
Steam Cooling Method	Heat exchanger that uses cooling tower brackish water	
Emission Control System per Process Line	Activated carbon injection, Turbosorp® dry scrubber and fabric filters (baghouse) followed by RSCR unit.	
Recovered nonferrous metals (from bottom ash)	10 tons	3,650 tons
Recovered ferrous metals (from bottom ash)	80 tons	29,200 tons
Recovered Boiler Aggregate™ (from bottom ash after recovery of ferrous and nonferrous metals)	110 tons	40,150 tons
Fly ash	135 tons	49,275 tons
Gross Electric Power Production	80 MW	
Net Electric Power Production	70 MW	

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Figure 1-13: Resource Recovery Plant Architectural Rendering

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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22 abril 2010 GISTeam rdarcher rev evazquez 16sep 2010 AV 9.2 rev December 4, 2012 AE10

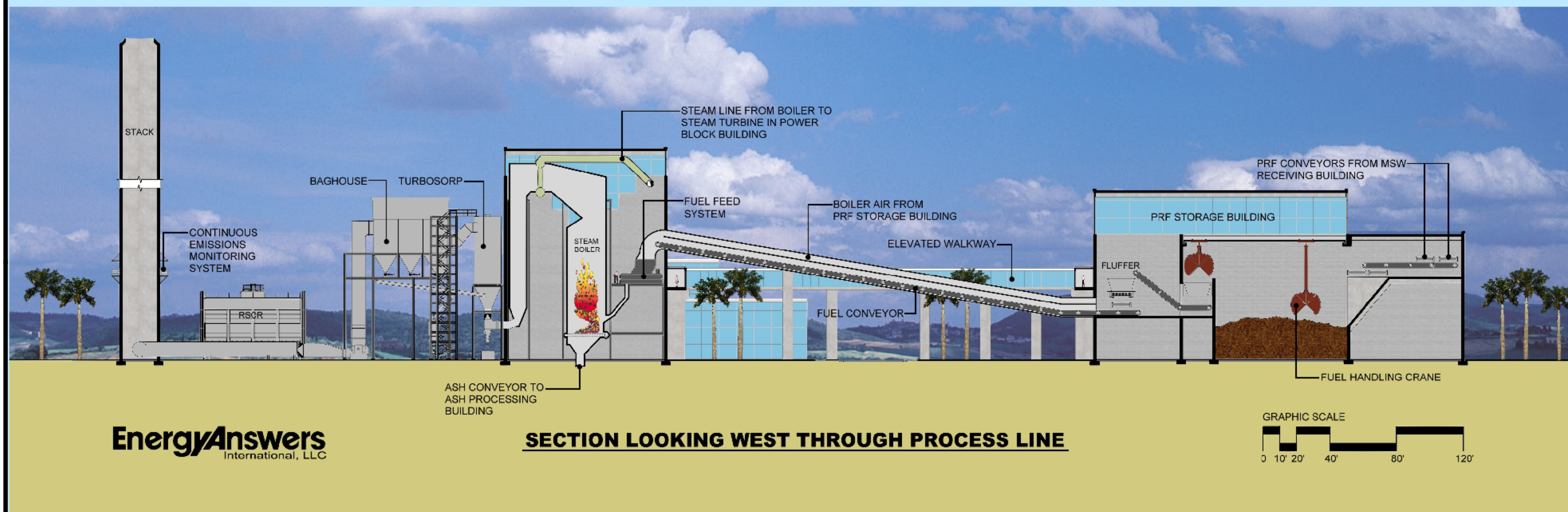

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Figure 1-14: Architectural Rendering of the Main Building Interiors and the Plant Process Structures (West View)

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

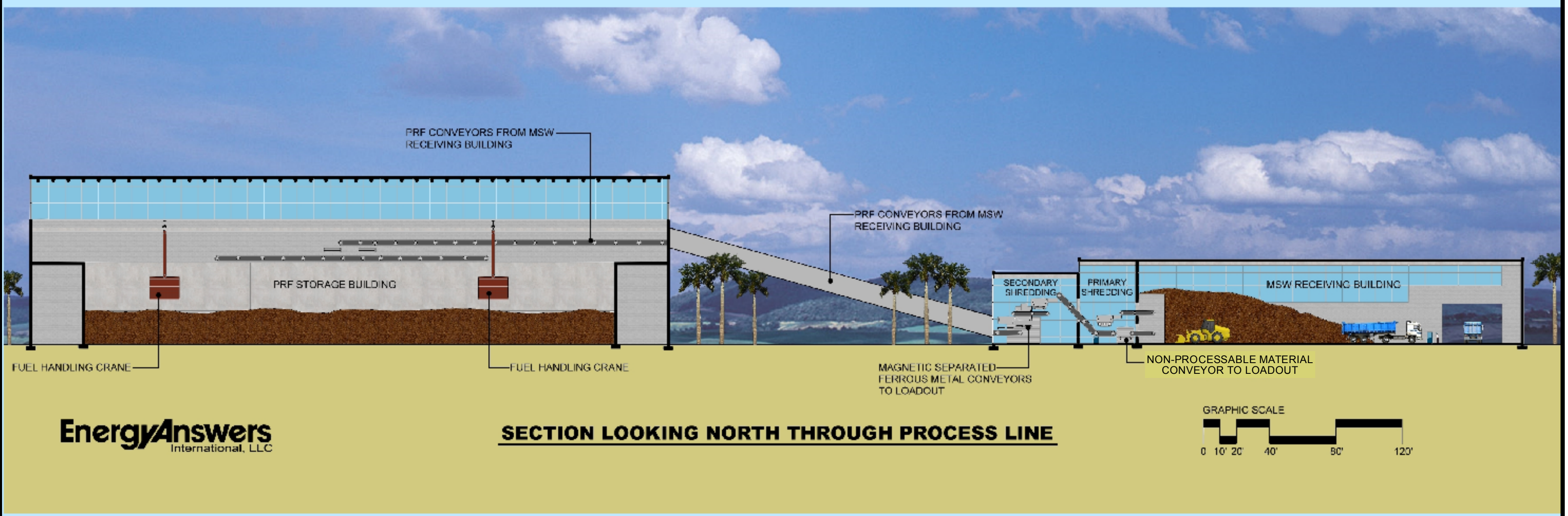

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Figure 1-15: Architectural Rendering of the Main Building Interiors and the Plant Process Structures (North View)

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

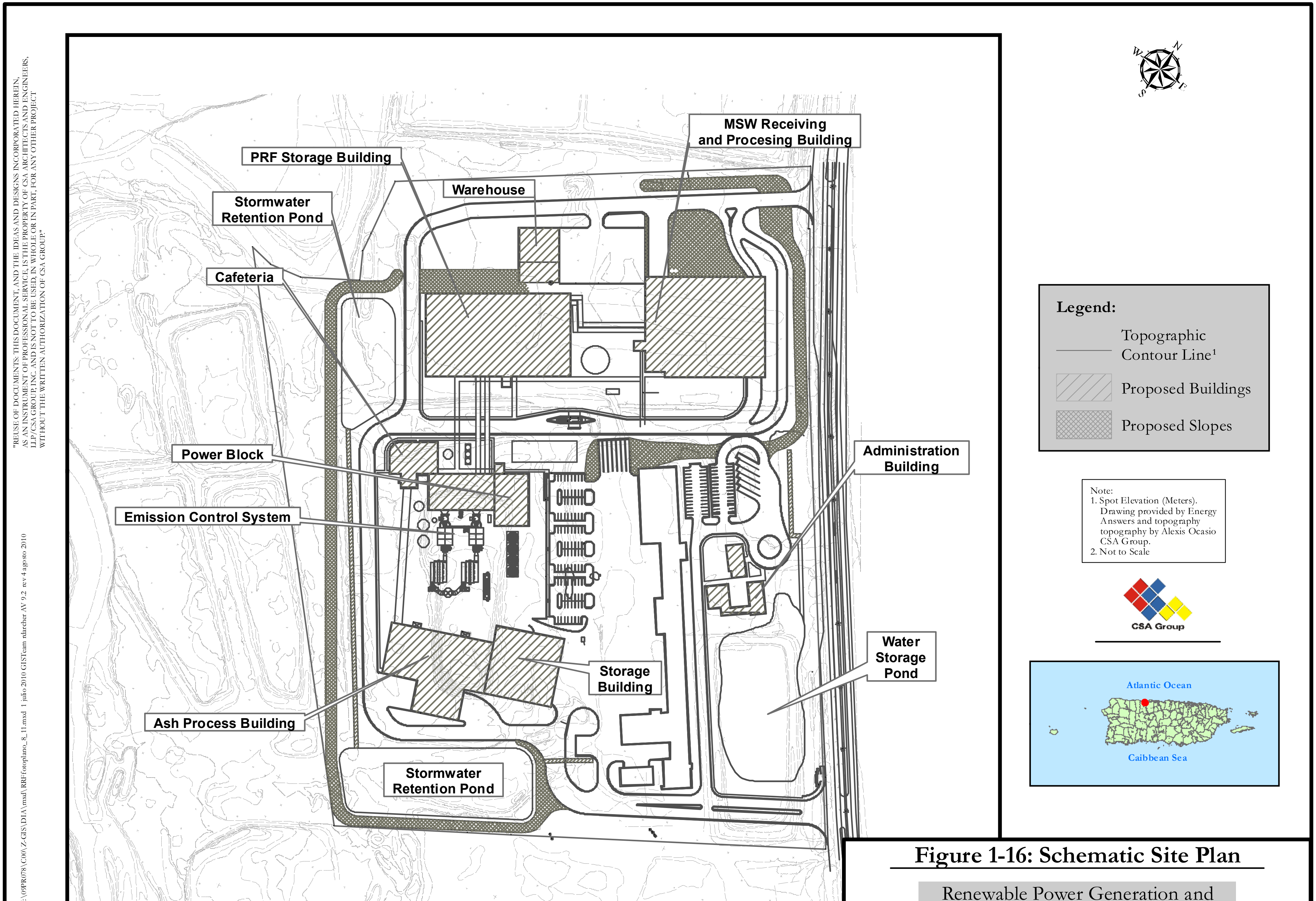

Figure 1-16: Schematic Site Plan

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

1.4.3.1 Receiving and Handling of PRF Raw Material

The PRF raw material, MSW, will arrive daily at the Plant by trucks, which vary in type and size, and will be weighed on scales located at a Weigh Station. From the Weigh Station, incoming trucks will be directed to the enclosed and ventilated MSW Tipping and Storage Area for inspection. (See **Figure 1-17**).

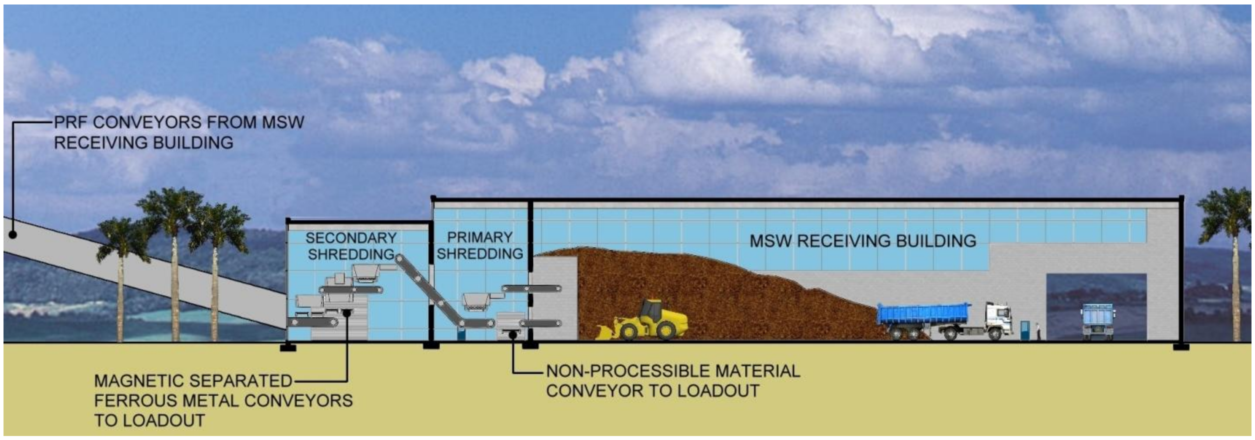

Figure 1-17: MSW Receiving and Processing Building

The storage area will be designed to store approximately 2,100 tons of PRF. It is in this area that the recyclable waste will be separated from waste that cannot be processed or accepted for processing. Waste that is deemed acceptable and can be processed will be shredded to produce the PRF. In addition, the previously identified alternative fuels will be received in a dedicated storage area inside the receiving building. In case the PRF heat content lowers and it becomes necessary to maintain a steady temperature inside the boilers for steam production, the alternative fuels can be mixed directly with the PRF flow prior to combustion. Waste that cannot be accepted or processed will be rejected and re-directed to the weighing station before leaving the Plant.

According to data from the SEMASS plant, about 1% (by weight) of the initial waste received at that facility was non-processable or unacceptable material (which was removed prior to processing).

Recyclable waste such as old corrugated cardboard (OCC) will be removed in the designated sorting stations and stored for recycling and sale locally or internationally.

As part of the Plant operation, a quality control program will be implemented to prevent the delivery of unacceptable waste to the download area. Unacceptable materials will be rejected at the time of inspection. The non-processable material will be separated and transported to consumer markets or a licensed facility for disposal. Following is a description of acceptable and unacceptable materials:

- **Acceptable materials** are those that are processed into PRF and include materials that have the typical characteristics of household waste collected as part of municipal solid waste collection programs; commercial/retail waste; and non-hazardous solid waste from industrial facilities.

- **Unacceptable materials** are those that will not be processed into PRF and consist of, but are not limited to, radioactive materials, explosives, hazardous waste, biomedical waste, liquids, motor vehicles except ASR, trailers, boats, biological waste, pathological waste, infectious and chemotherapy waste, agricultural machinery, vehicle batteries, cathode ray tubes, fluorescent lamps, thermostats or any other material that can be hazardous or pose a substantial threat to health and safety, or has a reasonable possibility of adversely affecting the Plant in any way.

- **Non-processable materials** are those that cannot be processed at the Plant because of their size or type.

Energy Answers will rigorously implement standard operating procedures to ensure that waste is rigorously inspected in the MSW tipping floor to remove those that are identified as unacceptable or non-processable, prior to the processing of PRF.

1.4.3.2 Production and Storage of PRF

The MSW will be processed into PRF using two process lines consisting of slow speed shear shredders followed by ferrous metal separators. This system will operate for a period of 12 hours per day, six days a week. The remaining time will be used for maintenance of the unit or extended operation in case one of the process lines becomes unavailable.

The operation begins when the loader collects the MSW and places it in conveyors that take it to the shredders. After shredding, the material is discharged into conveyor belts, where a magnetic separator removes a large portion of the ferrous material. The PRF is carried by conveyors to the PRF storage building. (See **Figure 1-18**).

The PRF will be stored adjacent to the MSW Receiving Building, in a building that will contain a structure at least 25 feet high, to store up to 6,000 tons of PRF, which is equivalent to approximately three (3) days of operation. The Plant will be designed to process PRF with a heat content of 5,700 BTU/lb, within a range of 4,600 to 7,600 BTU/lb; an average humidity of 25% and approximately 20% of inert material.

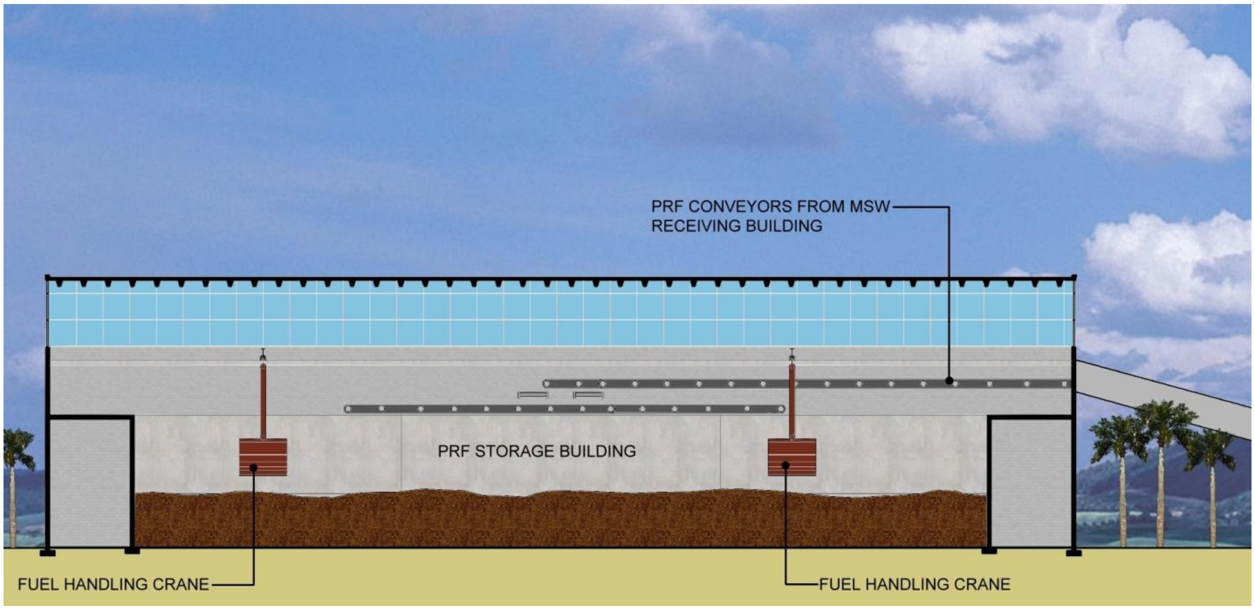

Figure 1-18: PRF Storage Building

1.4.3.3 PRF Combustion

Using an automated bridge crane system, the PRF will be transferred from the storage area to a fluffer to break clumps, if necessary, or directly onto the conveyor belt (see **Figure 1-19**). From this point, the PRF is loaded into the storage bins that feed the boilers. Each boiler will receive PRF at a nominal rate of approximately 44 tons per hour. The conveyor belts in the PRF storage area are variable speed which will allow the proper delivery rate of PRF to each of the PRF feed systems.

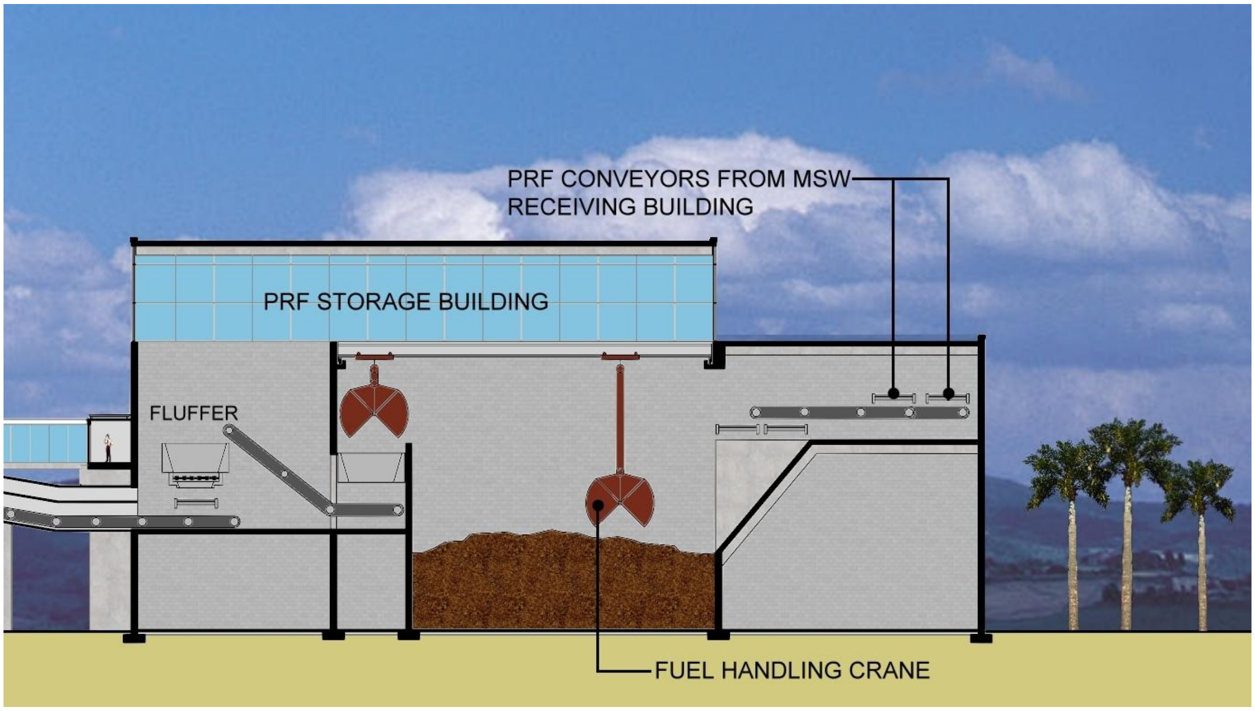

Figure 1-19: PRF Transfer

Once in the boiler feed chutes, the PRF falls by gravity to a point about six (6) feet above the boiler grate where it is blown into the boiler by a stream of distribution air. Lighter materials will burn in suspension while heavier portions of the PRF, including the non-combustibles, drop to the rear of the grate where the combustion of burnable, heavier material is completed. The grate moves from the back to the front of the boiler at a speed adjusted to allow time for complete PRF burnout. After final burnout, the ash drops into the bottom ash hoppers (devices for the management of granular or pulverized material), where the dry ash is continuously removed via a bottom ash removal system located below the boiler ash hoppers. **Figure 1-20** provides an illustration of the process of combustion of PRF in the boiler.

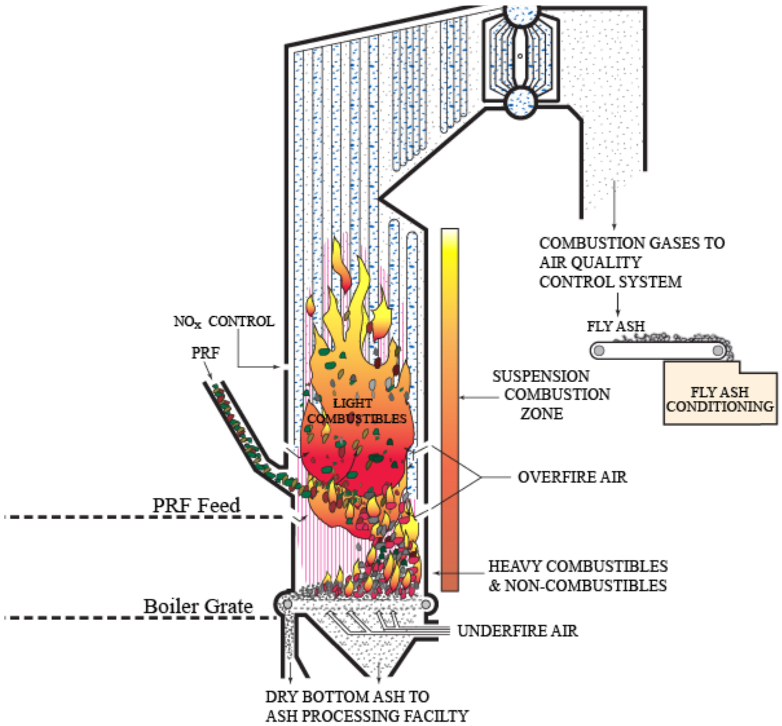

Figure 1-20: PRF Combustion in Spreader-Stoker Boiler

Steam will be produced in each steam generator (boilers) from the heat generated by the combustion of PRF. Each steam generator will consist of a waterwall boiler, superheater, steam and mud drums, economizer, and air heater. The superheater assembly will consist of a primary superheater, followed by a desuperheater complete with spray internals and then a final superheater. The main steam system will transport high-pressure, superheated steam from the superheater outlets to the turbine inlet for the generation of electricity.

The boilers will be designed to use #2 fuel (low sulfur distillate) that will be used during startup and shutdown, and to maintain system temperature at 1500°F during short-term plant upsets. Fuel will never be used for power generation.

Under normal operation, combustion air for the boilers will be drawn from the MSW and PRF Receiving and Storage Areas by a forced draft fan supplying air to the windbox under the grate to the plenum chambers. This design will serve to minimize the emissions of fugitive dust and odor from the Plant.

Design Parameters

The Plant will be designed to process approximately 2,100 tons per day of PRF with a heat content of 5,700 BTU/lb, and will have the capacity to manage alternative fuels and to generate electric power and steam. Each boiler will have a design heat input rate of 500 MMBTU/hour, which translates to an approximate PRF feed rate of 44 tons per hour per boiler. The maximum short-term operating level of each boiler will be equivalent to 110% of the design capacity, and the minimum will be 60%.

1.4.3.4 Emission Control System

The design and operation of the emission control systems will meet EPA applicable standards such as the New Source Performance Standards (NSPS), and the Best Available Control Technology (BACT) requirements. In addition, Maximum Achievable Control Technology MACT emission limits will apply for the substances that will be included in the federal permit known as PSD. **Figure 1-21** shows the emission control system.

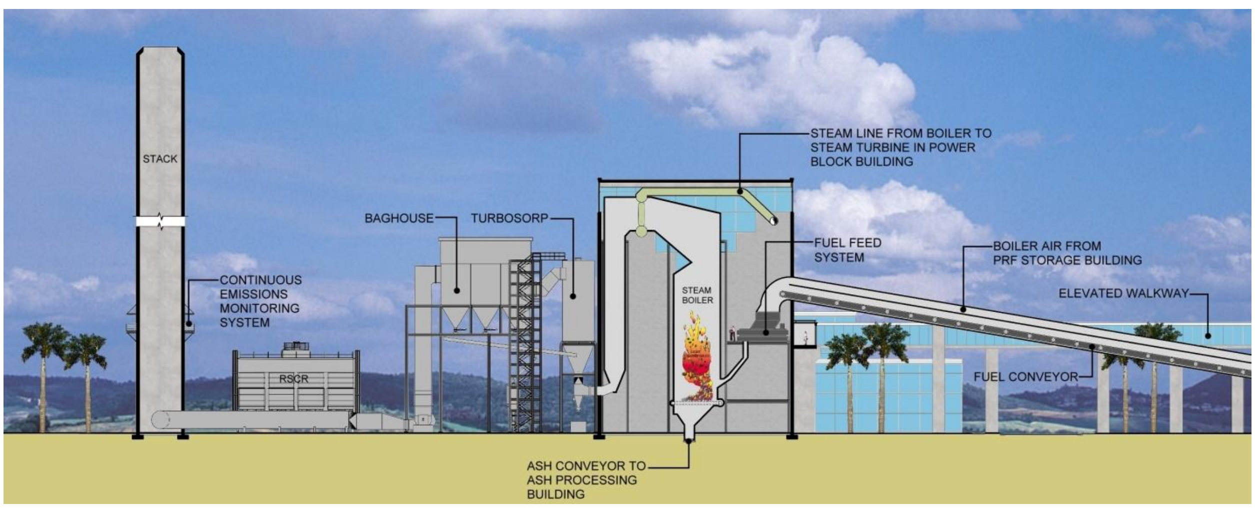

Figure 1-21: Emission Control System

Four (4) independent emission control systems are proposed for each boiler, consisting of:

1. An activated carbon injection system to remove heavy metals and dioxins/furans;
2. A Turbosorp® Dry Circulating Fluid Bed Scrubber system to remove acid gases from the boiler flue gas with lime injection;
3. A fabric filter (baghouse) to control particulate emissions (including metals); and
4. A regenerative selective catalytic reduction (RSCR) system to reduce emissions of nitrogen oxides (NOx).

These technologies qualify as MACT and BACT (see **Appendix C**)

The Turbosorp® system will remove acid gases, primarily hydrogen chloride and sulfuric acid, from the boiler flue gas. The principle of the Turbosorp® dry scrubbing technology is to bring together high levels of solid circulation, finely atomized water, hydrated lime and flue gas within a circulating bed reactor. Lime and finely atomized water are injected independently into the turboreactor to lower flue gas temperatures and enhance absorption capacity. The fluid bed material is comprised of solids, including calcium hydroxide, recirculated fly ash from the combustion process, and solid reaction products from the fabric filter. Upon leaving the turboreactor, the solid particles are separated from the flue gas in a baghouse and recycled back to the reactor. Following the fabric filter, the flue gas is injected with and ammonia aqueous solution and enters the RSCR and then to an induced draft fan, which will be connected to the stack.

Each air quality control system will include a complete system for the storage and preparation of the Turbosorp® and the RSCR reagent, ammonia aqueous solution, which will be stored in a 12,000 gallon storage tank. Lime will be stored in a silo with a bin vent filter to control particulate emissions.

The proposed air quality control system will be equipped with devices that will continuously monitor the following parameters at the sampling point:

- Sulfur dioxide emissions at the inlet to the Turbosorp®;
- Carbon monoxide emissions;

- Oxides of nitrogen emissions;
- Opacity;
- Boiler temperature;
- Temperature of the flue gas at the inlet of the fabric filter;
- Concentration of oxygen and carbon dioxide at the inlet of the Turbosorp® and at the outlet of the fabric filter; and
- Steam flow.

The Continuous Emission Monitoring Systems (CEMS) equipment will be designed and operated in conformance with the performance specifications of 40 CFR 60, Appendix B as referenced from 40 CFR 60, Subpart Eb.

The Plant will have a dedicated computer system to accumulate and process monitoring data from the stack gas monitors and boiler operating data. It will be instrumental for preparing reports of stack gas emissions as required by the EPA and the EQB. The data will also be shared by the digital control system of the Plant for performance monitoring.

The Plant stack will have a maximum height of 107 meters (351 feet) from ground level in accordance with Good Engineering Practices (GEP). FAA requirements for stack lightning will be incorporated into its design, which will also include platforms and access paths for emission monitoring.

1.4.3.5 Management and Recovery of Combustion Residues

PRF combustion will result in the generation of two (2) types of ash:

1. Bottom ash is the heavier, coarse fraction of the ash that remains on the boiler grate and is collected at the bottom of the boiler.
2. Fly ash is the lighter, finer fraction of the ash that is carried by combustion gases to the air pollution control equipment where it is removed.

These two (2) ash streams represent a total of approximately 20% (by weight) of the PRF that will be processed at the Facility. Since the two ash streams have different characeristics, they will be collected and managed separately.

- Fly Ash Handling System: Fly ash will be collected from the air heater hoppers, Turbosorp® hoppers and fabric filter hoppers using drag flight conveyors, and transported into a storage silo.

- Bottom Ash Handling System: Each boiler will be equipped with four (4) bottom ash hoppers and four (4) siftings hoppers which will discharge into a bottom ash discharge conveyor located at each hopper outlet.

The bottom ash hopper discharges onto two collection conveyors passing under each boiler. Each of the common redundant collection conveyors will have a design conveying capacity of 125% to 150% based on the maximum hourly design and production rate of both boilers discharging to the same conveyor.

Fly ash will be conditioned with EAI's patented process, which includes the addition of a conditioning agent and water. The process will result in a material that has consistently been proved by analytic methods (Toxicity Characteristic Leaching Procedure or TCLP) to be non-hazardous. This material has a mortar consistency which sets and hardens like cement, and has been proved to be effectively used as landfill cover. Energy Answers is currently researching potential uses for the conditioned product; however, if no potential reuse alternatives are identified, the material will be disposed of in an authorized landfill in compliance with the applicable legal requirements.

The bottom ash will be conveyed from the boilers to the Ash Processing Building where it will be processed using Energy Answers' proprietary system. This system will separate it into three components: ferrous metal, non-ferrous metals (aluminum, brass, copper, etc.) and a granular material known as Boiler Aggregate™, which has been demonstrated to have useful applications as a substitute for conventional aggregate in asphaltic underlayment and other construction related products.

1.4.3.6 Electric Power Production

The steam turbine will be a single-casing, single-flow extraction machine with three uncontrolled and one controlled extraction and a downward or axcial exhaust. The turbine will be directly coupled to an electrical generator that operates at 3,600 revolutions per minute (RPM) and will be sized at 110% of the rated flow of both boilers. Turbine throttle conditions will be 850 psig and 830°F. The generator will be specified to produce approximately 80 MW.

Electric power exported from the Project will be transmitted through a switchyard to PREPA distribution systems. The main and auxiliary transformers will be located at the electrical switchyard, located north of the power central structure or Power House, and will be equipped with containment dikes to retain oil in the event of leakage. The electrical switchyard will additionally contain a circuit breaker, a disconnect switch, provisions for electric power metering and other interconnection criteria. A takeoff tower will provide the interface with the transmission lines.

The necessary power for the Project will be provided by an auxiliary transformer which will receive power from the switchyard. The auxiliary transformer will be sized such that it will be capable of providing auxiliary power during normal, start-up, and shutdown operations. The auxiliary transformer will supply the 4.16 kV switchgear, which will be the distribution source for all large motors, the 480 V load centers and motor control centers, and all other station loads.

1.4.3.7 Water Supply for Plant Operation

An in-depth study of potential sources of water was conducted (Appendix N), which included the following alternatives:

- PRASA water main;
- Groundwater;
- Surface water;
- Brackish water from the DNER excedent discharge from Caño Tiburones into the Atlantic Ocean; and

- Reclaimed water from Arecibo Waste Water Treatment Plant

From this study, the recommendation for the use of 2.1 MGD of brackish water was adopted. Brackish water will be pumped from the excedent DNER discharge from Caño Tiburones to the Atlantic Ocean, through a force line from the Vigía Pumping Station to the Plant (*e.g.*, cooling tower and boiler).

The Plant cooling water system will also require chemical controls to prevent the formation of solid deposits and control corrosion, oxygen content and pH of the water and steam. These chemicals are typically provided by the chemical supplier in portable totes or drums, and added at low level concentrations (parts per million) to the cooling water cycle.

The Project will include a demineralizer system to provide high-purity demineralized boiler makeup water as required to maintain boiler system performance. The demineralezed water supply for the system will offset the boiler blow down (typically 1% of the steam production rate) necessary to maintain required steam quality and cycle performance. Deionized water will also be produced, which could be used for cleaning the equipment inside the steam cycle and for cleaning and maintenance of the demineralization system.

The demineralization system will be a three-stage process, based on reverse osmosis membrane technology: (1) pretreatment particulate filtration and dechlorination with either granular activated carbon adsorption and chemical dechlorination; (2) reverse-osmosis demineralization; and, (3) final demineralization "polishing."

Plant ancillary systems will include backwash and cleaning systems, chemical injection systems and possibly an ion exchange regeneration system utilizing sulfuric acid and sodium hydroxide solutions. The exact system configuration and optimization is highly sensitive to service water quality. Further characterization will be conducted during the Project design phase, to refine the indicated treatment scheme to minimize water use, chemical use and wastewater generation.

A steam cycle and water analysis system will be provided, consisting of a sampling panel with coolers, valves, pressure and temperature gauges, continuous sample analyzers and local grab sample connections. Sample points include boiler drum saturated steam, boiler drum water, feedwater to the economizer inlet, and condensate to the deaerator.

1.4.3.8 Alternative Fuels

The Plant will be able to handle, in addition to PRF, alternative fuels such as automotive shredder residue, tire-derived fuel and processed urban wood waste. Regular use of these alternative fuels is not ancitipated as part of the regular Plant operation.

Automotive Shredder Residue (ASR)

ASR is generated from the shredding of the interior plastic trim, upholstery fabric and filler, insulation and padding of end-of-life vehicles (ELVs). ASR may also consists of pieces of rubber, paper, hard plastic, vinyl, glass, and some aluminum and plated metals from the scrap, as well as rocks and dirt, the amount of which depends on scrap handling procedures. The successful co-combustion of ASR with MSW is well-documented in scientific and technical literature, and provides the benefits of additional materials recovery, energy recovery, and conservation of landfill space.

Energy Answers has conducted research with respect to a comparison of the compositions of ASR and the PRF for the Plant, and presents the following estimated data:

- The range of heating value of ASR (approximately 4,000-5,700 BTU/lb) is similar to that of PRF.
- The range of moisture content of ASR (approximately 8-12 %) is somewhat less than the expected average moisture content of the PRF.
- The range of inert material content varies (approximately 44-53% by weight) according to the process and the waste management practices.

Although currently ASR generation is not a common practice in Puerto Rico, the development of this Project provides an opportunity for the creation of a market for this alternative fuel, thus promoting the development of new recycling operations in Puerto Rico and helping to increase the municipalilities' recycling and recovery rates.

Processed Urban Wood Waste

Processed urban wood waste can be derived from activities such as demolition of wood structures, construction, land clearing after weather events (*e.g*., hurricanes, tropical storms), which usually are not used for chipping. This waste does not include vegetative material resulting from ordinary gardening activities. Dry wood has a heat content of approximately 8,000 BTU/lb, while wet wood has a heat content of approximately 4,500 BTU/lb. The environmental benefits of the use of processed urban wood waste depend on the recovery method.

Tire-Derived Fuel (TDF)

The system will be able to use TDF as an alternative fuel. TDF offers several advantages as a supplement to existing fuel sources. According to several emission studies conducted over the last decade, some of these advantages include its high heating value, which ranges from 12,000 to 16,000 BTU/lb, the generation of more electric power from less amount of waste, and the potential to decrease certain emissions through TDF co-combustion.

1.4.3.9 Main Plant Buildings

The Plant consists of eight (8) main buildings; below is a list of them that follows the same sequence as the schematic site plan (**Figure 1-16**):

- MSW Receving and Processing Building – municipal solid waste receiving and processing areas, where trucks will carry waste to the tipping area to separate recyclables from non-recyclables, and later to shred and process non-recyclables into PRF;
- PRF storage building;
- Storage building;
- Adjacent buildings that house the two (2) spreader-stoker boilers, steam turbine, and employee facilities (*e.g*., cafeteria, dining room, training area dressing room);
- Bottom and fly ash process building. In this structure the fly ash will be conditioned and

processed prior to disposal; and bottom ash will be collected and processed to separate and recover ferrous metals from nonferrous metals and to produce Boiler Aggregate ™ suitable for use in construction;

- Existing former paper mill building; and
- Administrative building.

Table 1-7 provides information regarding the footprint of the buidings indicated above:

Table 1-7: Floor Area of the Plant Main Buildings

Buildings	Approximate Floor Area (sq ft)
MWS Receiving	86,117
PRF Storage	86,469
Storage	16,500
Adjacent Building for Employees/Boilers/Steam Turbine	43,470
Ash Processing/Concrete Products	83,755
Former Paper Mill	71,902
Administration Building	17,355

In addition, **Table 1-8** lists the tanks that will be installed in the Plant:

Table 1-8: **Tanks to be Installed in the Plant**

Tank	Capacity (thousand gallons)
Raw Water (Brackish)	1,000
Treated or Processed Water	80
Diesel Fuel for Fire Water Pump	0.5
Diesel Auxiliary Fuel	100
Emergency Generator Tank	2

Tank	Capacity (thousand gallons)
Neutralization Tank	10
Sulfuric Acid Tank	5
Caustic Soda Tank	5

1.4.4 Construction and Operation Period

Construction activities within the site will include demolition, if necessary; site preparation; and structure construction. It is estimated that site preparation and construction of the Plant will be completed within 24 months.

It is envisioned that the operation schedule of the Plant will be 24 hours a day, 7 days a week and solid waste will be received from Monday to Saturday.

1.4.5 Safety Controls

The Plant will have control systems whose main goal is to promote plant and staff safety during the production schedule, both inside the site and surrounding areas. Security controls to be implemented are described below:

1.4.5.1 Fire Protection System

The main objective of the fire protection system is to provide the Plant with an adequate detection and alarm system and a means for controlling and extinguishing fires. The fire protection system will be developed according to the requirements of the Puerto Rico Fire Department and the Puerto Rico Human Safety and Fire Protection Code, and will follow the guidelines of the National Fire Protection Association (NFPA). In addition, local fire protection codes will be incorporated into the design of the Plant.

The fire protection system will be a loop-type distribution system designed to service the main buildings of the Facility. It will consist of a water fire main around the Plant servicing a yard hydrant system and sprinkler, deluge and standpipe systems within the various buildings. A jockey pump and redundant fire pumps will be installed to boost the pressure and flow as necessary.

Isolated structures such as the Administration Building may be served directly from the municipal water supply. Fire hydrants will be located at approximately 250-foot intervals. Hose cabinets will be located adjacent to yard fire hydrants. Post indicating valves and/or underground valves with roadway boxes will be furnished to isolate sections of the yard main and individual building supplies. The source of water for the fire systems will be the raw water storage tank. The water system will be supplemented by portable extinguishers throughout the Plant, in accordance with the current applicable regulations.

A detection and alarm system will be designed as part of the fire protection system and will meet the requirements of NFPA. The fire alarm system will actuate the audible alarms required for building evacuation signals. 180,000 gallons of water will be stored at all times and reserved for the fire protection system. This volume exceeds NFPA requirements.

1.4.5.2 Control Systems

MSW processing operations will be monitored and controlled from the MSW Processing and Storage Building. Boiler and power block operations will be monitored and controlled from the Boiler Building. Ashes processing will be controlled from the Ash Processing Building.

Pan/tilt/zoom cameras will be provided at the MSW and PRF storage areas that can also monitor the storage transfer belt conveyor discharge. The fuel feed system to the boilers will be provided with one camera at each boiler feed conveyor.

A Distributed Control System (DCS) will provide overall Plant control and monitoring functions. The DCS will include microprocessor-based process control units and redundant data. The DCS microprocessor process control units will be redundant, with diagnostics to alert the control room operator of a malfunction.

Separate programmable controllers will be provided for packaged equipment such as the water treatment system, lime slurry preparation and fire protection. A burner management system (BMS) will be provided to supervise the operation of the boiler auxiliary natural gas burners. The BMS will include boiler purge, burner light-off, burner shutdown, burner safety, and overall management of these features. The BMS will conform to NFPA standards.

The turbine will be controlled by an electro-hydraulic governor system with operator interface from the main control room. Generator controls for synchronization, voltage regulation, and generator breaker operation will be hardwired for control from the main control room. Unit protective functions will be directly wired to turbine trip, boiler trip, electrical lockout relays, etc., with a minimum of interposing relays or solid-state devices in the circuit. Other self-controlling loops, such as feedwater heater drain control, will be local to equipment. Equipment requiring periodic actuation while the Plant is in normal operation, such as conveyors, burners, and other load-dependent equipment, will be controlled from the main control room while the Plant is operating.

Two operator stations will be provided as part of the main control room console. Boiler and turbine panel inserts will be supplied and integrated into the main control room auxiliary panel. Printers and engineers' work stations will be provided for performing program modifications.

The operator will be alerted to abnormal conditions by LCD station displays and by alarm printer(s). The LCD stations will have access to all the information transmitted on the data network.

The DCS also will provide specific shift and daily logs to augment the operator's log. These will be automatically printed or printed upon demand. The operator will also be able to create additional logs. These logs will summarize consumption of fuel, lime reagent, power, and water usage.

1.4.5.3 Ventilation and Air Conditioning Sistems

Designated zones of the Plant will be equipped with a ventilating and air conditioning system where necessary to provide an environment suitable for personnel and/or equipment operations, with consideration to maintaining acceptable conditions of temperature, humidity, filtration, fresh air supply, pressurization, air movement and exhaust removal of vitiated or contaminated air. Outside ambient conditions of temperature and relative humidity will be used for design of the system.

MSW, PRF, and ash processing, storage and equipment areas will not be air conditioned but will have ventilation systems designed for dust and odor control.

1.4.5.4 Education Program

Energy Answers will conduct an education program to (a) prevent delivery of unacceptable wastes to the Plant; and (b) to ensure that non-processable wastes are delivered in segregated loads rather than mixed with processible waste. A brochure will be prepared for distribution to schools and residential areas to alert and educate them of the proper way to handle and dispose of household hazardous waste.

A separate brochure will be prepared for comercial, industrial and institutional customers identifying the unacceptable wastes that should not be delivered to the Plant and alternative means of disposal of such wastes. Depending on availability, Energy Answers personnel will provide presentations to students in science and environmental courses and training schools, regarding recycling and proper disposal of solid waste.

All waste haulers will be advised about unacceptable wastes and will be required to sign statements that they are not collecting and delivering such wastes to the site. Warning signs and listings of unacceptable waste materials will be located near the main gate and ahead of the incoming truck scales. During the first few months of operation, and on a periodic basis thereafter, the scalehouse operator will query drivers to determine if their waste loads contain unacceptable waste. All known loads consisting of unacceptable waste will be rejected.

1.4.5.5 MSW Inspection Program

Several measures will be taken at the site to inspect the incoming waste stream for the presence of unacceptable and non-processable waste. The scalehouse will be equipped with radiation detectors just ahead of the incoming scales to screen all truck deliveries for radioactive waste. If the alarm sounds, further inspection of the load will be conducted. Upon confirmation of the presence of radioactive waste, the load will be rejected and the appropriate authorities notified.

Waste delivery trucks which have been properly identified, screened and weighed-in will proceed to the MSW tipping area to be unloaded. Loads will be visually inspected during unloading onto the tipping floor. Random inspections of vehicles will also be conducted to detect not-recyclable, unacceptable and non-processable items, as stated on the Plant Operation, Maintenance and Safety Manual. Waste loads that are deemed unacceptable by the operations personnel will be rejected and the driver will be issued a written rejection slip. A record will be maintained of unacceptable waste deliveries, by delivery vehicle, and repeated deliveries by a particular vehicle or by a particular waste hauler will result in a prohibition of future deliveries to the Plant. Special handling procedures will be implemented in the event of returned waste, and vehicles carrying rejected waste will be weighed out before leaving the site. Specific procedures for the management of hazardous waste that gets into the Plant will be developed in accordance to the Plant Operation, Management and Safety Manual.

An extensive training program will be provided for the waste receiving area attendants and front-end loader operators so they can inspect for and remove unacceptable and non-processable waste materials from the waste stream that has been unloaded and accepted. The operators of the picking station at each of the infeed conveyors to the shredders will provide additional inspection of the acceptable waste stream. Each picking station will be equipped with a stop button to allow workers to remove such items from the waste stream. Unacceptable materials discovered in the acceptable waste stream will be removed and stored in a designated area of the MSW tipping area the PRF storage area, to be loaded into a container or transfer trailer for shipment to licensed disposal facilities. Non-processable items discovered in the acceptable waste stream will be removed or recovered, if possible, or disposed of in accordance with applicable regulations.

1.4.5.6 Household Hazardous Waste Collection

Energy Answers will encourage municipalities served by the Plant to conduct “hazardous waste days”, for the special collection of household hazardous wastes, through contract agreements with the concerned municipalities. Energy Answers will work with communities and licensed hazardous waste disposal contractors to establish such collection programs and/or drop off programs at the Plant. As soon as the program is implemented, it will be publized in the residential and commercial brochures.

1.4.6 Flooding Design

The Rio Grande de Arecibo (RGA) is located west of the site that has been proposed for the development of the Plant. Based on the Flood Insurance Rate Map (FIRM), Panel 230J of November 18, 2009, the site is located in a Zone AE within the floodway of the RGA, with a base flood (100-year) elevation of 5.2 meters (17.06 feet) above mean sea level (MSL).

A Hydrological-Hydraulic Study (**Appendix B**) was conducted in order to determine RGA flood levels for the 10-, 50-, 100-, and 500 year events, and to revise the limits of the floodway within the site, taking into account the existing topography and model updates. The study provides the hydraulic modeling and required documentation to request from FEMA and the PRPB an amendment to the floodway limits. The hydrological analysis was calibrated using the rain event associated with Hurricane Georges in September 1998, with data published on the USGS report "Flood of September 22, 1998, in Arecibo and Utuado, Puerto Rico" (Torres-Sierra, 2002).

Since the Effective FEMA Model is not available, a bi-dimensional model was prepared using the FLO-2D model to match FEMA base flood levels (100 years) along the area of river under study, covering a distance of 2.1 km, from FEMA section "C" to section "E".

Based on the above information, a model was prepared to determine the new floodway limits for a 100-year event, where regulatory limits and the new floodway limit were analyzed. The new floodway limits were determined along RGA based on the highest allowable increase of 0.3 meters in flood level.

1.4.6.1 Flood Control Measures

The floodway limits have been revised to run along the perimeter of the proposed site, thus re-classifying the site as a Zone AE outside the floodway, where the provisions of Section 7.03 of Regulation #13 apply. **Figure 20** of **Appendix B** shows the proposed floodway limits. The proposed amendments require modifications to the topography of the area between the Plant and the river channel, to reach a maximum land elevation of 3.5 meters-msl, and to provide a larger flow area along the river bank as shown on **Figure 21** of **Appendix B**. Specifically, this activity will take place west of the Project site, in the area where the existing retention ponds are located, and will consist of the cutting of the berms or the pond tops to lower them to a maximum elevation of 3.5 m-msl (Figures 20 and 21 of the H-H Study).

The 100 and 500 year flood levels remained unchanged; therefore, the flood limits do not have to be changed.

1.4.6.2 Stormwater Management

In addition to the flooding analysis, a preliminary assessment of the stormwater retention capability of the site was conducted for compliance with Section 14.0, Stormwater Management, Planning Regulation No. 3 (Planning Board Subdivision and Urbanization Regulation).

The peak stormwater discharge produced by the site in its existing and proposed states was preliminarily determined. Stormwater discharge generated by the proposed development shall not exceed the existing discharge. The assessment consisted of a hydraulic modeling of the site to determine the dimensions of the ponds that will limit the proposed peak discharge, so that it does not exceed the existing peak discharge for storms with different recurrences.

Two (2) retention ponds, each approximately 2-meter deep, are proposed to be located in the northwest and southwest corners of the Project site (**Figure 1-16**). However, the final dimensions of the ponds will be defined during the design of the Project. Preliminarily, the Project has been divided into three drainage areas. The stormwater discharge will be directed to the two ponds, using the Project's final slopes to direct runoff as surface flow into the ponds. The stormwater discharge will keep the existing drainage pattern and will reduce the Project peak discharge, in compliance with PRPB Regulation No. 3 (Subdivision and Urbanization).

The conclusions and recommendations of the Study HH regarding stormwater management and flood levels will be considered in the design and construction of the Project.

1.4.7 Contingency Plans

Contingency plans for the Plant will be put into effect if operations are interrupted and alternative disposal sites are needed, because of severe weather events such as a hurricane, or maintenance schedules, or issues with PRF storage capacity and management. The Plant manager will provide advanced information to users regarding the need and availability of alternative disposal.

If operations were interrupted, MSW that can not be processed into PRF will be stored in the waste disposal area of the MSW storage building. Alternative disposal facilities could be used for the short duration of the emergency or event, if necessary.

1.4.8 Off-site Works

The Project will require the completion of off-site work to bring brackish water to the Plant and to connect the electric power produced by the Plant to the PREPA network. In addition, the Plant will be connected to PRASA's water line and sanitary trunk located in State Road PR-2 adjacent to the site. Following are the details of the proposed off-site work.

1.4.8.1 Brackish Water Pumping and Transfer Pipeline

The Department of Natural and Environmental Resources (DNER) operates a brackish wáter pumping system that contributes to the restoration of Caño Tiburones by minimizing saline intrusion in the wetland and keeping and increasing its wildlife. As part of this pumping system, the DNER currently discharges approximately 100 MGD of excedent brackish water into the Atlantic Ocean through El Vigía Pumping Station (See **Figure 1-22**). The pumping system is comprised of the pumping station located at El Vigía sector and the discharge channel that ends in an area adjacent to the Arecibo Yatch Club (*Club Náutico*). Currently there are two (2) 1,500 HP pumps operating in the station, each with capacity to pump 80,000 gallons per minute (gpm). These pumps are operated with two electric power generators. The pumping station has two aboveground storage tanks, with capacities of 5,000 and 280 gallons (*i.e.*, daily tank) to storage the diesel fuel used by the generators.

Energy Answers plans to maximize the use of wastewater for the Plant operation, and to minimize the use of potable water and its impacts to the Regional surface or groundwater supply. Therefore, the design and operation of the Plant will include the use of the brackish water already extracted by DNER through the pumping station. Approximately 2.1 MGD (*i.e.*, 1,460 gpm) of brackish water will be pumped through a 14-inch diameter and 3,200-meter long force line to the Plant (see **Figure 1-23**). This volume represents approximately 2% of DNER's daily discharge of brackish water into the ocean. The pumping proposed by Energy Answers only applies to the excedent brackish water that DNER discharges daily into the indicated channel.

DNER has confirmed the viability of Energy Answers' proposal to the use of excedent brackish water from its daily discharge, see **Appendix O**.

Figure 1-22: Photo of Excedent Brackish Water Discharge – El Vigía Pumping Station

N
W
E
S

Scale: 1:14,000

0 100 200 400 Meters

Legend:

- Pump Station
- Roads[1]
- Brackish Water Pipeline Route
- Property Boundary

Sources:
1. Puerto Rico Highway and Transportation Authority (ACT by its acronym in Spanish), June 2006
2. 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)

CSA Group

Figure 1-23: Aerial Photo of the Brackish Water Pipeline Route

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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The brackish water line to the Plant will be located in the pump station, after the existing DNER extraction point. Two pumps with pumping capacity of 1,460 gpm each will be installed to transfer brackish water to the Plant. These pumps will work alternately and will be backed up by an emergency generator of up to 100 HP capacity that will maintain operation in the event of interruptions in PREPA's electrical service. The emergency generator will use diesel fuel that will be stored in an above ground storage tank with a secondary containment system, as required by the current regulations.

The force line will be installed along the right of way of State Roads PR-681, PR-6681, and PR-2 all the way to the Plant. The line will be installed at 1.25 meters down from the existing street level of the indicated roads. **Figure 1-24** shows a detail of the trench that will be used for the installation of the pipeline. Approximately 4,500 m^3 of earth crust material will be excavated for the proposed trench, and approximately 65% of this amount will be reused to refill the trench. In addition, selected fill material (see trench detail) will be used for the installation of the pipeline.

The existing infrastructure in these state roads was identified and no impediment is expected for the installation of the proposed pipeline. The proposed route will cross the existing bridge at State Road PR-681 (near the Arecibo Yatch Club), with the pipeline running attached to its right side in the direction of State Road PR-2. Currently there are no pipes installed on that side of the bridge, so no need for special structures for the installation of the brackish water line is anticipated. As part of the installation of the pipeline, a Maintenance of Traffic Plan shall be prepared and submitted to the PRHTA, outlining the security and operational measures that will be established and implemented during this process, so that temporary impacts to traffic are minimal.

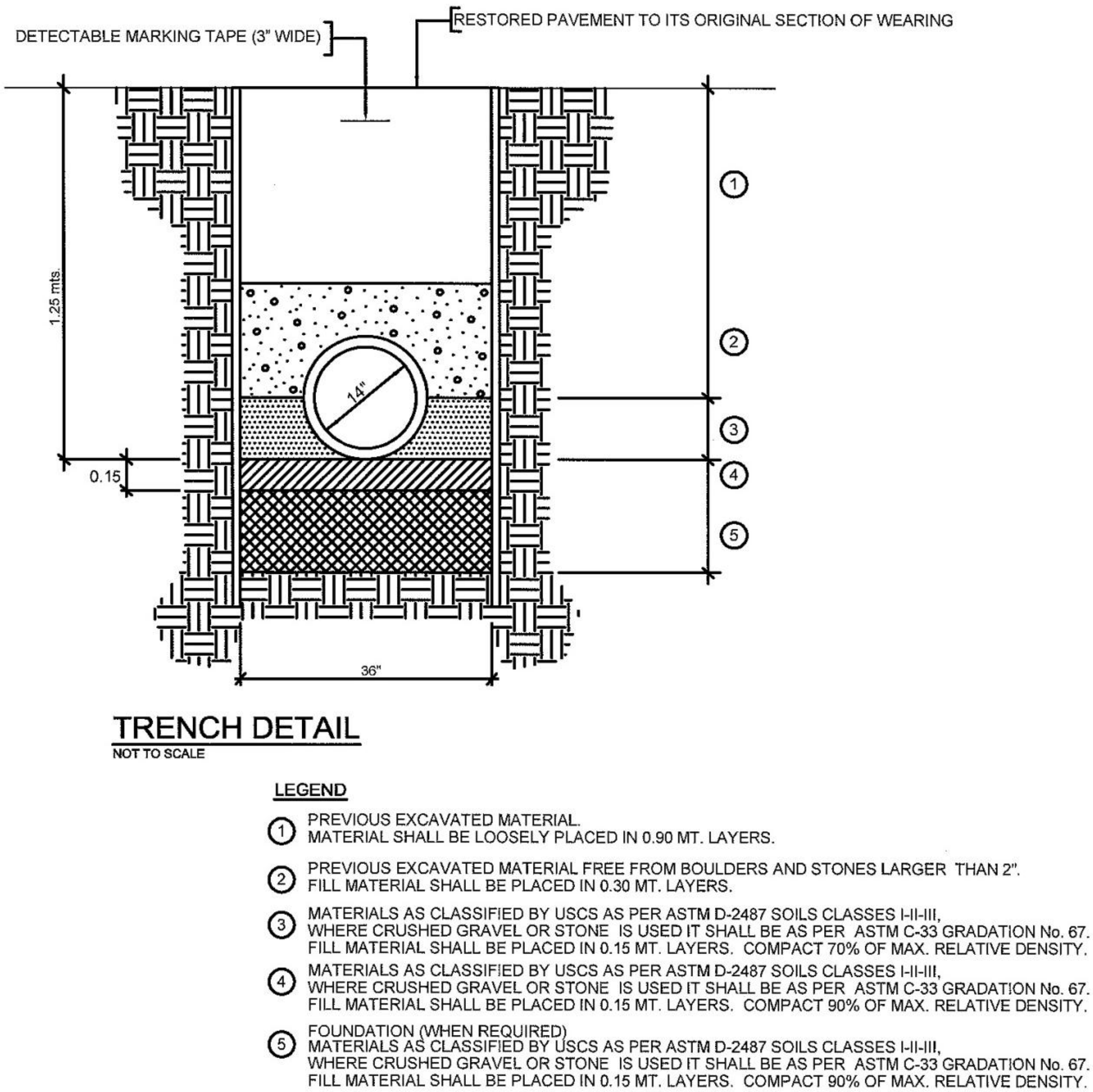

Figure 1-24: Trench Detail for the Installation of the Brackish Water Pipeline

1.4.8.2 Power Transmission Lines and Improvements to Existing Substation

As indicated, the Plant will produce a gross amount of 80 MW of electric power. Approximately 70 MW will be sold to PREPA through a purchase agreement and delivered at the Project interconnection point.

To determine the best route for the transmission lines to the existing substation, parameters such as the distance from the Project interconnection point, parcel owners or adjacent properties, adjacent land use, existing utility easements, flooding areas, wetlands and the costs associated with the construction of the electrical system were considered.

PREPA evaluated several interconnection alternatives for the Project and determined that the preferred electrical interconnection point would be the Cambalache Transmission Center (CTC), located at approximately 0.5 miles south of the Plant site. The interconnection point in the CTC will have a voltage of 38 KV. This voltage is derived from an existing 100 MVA, 115kV to 38kV transformer located at the CTC. This 100 MVA transformer feeds at 115 KV from a PREPA's Cambalache Power Plant direct line.

Of the evaluated alternatives, the best route is a feeder or dual conductor simple circuit line. The aerial feeder line leaves the Plant heading south, and will run parallel (with an easement of approximately 25 feet wide) to the west side of the PR-2, up to the southern boundary of the former Central Cammbalache Sugar Mill where it will continue west until reaching the CTC (see **Figure 1-25**). The aerial power line will run on steel poles 70 feet high and 150 feet apart.

1.5 Financing

EAI will finance the construction of the Project through private funding. The preliminary evaluation indicates that the Project total cost will be approximately $500 million.

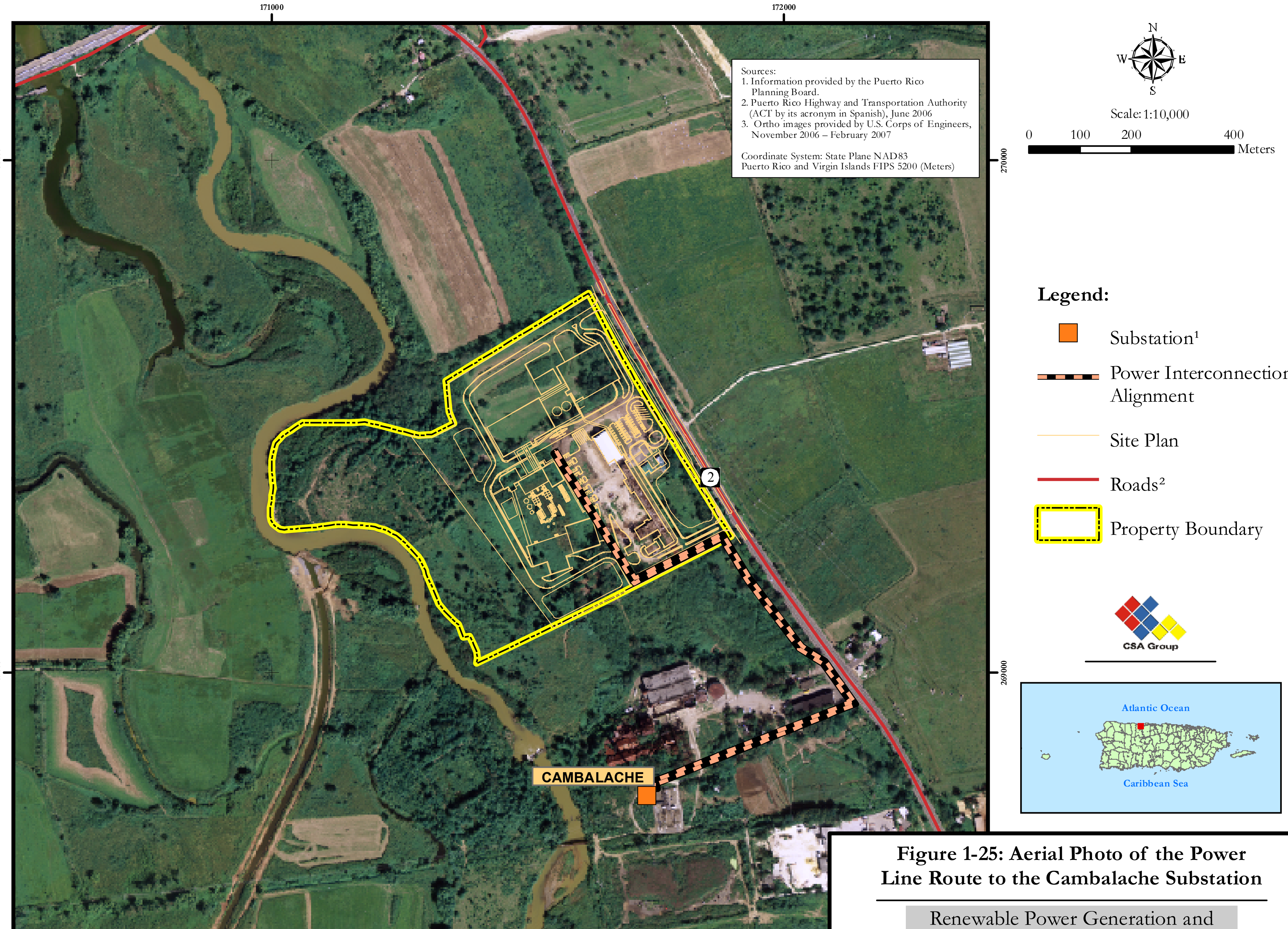

Figure 1-25: Aerial Photo of the Power Line Route to the Cambalache Substation

Renewable Power Generation and Resource Recovery Plant / Arecibo, PR

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