Autoridad de Desperdicios Sólidos

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Dynamic Itinerary for Infrastructure Projects Public Policy Document

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1. Introduction

The Puerto Rico Solid Waste Management Authority [Autoridad de Desperdicios Sólidos (ADS, for its initials in Spanish)] has developed an integrated, comprehensive infrastructure program to provide environmentally sound and cost-effective solid waste management services for Puerto Rico. The solid waste program policy includes the development of a Dynamic Itinerary for Infrastructure Projects (Dynamic Itinerary or Itinerary). The main objective of this Itinerary is to develop and implement infrastructure strategies to manage Puerto Rico's solid waste in a safe and efficient manner for the next 25 years in compliance with regulations. It will provide strategic guidance for the development of the appropriate infrastructure needed according to the technology and the environment. The implementation of this Itinerary compliments the work plan established by the ADS.

The Strategic Plan for Solid Waste Management (PERMS) was prepared by the ADS in 2003 and elevated to a public policy through Executive Order 2004-41 of July 21, 2004. The PERMS considers areas that have not been attended by previous plans, such as the development of markets and the participation of citizens. This Itinerary represents the operations part to implement the established strategies in the different areas contained in the PERMS. On November 2, 2007, Executive Order 2007-48 was approved through which the reduction on the use of landfills as a principal method of disposition and management of solid waste in Puerto Rico was ordered. Through this mandate it becomes necessary the development of this Itinerary.

Furthermore, over the last few years, ADS initiated and completed two additional major studies. The "Waste Characterization Study" report prepared by Wehran (2003) consisted of an analysis of the solid waste generation quantities and characteristics. "The Study of Evaluation Diagnosis and Recommendations for Sanitary Landfills" in 2004 also known as the "Landfill Useful Life Study" by VHL/Malcolm Pirnie, Inc. provided a detailed analysis of the remaining capacity of all the currently operating landfill disposal facilities. These two studies provided critical information on which many assumptions of this itinerary are based. During the development of this planning document several suppositions were developed to project possible future conditions. Periodically, this suppositions will be evaluated and adjusted accordingly.

The Dynamic Itinerary provides an overview of the existing solid waste management system. The Puerto Rico solid waste management system serves seventy-eight (78) municipalities that generate almost four million tons per year of residential, industrial, and commercial waste. It consists of: several programs that help with the source

reduction/reuse and recycling of this waste; nine (9) materials recovery facilities (MRFs); four (4) compost plants; seventeen (17) transfer stations; and thirty-two (32) operating landfills. The Itinerary considers the diversion programs that have been implemented and the existing facilities, as well as the proposed changes to optimize these.

It also projects the waste generation for the next 25 years. For the purposes of this Dynamic Itinerary, the average daily generation rate reported in the Waste Characterization Study was adjusted for the published 2003 population projection and the amount of recycled materials per person per day to determine a final generation daily rate of 5.56 lbs per person.

An evaluation of all 32 of the existing landfills in Puerto Rico was performed as part of this Itinerary to identify potential landfill expansions. The evaluation utilized the criteria outlined in the 40 CFR Part 258 Subpart B regulation that specifies the municipal solid waste landfill location restrictions to determine the potential expansion capabilities of these systems.

The Dynamic Itinerary discusses the development of the capacity model to be used as a tool for understanding solid waste management planning:

"Do Nothing" Scenario The capacity model projection of the "Do Nothing" scenario (i.e., no additional disposal or processing capacity added and no growth in the diversion rates is achieved) shows that Puerto Rico would run out of disposal capacity by 2018 giving the current system a useful life of approximately 12 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 waste from landfills while providing adequate disposal capacity during the development and implementation of the proposed strategies.

Base Case Scenario The Base Case scenario capacity model projection (i.e., ADS 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 following assumptions are considered in the Base Case scenario:

- Diversion rate begins at 15.3% in 2006 and reaches the 35% goal in 2016
- Assume the diversion rate stays constant at 35% from 2016 to 2030
- A 1,560 ton per day waste-to-energy processing facility will be in service in 2013 in the North East Region and another 1,350 tons per day will be in service in 2012 in the North West Region.

- The closed landfill loads that are projected could be transferred to the North East Region waste- to-energy facility are: Carolina, Toa Alta, Toa Baja, Guaynabo, Florida, and Vega Baja[1].
- The closed landfill loads that are projected and could be transferred to the North West Region waste-to-energy facility are: Aguadilla, Añasco, Arecibo, Moca, Hormigueros, and Mayaguez[1].
- Existing landfills use all of their remaining useful life before closing
- Six landfills are expanded outside of current footprint: Fajardo, Humacao, Ponce, Juncos, Salinas and Yauco for a total additional capacity of 63.4 Million Tons
- The expansion for the Isabela landfill will be performed with the purpose of mitigating environmental conditions at the site and stabilizing the slopes of the landfill. This expansion was calculated in approximately 0.6 million tons.
- Transfer of waste from closed to operating landfills is facilitated through the use of transfer stations
- Includes the incoming capacity added by the new Peñuelas landfill, coming on line in 2010. However, this landfill could begin operating sooner since the construction phase of the landfill could start at any moment.

The Base Case scenario establishes the necessary steps to reduce the use of landfills as a primary alternative to manage the municipal solid waste (MSW). It also defines the initial goals to increase the deviation rate and to incorporate the waste-to-energy technology. Once the projects proposed for the next ten years have been developed, Puerto Rico will be in a suitable position to increase the Diversion Rate and the use of the waste-to-energy technology. This scenario provides the flexibility necessary to surpass these expectations because, after having developed these projects, increasing both alternatives will only require the reduction of existing landfill capacity.

Back up Case Scenario The Back up Case scenario capacity model projection (i.e., diversion rate goal of 35% met in 2026 instead of 2016 and the alternative technology processing facility is never implemented) demonstrates that in year 2030 there will be eight (8) landfills in operation with 7.5 years of useful life left. The following assumptions are considered in the Back up Case scenario:

- Diversion rate in Puerto Rico begins at 15.3% in 2006 and reaches the 35% goal in 2026
- No alternative technology processing facilities are constructed during this period
- Existing landfills use all of their remaining useful life before closing

[1] Possible load transfer alternative

- Seven landfills are expanded outside of their current footprint: Cabo Rojo, Fajardo, Humacao, Juncos, Ponce, Peñuelas New and Yauco for a total additional capacity of 70.6 million tons.
- The expansion for the Isabela landfill will be performed with the purpose of mitigating environmental conditions at the site and stabilizing the slopes of the landfill. This expansion was calculated in approximately 0.6 million tons.
- Transfer of waste from closed to operating landfills is facilitated through the use of transfer stations
- Includes the incoming capacity added by the new Peñuelas landfill, coming on line in 2010. However, this landfill could begin operating sooner since the construction phase of the landfill could start at any moment.

Table 1-1: Main Assumptions and Projections for the Base and Back-up

Scenario	35% recycling goal met?	Year when 35% diversion goal is met	Proposed WTE capacity added in tons/yr	Proposed # of landfill expansions	Total disposal capacity added through landfill expansions in M Tons, 2007-2030	# of landfills in operation in 2030	Landfill capacity available in 2030 in M Tons	Remaining Landfill useful life at 2030 in Years
Base Case	Yes	2016	902,828	6	63.4	7	34.9	17.8
Backup Case	Yes	2026	0	7	70.6	8	21.1	7.5

Table 1-1 summarizes the importance of increasing the Deviation Rate and establishing the waste-to-energy facility proposed in the base case. These will provide additional processing capacity and will extend the remaining life of the infrastructure system for the management of the MSW.

2. Existing Solid Waste Management System

2.1. General Description

The Puerto Rico solid waste management system serves seventy-eight (78) municipalities that generate almost four million tons per year of residential, industrial, and commercial waste. It consists of: several programs that help with the source reduction/reuse and recycling of this waste; nine (9) materials recovery facilities (MRFs); four (4) compost plants; seventeen (17) transfer stations; and thirty-two (32) operating landfills.

The federal and state regulations are an important factor in the Solid Waste Management System in Puerto Rico and determinant on identifying which facility continues operating and which facility closes. The most critical regulations that are affecting current landfill facilities are the EPA's Subtitle D (40 CFR 258) regulations of the Resource Conservation and Recovery Act (RCRA) of the EPA. These regulations enforce how the construction, operation and closure of landfills should be undertaken.

2.2. Recycling/Composting

On September 18, 1992 the first legislation mandating recycling was approved in Puerto Rico. This legislation came to be known as Law 70 or Law for the Reduction and Recycling of Solid Waste in Puerto Rico. Law 70 promotes the development and implementation of a program for the reduction, reuse, and recycling of the solid waste in Puerto Rico with the integration of the public and private sector. The same established the 35% as an initial goal for recycling. The Dynamic Itinerary proposes assertive strategies to reach at least the 35% deviation rate on or before year 2016.

Table 2-1 presents a summary of the MRF facilities, while Table 2-2 presents a summary of the compost facilities. As identified in the two tables above, not all facilities are in operation.

Table 2-1: MRF Facilities in Puerto Rico

Facility	Owner	Municipality	Operational Status
Hatillo MRF	PRIDCO	Hatillo	In Operation
Hormigueros MRF	ADS	Hormigueros	In Operation
Guayanilla MRF	ADS	Guayanilla	In Operation
Pronatura	Private	Bayamon	In Operation

Facility	Owner	Municipality	Operational Status
IFCO	Private	Caguas	In Operation
GC Reciclaje Inc.	Private	Humacao	In Operation
Carolina MRF*	Municipality	Carolina	In Operation
Guaynabo MRF	Municipality	Guaynabo	In Operation
Ameriplast	Private	Arecibo	In Operation

* The Carolina Dirty MRF is in the process of changing to a Clean MRF.

Table 2-2: Compost Facilities in Puerto Rico

Facility	Municipality	Operational Status
Toa Baja Compost	Toa Baja	Not in Operation
Arecibo Compost	Arecibo	In Operation
El Fresal Compost	Aibonito	Not in Operation
Mayaguez (PRASA) Compost	Mayaguez	In Operation

The ADS has also implemented several recycling programs with the help of local community groups, private commerce and industries, schools, and government entities, among others. Among these are collections of recyclables via blue bags, drop off programs or other source separation programs. Table 2-3 summarizes the number of programs established as of the year 2006.

Table 2-3: ADS Implemented Diversion Programs for 2006

Program	Number of Programs Established
Blue Bags	1,422
Commerce	5,603
Industries	454
Schools	1,104
Agencies	456
Dependencies	1,347
Drop Offs	129

During the preparation of this Dynamic Itinerary, ADS calculated the Deviation Rate which includes the reduction, reuse, recycling and compost. In 2006, the Deviation Rate was 15.3%. Table 2-4 summarizes the related information.

Table 2-4: Summary of 2006 Diversion Rate by ADS

Material	Recycled Material Reports (tons)
Cardboard	109,469.44
Paper	61,096.29
Plastic	17,423.50
Glass	5,971.95
Aluminum	14,000.31
Iron and Steel	167,748.90
Other Metals	42,614.11
Tires	18,937.64
Tires (non structural use)	37,035.39
yardwaste	20,969.53
wooden palets	37,059.34
E-waste	717.78
Vegetable oil	4,106.24
Cotton	183.00
Asphalt	32,724.75
Printer cartredges	17.88
Sludge	23,541.65
Concrete	33,615.60
Total Material Diverted	627,233.30
General Data	
Population (persons)	3,948,044.00
Disposed Solid Waste (tons)	3,468,950.06

Diversion Rate	
Recycling Material	627,233.30
Generated Solid Waste	4,096,183.36
2006 Diversion Rate	**15.3%**

2.3. Collection and Transfer Operations

Solid waste in Puerto Rico is currently being collected by private and municipal solid waste haulers. Municipalities may self-haul its waste to disposal locations with its own public workforce or contract out for such services with the private sector. Such municipality-sponsored collection systems are generally for residential waste generation. There are different types of contracts established by each municipality with the private

collectors. In addition, some municipalities participate in the collection of solid waste with private companies in the same municipality. Although the municipalities have traditionally been in charge of collecting most of the waste, private collection of residential solid waste has been increasing in Puerto Rico. Commercial waste is often arranged for and collected by private sector haulers via direct contractual arrangements with the commercial generators.

Some municipalities utilize waste transfer stations to process and transport the waste to the ultimate disposal sites due to long distances. The solid waste management system in Puerto Rico currently has seventeen (17) transfer stations of which fourteen (14) are in operation. The facilities are presented in Table 2-6:

Table 2-5: Overview of Transfer Stations in Puerto Rico

Transfer Station	Location	Operating (Yes or No)	Processed Waste (TPD)[1]	Operator[2]	Landfill Disposal Location[3]
Comerio MTS	Comerio	Yes	30	Municipality of Comerio	Toa Alta
Morovis MTS	Morovis	Yes	67	Municipality of Morovis	Arecibo
Jayuya MTS	Jayuya	No	47	NA	NA
Quebradillas MTS	Quebradillas	Yes	30	L&M Waste	Yauco
San Sebastian MTS	San Sebastian	Yes	60	Municipality of San Sebastian	Moca
Lares MTS	Lares	Yes	40	Municipality of Lares	Arecibo
Las Marias MTS	Las Marias	Yes	10	Municipality of Las Marias	Moca
Maricao MTS	Maricao	Yes	10	Municipality of Maricao	Mayaguez
San German MTS	San German	Yes	80	Municipality of San German	Yauco
Villalba MTS	Villalba	Yes	40	Municipality of Villalba	Juana Diaz
Cidra MTS	Cidra	Yes	70	BFI	Ponce and Salinas

Transfer Station	Location	Operating (Yes or No)	Processed Waste (TPD)[1]	Operator[2]	Landfill Disposal Location[3]
Maunabo MTS	Maunabo	Yes	30	L&M Waste	Arroyo
San Juan TS	San Juan	Yes	1,500	Waste Management	Humacao
Caguas TS	Caguas	Yes	375	Waste Management	Humacao
Cataño TS	Cataño	Yes	NA	BFI	Ponce
Trujillo Alto TS	Trujillo Alto	No (Under Construction)	125	Municipality of Trujillo Alto	Juncos
Utuado-Adjuntas TS	Utuado/Adjuntas	No (Under Construction)	150	NA	NA

Note:

1 Represents the processed waste at the Mini-Transfer Station (MTS) or Transfer Station (TS)

2 Operated by designated entity through operations contract

3 Represents designated disposal location for solid waste received and processed through facility

2.4. Energy/Resource Recovery

Currently, there are no resource recovery facilities operating in Puerto Rico. The existing flares at the Carolina and Humacao landfills burn the methane that is collected in the landfill but none of it is converted to energy. However, there are initiatives to install generators at these facilities to produce energy but none of them have been formalized. The Ponce landfill is also in the permitting process to construct a flare station to burn the methane from the landfill.

At this moment there are no energy recovery facilities constructed and/or operating in Puerto Rico.

2.5. Landfill Facilities

There are currently 32 operating landfills in Puerto Rico, all of them located in different municipalities. Landfills are owned and operated by a private company; owned by a municipality and operated by private companies; and others owned and operated by a municipality. Table 2-7 details this information.

Table 2-6: Existing Landfills in Puerto Rico

Landfill Name	Owner	Operator	Municipalities utilizing Landfill for disposal
Aguadilla	Municipality	Landfill Technologies	In the closure process
Añasco	Municipality	Municipality	Añasco
Arecibo	Municipality	Landfill Technologies	Arecibo, Camuy, Utuado, Manati, Lares, Hatillo, Barceloneta
Arroyo	Municipality	L&M Waste	Arroyo, Patillas
Barranquitas	Municipality	Municipality	Barranquitas, Orocovis
Cabo Rojo	Municipality	Landfill Technologies	Cabo Rojo
Carolina	Municipality	Landfill Technologies	Carolina
Cayey	Municipality	Municipality	Cayey
Culebra	Municipality	Municipality	Culebra
Fajardo	Municipality	Landfill Technologies	Fajardo, Luquillo, Ceiba, Loiza, Rio Grande, Canovanas, Naguabo
Florida	Municipality	Waste Disposal Management	Florida
Guayama	Municipality	Carlos Rental Equipment	Guayama
Guaynabo	Municipality	Landfill Technologies	In the closure process
Hormigueros	Municipality	Municipality	Hormigueros
Humacao	Waste Management	Waste Management	Gurabo, Caguas, Humacao, San Juan, Las Piedras, San Lorenzo
Isabela	Municipality	Municipality	Isabela
Jayuya	Municipality	Municipality	Jayuya
Juana Diaz	Municipality	L&M Waste	Juana Diaz, Villalba, Coamo
Juncos	Municipality	Municipality	Canovanas, Aguas Buenas (C&D), Trujillo Alto, Juncos, San Lorenzo (C&D)
Lajas	Municipality	Municipality	Lajas
Mayaguez	Municipality	Waste Management	Mayaguez, Maricao
Moca	Municipality	Municipality	Rincon, Quebradillas, Moca, San Sebastian, Las Marias, Aguada

Landfill Name	Owner	Operator	Municipalities utilizing Landfill for disposal
Peñuelas	Waste Management	Waste Management	Industrial
Ponce	Municipality	BFI	Adjuntas, Ponce, Comerio, Aguas Buenas, Cidra
Salinas	Municipality	BFI	Aibonito, Salinas, Cidra
Santa Isabel	Municipality	Municipality	Santa Isabel
Toa Alta	Municipality	Landfill Technologies	Comerio, Corozal, Toa Alta, Naranjito
Toa Baja	Municipality	Landfill Technologies	Bayamon, Catano, Toa Baja, Morovis, Dorado
Vega Baja	Municipality	AR Waste Disposal	Vega Alta, Manati, Ciales, Vega Baja
Vieques	Municipality	Municipality	Vieques
Yabucoa	Municipality	Landfill Technologies	Yabucoa, Maunabo
Yauco	Municipality	L&M Waste	Yauco, Guanica, San German, Sabana Grande, Penuelas, Guayanilla

In 2005 and 2006, the EPA ordered the closure of additional landfills for lack of compliance with Subtitle D regulations. These landfills included: Vega Baja, Florida, Santa Isabel, Aguadilla and Toa Baja landfills. These facilities are in the process of negotiations with the corresponding regulatory agencies in order to establish a final closure date for each landfill.

More information on the capacity, operating hours, and tipping fees for each one of these operating landfills can be found under Appendix A.

2.6. Litter Control

Illegal dumping of solid waste continues to be a nuisance and health problem for Puerto Rico. Although Puerto Rico has 32 operating landfills and there is waste collection by private and public entities, noticeable quantities of solid waste is illegally dumped in the streets, water bodies, and environmentally protected areas. This has become an increasing concern for the government and also the general public.

The government has promoted educational programs targeted at the elimination of this problem. Additionally, non-profit organizations have established programs to help eliminate these illegal dumps by educating the public. These organizations have helped in the process of restoring the solid waste impacted areas by removing the illegally dumped solid waste.

Future waste disposal projections provided in the Itinerary assume that the waste disposed at all of these clandestine landfills and illegal dump sites will eventually make its way to the appropriate landfill in that community. At this moment most of these illegal dump sites are cleaned up by the municipality and the waste recovered is deposited back in a nearby landfill.

3. Solid Waste Generation and Landfill Facility Assessment

3.1. Population Projection

Existing and projected population is an important component for developing future solid waste generation projections. The anticipated population projections coupled with the estimated per capita waste generation provides the basis for projecting the total solid waste generation quantities during the planning period. (25 years)

The population projections used for the development of this Itinerary are provided in Appendix B-1. The population projections were obtained from the Census office, Planning Board of Puerto Rico (Junta de Planificación de Puerto Rico) for the years 2000 to 2025. This information was gathered and revised on August 2006 by the Census office and compiled in the table provided in Appendix B-1. The basis of these projections is the latest US Census (2000), which not only provides the population in 2000 but additional information like vital records, migration, etc.

3.2. Existing Solid Waste Generation and Diversion

3.2.1. Existing Solid Waste Generation

The existing solid waste generation is defined as the amount of solid waste generated by all sources: residential; commercial and industrial disposed in landfills and the amount of solid waste recycled. This total amount is then divided by the current population to obtain the average daily generation rate per person.

The Plan of Regional Infrastructure for Recycling and Disposal of Solid Waste in Puerto Rico (1995) prepared by Quiñones, Diez, Silva and Associates/Brown and Caldwell suggested an average daily generation rate of 3.66 pounds per person per day (lbs/pers-day). In comparison, the Waste Characterization Study report prepared by Wehran (2003), reported an average daily generation rate per person of 5.18 lbs or 3.91 lbs per person per day (excluding C&D debris, special waste, and automobiles, which are not included in the EPA estimates of MSW). Although these two studies evaluated the same type of MSW, their respective waste generation rates (3.66 and 5.18) differ by 1.52 pounds per person per day. The rate of 5.18 per person per day was selected since it is more recent and complete. According to the Wehran study, the 3.91 rate of lbs per person per day excludes C&D residues; Special residues and automobiles.

To calculate the 5.18 lbs per person rate information of the 2000 Census was utilized and not the 2003 population projection. For this reason, it was necessary to adjust the generation rate with the published 2003 population projection (Junta de Planificación de Puerto Rico). The revised daily rate amounted to 5.07 lbs per person. This number had to be further revised given that Wehran used weight of the trucks coming into the landfills to calculate the generation and therefore the amount of recycled material, which was separated before entering the landfill, was not accounted for. According to ADS, the amount of recycled materials per person per day amounted to 0.49 lbs per person, which when added to the adjusted rate of 5.07 results in a final generation daily rate of 5.56 lbs per person.

For planning purposes of this Itinerary, the final generation daily rate of 5.56 lbs per person is assumed to remain constant for the next 25 years. This information was verified with EPA "Municipal Solid Waste in the United States" publications that report that between the 1990s and 2003 MSW generation rate remained constant at 4.5 pounds per person per day (excluding C&D, special and auto wastes). The only increase in waste generation will be from population increase in the next 25 years.

3.2.2. Existing Solid Waste Diversion

In the US, recycling, including composting, diverted 72 million tons of material away from disposal in 2003, as reported by the EPA. This number surpasses significantly the 15 million tons in 1980. Typical materials that are recycled include batteries, recycled at a rate of 93%, paper and paperboard at 48%, and yard trimmings at 56%. These materials and others were recycled through curbside programs, drop-off centers, buy-back programs, and deposit systems (EPA, 2006). In Puerto Rico the Deviation Rate for 2006 was calculated in 15.3% which is equivalent to 627, 233 tons of recovered material according to the Report on Deviation and Recycling Rate, 2006, published by ADS.

Another way for vegetative waste diversion is through the processing in compost facilities. An example of this is the compost plant in Arecibo. This facility processes sludge, wood and vegetative waste. The estimated composition of the material composted is as follows: sludge: 51%, yard waste: 37% and wood: 12%. This plant produces approximately 100 ton per day.

3.3. Waste Composition

Waste composition or characterization is defined as the classification of different types of waste (glass, metal, paper, food waste, etc.) in the waste stream. This typically is determined by collecting, sorting, and weighing waste generated at different facilities and classifying the material into the appropriate composition categories.

In 2003, Wehran conducted a Waste Characterization Study.

Wehran's report, provides an estimate of the waste composition (types of waste) disposed at 12 landfills and 2 transfer stations. For this study, waste characterization activities were performed concurrently with waste measurement activities at the selected landfills and transfer stations.

The waste characterization study was performed at the following landfills: Ponce, Toa Baja, Mayagüez, Humacao, Jayuya, Cabo Rojo, Salinas, Fajardo, Yauco, Vieques, Arecibo and Culebra. Four of the 12 landfills were sampled a second time to compare seasonal impacts of the vacationing population in these municipalities during the peak tourism season. The four landfills where a second sampling was conducted include: Cabo Rojo, Fajardo, Vieques and Culebra. The overall results of the Wehran study are provided in Table 3-1.

Table 3-1: Wehran Waste Characterization Study Results, 2003

Components		Combined % By Weight
Plastic	Type 1 – Polyethylene	1.1%
	Type 2 - HDPE	2.9%
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	6.5%
Paper/ Cardboard	High Quality Paper	1.3%
	Low Quality Paper	8.7%
	Corrugated Carton	9.3%
Metals	Ferrous Metals	9.4%
	Non-Ferrous Metals	1.1%
Yard	Yard Waste	20.4%
Organic	Organic Waste	12.9%
C&D	Construction and Demolition Debris	17.1%
Glass	All Types Glass	2.4%
HHW	Household Hazardous Waste	0.5%
Other	Not Otherwise Defined	6.3%
Total		100.0%

3.4. Projected Solid Waste Generation

In order to develop a solid waste management Itinerary for the next 25 years the amount of solid waste to be generated must be estimated. The solid waste generation was estimated using the daily generation rate and the population projections developed for Puerto Rico.

As described in Section 3.2.1 of this Itinerary, the estimated daily generation rate amounted to 5.56 lbs per person. The projected solid waste generation was then calculated using the latest version (August 22, 2006) of the population projections published by the Puerto Rico Planning Board and multiplying then by the calculated daily generation rate.

A summary of the projected solid waste generation is given in Table 3-2.

Table 3-2: Projected Waste Generation

Year	Population Projection[1]	Projected Waste Generated (Tons)[2]
2006	3,956,003	4,014,156
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
2030	4,256,441	4,319,011

Notes:
[1]Source: Puerto Rico Planning Board, population projections as of August 22, 2006.
[2]Based on population projection and estimated generation rate (pounds per person per day).

3.5. Evaluation of Potential Landfill Expansions

An evaluation of all 32 of the existing landfills in Puerto Rico was performed in order to identify potential landfill expansions outside of the existing property boundaries. The evaluation was performed following the 40 CFR Part 258 Subpart B regulation, which specifies the location restrictions for municipal solid waste landfills. This evaluation was conducted by reviewing the site conditions of each landfill, reviewing the topography, geology, groundwater, floodplain, wetlands, zoning, and aerial photography plans.

The location restrictions outlined in the 40 CFR Part 258 Subpart B include the following:

1. Airport Hazard

2. Floodplains

3. Wetlands

4. Fault Areas

5. Seismic Impact Zone

   According to the "Documentation for 2003 USGS Seismic Hazard Maps for Puerto Rico and the U.S. Virgin Islands" published by the United States Geological Survey, Puerto Rico is located in an area of seismic impact zone. Therefore, the landfill expansions could be developed as long as the appropriate design measures are taken.

6. Unstable Areas

The karst region of Puerto Rico is an area composed of mostly limestone formations located in different areas of the island. This type of region is considered as unstable terrain. For expansions in the karst region the owner or operator must demonstrate that the expansion will incorporate the necessary engineering measures to ensure that the integrity of the structural components will not be disrupted.

In addition, according to the Act for the Protection and Preservation of Puerto Rico's Karst Region, Act No. 292 of the Department of Natural and Environmental Resources (DNER), the owner or operator must have an approval from the Secretary of the DNER prior to the commencement of any activities of construction or expansion of a landfill on the Karst Region of Puerto Rico.

Following are the recommended landfill expansions. The proposed expansions appear to generally comply with the requirements of 40 CFR 258 Subpart B – Location Restrictions with the exception of seismic areas.

3.5.1. Fajardo Landfill

The Fajardo Landfill is a municipally-owned solid waste management facility situated in the eastern region of Puerto Rico. The landfill is privately operated by Landfill Technologies. According to the Solid Waste Characterization Study (Wehran, 2003), the Fajardo Landfill accepts waste from the municipalities of Fajardo, Canóvanas, Ceiba, Las Piedras, Trujillo Alto, Loíza, Luquillo, Río Grande, and Naguabo. Incoming waste consists primarily of municipal solid waste (81%) with minor composition of automotive wastes (1%), construction debris (16%), and yard wastes (2%). The average filling rate of the landfill is estimated to be 4,095 tons of waste per week (ADS, 2006). The tipping fee for waste entering this landfill is reported to be $27.00/ton (ADS, 2006).

3.5.2. Humacao Landfill

The Humacao Landfill is privately owned and operated by Waste Management Inc. According to the Solid Waste Characterization Study (Wehran, 2003), the Humacao Landfill accepts wastes from the Municipalities of Humacao, Caguas, San Juan, San Lorenzo, Las Piedras and Gurabo. Incoming waste to the Humacao Landfill consists primarily of municipal solid waste (87.5%) with minor composition of construction debris (10%), special wastes (0.8%), and yard wastes (0.9%) (Wehran, 2003). The average filling rate of the landfill is estimated to be 13,800 tons of waste per week (ADS, 2006). The tipping fee for waste entering this landfill is reported to be $42.00/ton (ADS, 2006).

3.5.3. Juncos Landfill

The Juncos Landfill is a municipally-owned and operated waste management facility situated in the eastern region of Puerto Rico. According to the Solid Waste

Characterization Study (Wehran, 2003), the Juncos Landfill accepts waste from the Municipalities of Juncos, Caguas, Canovanas, Carolina, Ceiba, San Juan, Trujillo, Alto and other small municipalities. Incoming waste consists primarily of municipal solid waste (61.7%) and construction debris (34.6%), with minor composition of yard wastes (3.7%) and auto wastes (<0.5%). The average filling rate of the landfill is estimated to be 4,296 tons of waste per week (ADS, 2006). The tipping fee for waste entering this landfill is $21.00/ton (ADS, 2006).

3.5.4. Ponce Landfill

The Ponce Landfill is jointly owned by the Municipality of Ponce and Browning-Ferris Industries (BFI), and privately operated by BFI. According to the Solid Waste Characterization Study (Wehran, 2003) the Ponce Landfill accepts waste only from the Municipalities of Ponce, Cataño, Ciales, Barceloneta, Mayagüez, Carolina, San Juan, Peñuelas, Adjuntas and Villalba. Incoming waste consists primarily of municipal solid waste (51%) with minor composition of special wastes (17%), construction debris (26%), auto waste (1%) and yard wastes (5%). The tipping fee for waste entering this landfill is reported to be $27.00/ton (ADS, 2006).

3.5.5. Salinas Landfill

The Salinas Landfill is municipality owned solid waste management facility and is privately operated by Browning-Ferris Industries (BFI). According to the Solid Waste Characterization Study (Wehran, 2003), the Salinas Landfill acts as a regional landfill that accepts wastes from Salinas, Aguas Buenas, Aibonito, Caguas, Cataño, Cidra, San Juan, and other municipalities. Incoming waste to the Salinas Landfill consists primarily of municipal solid waste (70%) with minor composition of special wastes (19%), construction debris (8%), and yard wastes (3%) (Wehran, 2003). The tipping fee for waste entering this landfill is reported to be $27.00/ton (ADS, 2006).

3.5.6. Yauco Landfill

The Yauco Landfill is a municipally-owned solid waste management facility situated in the southern region of Puerto Rico, and is privately operated by L & M Waste. According to the Solid Waste Characterization Study (Wehran, 2003), the Yauco Landfill accepts waste from the Municipalities of Yauco, Coamo, Cayey, Ponce, Guánica, Guayanilla, Sabana Grande & San German. The incoming waste consists primarily of municipal solid waste (66%) with minor composition of special wastes (17%), construction debris (14%), and yard wastes (3%). The tipping fee for waste entering this landfill is reported to be $21.75.00/ton (ADS, 2006).

4. Capacity Assessment Model

4.1. Capacity Assessment Model Description

The ADS developed a model to project how much disposal capacity is available at different times during the 25 year plan period. This model is a tool for the development of the Itinerary, as capacity to manage solid waste is the driver that will shape the long-term management approaches identified for implementation in the Itinerary. The model incorporates different factors that will affect the depletion rate of the disposal capacity of landfills and also considers the current hierarchy of solid waste management strategies established by the ADS by including the proposed recycling, alternative processing and disposal volumes that are proposed in the Itinerary. One of these factors that affect the depletion rate of the disposal capacity of landfills is the amount of recyclables recovered from the waste stream. In general, as the recycling rate increases the useful life of landfills increases.

The capacity assessment model projects the solid waste generation for the island using the population projections developed by the Planning Board of Puerto Rico and the waste generation per capita rates presented in the Wehran study. The model then incorporates the projected diversion rates that are consistent with the recycling, composting and alternative processing strategies of the Itinerary. After subtracting the diverted volumes from the projected generation, the model then allocates the remaining volume to be disposed of in each of the 32 existing landfills according to their current disposal participation rates as estimated by the ADS.

The model projects when landfills deplete their current useful life and close. Based on this projection, a distribution in the flow of solid waste to other facilities in operation is recommended. Most of the current available landfill capacities used in the model projections were provided by the Useful Life study completed in 2004. However, the available capacity for several landfills was updated based on recent information compiled by the ADS.

The model projects the available capacities for two case scenarios:

Base Case, which incorporates the main strategy to be implemented by the Itinerary; and the Backup Case scenario which projects how much capacity is available when some of significant strategies of the Base Case are not implemented as planned.

These scenarios used the following governing criteria for the creation of their projections:

Targeted the strategic objective of having enough capacity to manage all the solid waste generated in Puerto Rico for the next 25 year horizon (2006 – 2030).

- Considered available information compiled by the ADS related to the proposed landfill closures, expansions as well as discussions with regulatory agencies.
- Promoted landfill consolidation in order to reduce total number of landfills and favor the elimination of those with: limited size, difficult access to service other communities and no potential for expansion due to Subtitle D compliance.
- Promoted the closure of some landfills in the sensitive North region while favoring expansions of landfills in the South and East. Did not promote the creation of new landfills, however included the capacity that will be available on the New Peñuelas landfill, which has already been approved and where construction will start proximately.
- Assumed that waste transfer from closed landfills to operating ones will be based on: distance, facility ownership and operation and loading constraints.
- Assumed that landfills expansions for selected facilities in the South and East will be readily approved by the regulating agencies.
- Allowed landfills to deplete all their current useful life before closing, with two exceptions: Santa Isabel and Florida, as their closures have been suggested by the EPA before complete depletion of their capacities. The landfills that deplete their useful life must first establish the corrective actions to improve their current operations and at the same time comply with local and federal regulations.

A "Do Nothing Scenario" has also been prepared, which shows the future available capacity in the event that there is no additional disposal or processing capacity added and no growth in the diversion rates is achieved. The purpose of showing this scenario is to demonstrate what the remaining "useful life" is for the current management system.

4.2. Capacity Model Projection for the Do Nothing Scenario

The Do Nothing scenario projects how quickly the available disposal capacity that exists in 2006 is depleted if no future actions are taken and no growth in the current diversion rate occur.

The following assumptions are considered in the Do Nothing scenario:

- Diversion rate of 15.3% remains constant from 2006 to 2030
- No alternative technology processing facilities are implemented during the period
- Existing landfills use all of their remaining useful life before closing
- No landfill expansions are implemented

- Transfer of waste from closed to operating landfills is facilitated through the use of transfer stations
- Includes the additional disposal capacity associated with the new Peñuelas landfill, coming on line in 2010
- Used the same waste generation projections as in the proposed two scenarios.

The projection of the "Do Nothing" scenario demonstrates that Puerto Rico would run out of disposal capacity by 2018 giving the current system a useful life of approximately 12 years. This projection clearly demonstrates the need for urgent action in terms of planning and execution of waste management strategies that will divert waste from landfills while providing adequate disposal capacity during the development of new or expanded landfills and other processing disposal facilities. The following Base Case scenario projects how the proposed Dynamic Itinerary attempts to achieve this for the next twenty five years.

4.3. Capacity Model Projections for the Base Case Dynamic Itinerary

The projection of the Base Case shows how increasing the deviation rate, integrating the waste-to-energy facilities and increasing the landfill capacity by means of the recommended expansions will benefit the management of the MSW.

The following assumptions are considered in this Base Case:

- Diversion rate in Puerto Rico begins at 15.3% in 2006 and reaches the 35% goal in 2016. Diversion goals are achieved through:
  - Implementation of curbside collection of designated recyclable materials.
  - Development of a 250 tons per day on a single shift, and up to 500 tons per day on a double shift single stream materials recovery facility at the existing Toa Baja non-operating compost facility or on an alternate site located in the metropolitan area.
  - Development of a single stream materials recovery facility in the South Region with a processing capacity of 200 tons per day on a single shift and 400 tons per day on a double shift.
  - Development of three composting facilities with a combined capacity of 500 tpd (implemented in 2008 and 2010) to process yard waste.
  - The development and sizing of the proposed facilities should be predicated on the proposed implementation of the residential communities recycling programs. Some residential communities, if permitted, may desire to implement or continue to collect source separated materials and as such would not require processing at a single stream facility.

- Assume the diversion rate stays constant at 35% from 2016 to 2030.
- A 1,560 ton per day waste-to-energy processing facility will be in service in 2013 in the North East Region and another 1,350 tons per day will be in service in 2012 in the North West Region.
- The closed landfill loads that are projected could be transferred to the North East Region waste- to-energy facility are: Carolina, Toa Alta, Toa Baja, Guaynabo, Florida, and Vega Baja[1].
- The closed landfill loads that are projected could be transferred to the North West Region waste-to-energy facility are: Aguadilla, Añasco, Arecibo, Moca, Hormigueros, and Mayaguez[1]
- Existing landfills use all of their remaining useful life before closing
- Six landfills are expanded outside of current footprint: Fajardo, Humacao, Ponce, Juncos, Salinas and Yauco for a total additional capacity of 63.4 Million Tons
- The expansion for the Isabela landfill will be performed with the purpose of mitigating environmental conditions at the site and stabilizing the slopes of the landfill. This expansion was calculated in approximately 0.6 million tons.
- Transfer of waste from closed to operating landfills is facilitated through the use of transfer stations
- Includes the incoming capacity added by the new Peñuelas landfill, coming on line in 2010. However, this landfill could begin operating sooner since the construction phase of the landfill could start at any moment.

Landfill closure and transfer assumptions shall be implemented as per the following list:

Closed landfill	Transferred to[1]	Year of transfer[2]
Aguadilla	Cabo Rojo	2007
Añasco	Peñuelas New	2011
Arecibo	Northwest Region WTE	2012
Arroyo	Salinas	2009
Barranquitas	Ponce	2008
Cabo Rojo	Peñuelas New	2014
Carolina	Northeast Region WTE	2015
Cayey	Ponce	2010
Culebra	Fajardo	2008
Florida	Arecibo	2007
Guayama	Salinas	2011

[1] Possible load transfer alternative

Guaynabo	Humacao	2007
Hormigueros	Northwest Region WTE	2022
Jayuya	Peñuelas New	2025
Juana Diaz	Yauco	2026
Lajas	Peñuelas New	2018
Mayagüez	Peñuelas New	2011
Moca	Northwest Region WTE	2013
Peñuelas	Peñuelas New	2026
Santa Isabel	Ponce	2007
Toa Alta	Humacao	2007
Toa Baja	Humacao	2007
Vega Baja	Arecibo	2007
Vieques	Fajardo	2028
Yabucoa	Humacao	2007

Note: [1] Represents facility that could be designated to receive diverted waste from closed landfill.

[2] These dates were based on the results of the Study of Evaluation, Diagnosis and Recommendations for Sanitary Landfills in Puerto Rico, prepared by Malcom Pirnie. They can vary according to the changes in flow and operational optimization

In year 2030, the end of the Itinerary period, the projections for the Base Case show that there should be 7 landfills in operation with approximately 34.9 Million Tons of available disposal capacity and 17.8 years of remaining useful life. Please refer to Appendix C-1 for the Base Case Model printout.

The Base Case scenario establishes the necessary steps to reduce the use of landfills as a primary alternative to manage the municipal solid waste (MSW). It also defines the initial goals to increase the deviation rate and to incorporate the waste-to-energy technology. Once the projects proposed for the next ten years have been developed, Puerto Rico will be in a suitable position to increase the Diversion Rate and the use of the waste-to-energy technology. This scenario provides the flexibility necessary to surpass these expectations because, after having developed these projects, increasing both alternatives will only require the reduction of existing landfill capacity.

4.4. Capacity Model Projections for the Backup Case

The projection of the Backup Case scenario shows how reaching the Deviation Rate of 35% on 2026 and not implementing the waste-to-energy facilities would affect the

management of the MSW. The absence of both alternatives reduces dramatically the landfills capacity.

The following assumptions are considered in this Backup Case scenario:

- Diversion rate in Puerto Rico begins at 15.3% in 2006 and reaches the 35% goal in 2026.
- No alternative technology processing facilities are established during the period.
- Existing landfills use all of their remaining useful life before closing.
- Seven landfills are expanded outside of their current footprint: Cabo Rojo, Fajardo, Humacao, Juncos, Ponce, Peñuelas New and Yauco for a total additional capacity of 70.6 million tons.
- The expansion for the Isabela landfill will be performed with the purpose of mitigating environmental conditions at the site and stabilizing the slopes of the landfill. This expansion was calculated in approximately 0.6 million tons.
- Transfer of waste from closed to operating landfills is facilitated through the use of transfer stations
- Includes the incoming capacity added by the new Peñuelas landfill, coming on line in 2010. However, this landfill could begin operating sooner since the construction phase of the landfill could start at any moment.

Landfill closure and transfer assumptions shall be implemented as per the following list:

Closed landfill	Transferred to[1]	Year of transfer[2]
Aguadilla	Cabo Rojo	2007
Añasco	Peñuelas New	2011
Arecibo	Peñuelas New	2010
Arroyo	Ponce	2009
Barranquitas	Ponce	2008
Carolina	Fajardo	2014
Cayey	Ponce	2010
Culebra	Fajardo	2008
Florida	Arecibo	2007
Guayama	Ponce	2011
Guaynabo	Humacao	2007
Hormigueros	Peñuelas New	2019
Jayuya	Peñuelas New	2022
Juana Díaz	Yauco	2022

Lajas	Peñuelas New	2016
Mayagüez	Peñuelas New	2011
Moca	Peñuelas New	2012
Peñuelas	Peñuelas New	2010
Salinas	Ponce	2007
Santa Isabel	Ponce	2007
Toa Alta	Arecibo	2007
Toa Baja	Peñuelas	2007
Vega Baja	Arecibo	2007
Vieques	Fajardo	2025
Yabucoa	Humacao	2007

Note: [1] Represents facility designated that could receive diverted waste from closed landfill.

[2] These dates were based on the results of the Study of Evaluation, Diagnosis and Recommendations for Sanitary Landfills in Puerto Rico, prepared by Malcom Pirnie. They can vary according to the changes in flow and operational optimization

In year 2030, the end of the Itinerary period, the projections for the Backup Case show that there should be 8 landfills in operation with 21.1 Million Tons of available capacity and 7.5 years of remaining useful life. Please refer to Appendix C-2 for the Backup Case Model printout.

The following table summarizes the main assumptions and projections for the Base and Backup cases:

Table 4-1: Main Assumptions and Projections for the Base and Backup Cases

Scenario	35% recycling goal met?	Year when 35% diversion goal is met	Proposed WTE capacity added in tons/yr	Proposed # of landfill expansions	Total capacity added through landfill expansions in M Tons, 2007-2030	# of landfills in operation in 2030	Landfill capacity available in 2030 in M Tons	Remaining Landfill useful life at 2030 in Years
Base Case	Yes	2016	902,828	6	63.4	7	34.9	17.8
Backup Case	Yes	2030	0	7	70.6	8	21.1	7.5

Table 4-1 summarizes the importance of increasing the Deviation Rate and establishing the waste-to-energy facility proposed in the base case. These will provide additional processing capacity and will extend the remaining life of the infrastructure system for the management of the MSW.

5. Dynamic Itinerary

Section 5 presents the Dynamic Itinerary for the Base and Backup Cases. It includes a set of strategies that should be further developed into specific implementation plans. The strategies presented in this Itinerary are consistent with the model projections presented in Section 4.

5.1. Base Case Dynamic Itinerary

The following section details the developed strategies for the Base Case. These strategies are classified in the following categories: diversion strategies, disposal strategies, and transport strategies. This section also presents the infrastructure maps showing all facilities at different time frames and summarizes the implementation schedule for each of the three planned periods: short, intermediate, and long term.

5.1.1. Diversion Strategies

This section summarizes the strategies that have been identified to divert waste from landfill disposal. These strategies include the following activities: reuse, recycling, composting, yard waste management, and others.

5.1.1.1. Reuse Strategies

Reuse strategies are strategies to reduce the amount of waste generated. These may include promoting grass cycling and on-site composting; promoting new product and packaging designs; expanding producer responsibility for waste generated by their products, promoting changes in consumption patterns; providing technical assistance to businesses to identify ways to reduce the amount of waste generated; promoting reuse businesses such as charities used clothing and furniture stores, book exchanges, etc.; and others. Development of reuse strategies requires significant education, a shift in consumer thinking towards packaging, consumption and discards, development of more efficient business operations and legislation to promote producer responsibility for packaging and waste generated by their products.

Reuse can be greatly enhanced through implementation of pay as you throw (PAYT) pricing systems, whereby residents pay based on number of bags of waste discarded or size of trash containers. Under such a pricing system, reuse and recycling are encouraged through economics. It is noted, however, that these pricing systems are often highly unpopular with residents because of its direct cost impacts and residential need to monitor the waste disposed. As such, PAYT systems often give rise to concerns over potential illegal disposal practices and dumping activities and increased litter generation. As such, the advantages and disadvantages of implementation need to be weighed and

disadvantages mitigated. For example implementation of stiff fines for litter and illegal dumping and enforcement of such fines serve to mitigate any such activities.

The potential impact of reuse strategies is difficult to measure and quantify and will take time to implement, but the major benefits include reduction in the amount of waste generated for processing and disposal and the corresponding cost reduction for collection processing and disposal of this waste.

5.1.1.2. Recycling Strategies

There are four (4) critical elements that must be developed in any successful recycling program. These elements are:

- Legislation mandating recycling and clearly setting forth requirements.
- A successful collection program with high participation rates from all the sectors (industrial, commercial and residential).
- A cost efficient infrastructure system that can separate and handle the recyclable material that is collected.
- Access to healthy markets that create demand for the recycled products.

It is estimated that the island currently recycles more than 15 percent of the waste stream, or approximately 627,000 tons per year. It is estimated that these recyclables included approximately 38,000 tons of yard waste, 420,000 tons of commercial recyclables and 170,000 tons of residential recyclables. This material is being recycled by communities direct to markets and by several private operators of recycling facilities. Table 5-1 below presents a breakdown of the composition of the waste as presented in the 2003 Wehran Report and potential estimates of capture and participation rates for these materials that are capable of achieving 35 percent waste diversion. The term capture rate in the below table pertains to the quantity of material that can readily be separated from the rest of the trash. For example, newspapers would have a high capture rate because it is easily separated from the rest of the waste, however, aluminum foil is more difficult to capture since it is generated in smaller quantities and often soiled with other items. The participation rate serves to provide a factor to reflect the resident and/or commercial establishment's participation in recovering the designated material. For example, many residents and establishments are willing to participate in the recycling of aluminum cans because they are light-weight, easily separated and they understand the value of recovering this material. On the other hand, participation in recovery of plastic milk jugs might be less due to storage space requirements and need to rinse container to prevent odors. Multiplying the capture rate for a material by the participation rate of the material provides a recovery rate for that material. As illustrated below, the sum total of these

recovery rates based on the composition of the waste identified in the Wehran Report result in an overall waste recovery rate of 35% which is consistent with the ADS goal.

Table 5-1: Diversion Goal Percentages Breakdown

Component		Estimated Waste Composition				Estimate for 35% Diversion			
		Disposed Tons (2005)	Recycled Tons (2005)	Total Generation (Tons)	Estimated Generation	Capture Rate (%)	Participation Rate (%)	Recovery Rate (%)	Percent Overfed
Plastic	Type 1 – Polyethylene	33,300	3,000	36,300	**0.9%**				**0.2%**
	Durable Goods				0.1%	0	0	0	0.0%
	Soft Drink Bottles				0.3%	70	60	42	0.1%
	Other Plastic Containers				0.3%	50	40	20	0.1%
	Other Packaging				0.1%	0	0	0	0.0%
	Other				0.1%	0	0	0	0.0%
	Type 2 - HDPE	107,400	6,000	113,400	**2.8%**				**0.3%**
	Durable Goods				0.3%	0	0	0	0.0%
	Milk & Water Bottles				0.4%	70	60	42	0.2%
	Other Plastic Containers				0.7%	50	40	20	0.1%
	Trash Bags				0.1%	0	0	0	0.0%
	Other bags, sacks & wraps				0.4%	0	0	0	0.0%
	Other Packaging				0.6%	0	0	0	0.0%
	Other				0.2%	0	0	0	0.0%
	Types 3 – 7 (PVC, LDPE, PP, PS, Mixed)	240,900	5,500	246,400	**6.2%**				**0.6%**
	Durable Goods				3.1%	0	0	0	0.0%
	Other Plastic Containers				0.2%	50	40	20	0.1%
	Plastic Plates & Cups				0.3%	0	0	0	0.0%
	Trash Bags (LDPE)				0.3%	0	0	0	0.0%
	Other bags, sacks & wraps				1.5%	0	0	0	0.0%
	Other Packaging				0.7%	0	0	0	0.0%
Paper	High Quality Paper	41,600	27,300	68,900	**1.7%**	80	60	48	**0.5%**
	Low Quality Paper	320,100	27,300	347,400	**8.7%**				**2.8%**
	Newspaper				3.2%	90	70	63	2.0%
	Books				0.3%	50	30	15	0.0%
	Magazines				0.7%	70	50	35	0.2%
	Telephone Directories				0.2%	90	30	27	0.1%
	Mail				1.7%	70	40	28	0.5%
	Tissue Paper & Towels				1.0%	0	0	0	0.0%
	Paper Plates & Cups				0.3%	0	0	0	0.0%
	Milk & Juice Cartons				0.1%	50	30	15	0.0%
	Other				1.2%	0	0	0	0.0%
	Corrugated Carton	307,000	85,100	392,100	**9.8%**	90	80	72	**6.1%**
Metals	Ferrous Metals	350,100	121,500	471,600	**11.8%**				**6.6%**
	Durable Goods Metals				9.8%	90	80	72	5.7%
	Steel Cans				1.8%	90	60	54	0.8%
	Other				0.2%	90	60	54	0.1%
	Non-Ferrous Metals	34,400	18,700	53,100	**1.3%**				**0.4%**
	Beer and Soft Drink Cans				1.0%	80	60	48	0.3%
	Foil and closures				0.3%	50	30	15	0.0%
	Other				0.0%	0	0	0	0.0%
	Yard Waste	776,200	19,200	795,400	**19.9%**	90	70	63	**13.4%**
	Organic Waste	469,200		469,200	**11.8%**	0	0	0	**0.0%**
	Construction Debris	583,800		583,800	**14.6%**	40	40	16	**2.6%**
Glass	**All Types Glass**	86,800	4,700	91,500	***2.3%***				**0.8%**
	Beer & Soft Drink Bottles				1.2%	70	60	42	0.5%
	Wine & Liquor Bottles				0.3%	60	60	36	0.1%
	Food Jars				0.5%	70	50	35	0.2%
	Other Durable (windows, etc.)				0.3%	0	0	0	0.0%
	Household Haz. Waste	18,000		18,000	**0.5%**	10	30	3	**0.0%**
	Not Otherwise Defined	278,200	23,000	301,200	**7.6%**	50	20	10	**0.8%**
	Total	**3,647,000**	**341,300**	**3,988,300**	**100.0%**				**35.1%**
	Diversion Rate				**15.3%**				

Yard Waste Recycling			13.41%
Private Commercial			13.76%
Residential			7.95%
			35.12%
		tpd	**tpy**
Yard Waste Processing Capacity Required (tons per year)	1,308	2,038	530,000
Private Commercial Recycling	1,538	2,115	550,000
Residential Direct to Market		192	50,000
Materials Recovery Facility Capacity Required	808	1,038	270,000
			1,400,000
Exisitng Yard Waste Capacity			
Exisitng MRF Capacity			

As illustrated in Table 5-1 this 35 percent diversion/recyclable material recovery goal is achievable based on mandating the recovery of designated materials and achieving the capture and participation rates identified in the table. This recycling rate is consistent with many state averages in the United States. Many communities in the United States have exceeded this goal and several states such and New York, New Jersey, California, Connecticut and Massachusetts have set goals in excess of 50 percent over the next 10 years. It should be noted, however, that communities that have achieved these high goals have been pressured by rising disposal costs (thereby making recycling much more economical) and have implemented aggressive programs. These programs have included mandating curbside recycling, implementing PAYT pricing systems, separating the organic waste fractions (including food scraps and soiled paper) for recovery, designating a wide range of waste types for recycling including bulky waste, electronic waste, C&D and other strategies. Many of these strategies require added financial resources, implementation of comprehensive education and enforcement programs, and time to implement.

Currently, it is reported that the markets for recyclable materials on the island is strong and the private recycling operators have capacity available for source separated materials in excess of demand. As illustrated by the types and quantities of materials currently being recycled, these recycling operators have focused their efforts in sourcing their needs primarily from the commercial sector, as these efforts usually produce cost effective results for the operators. Industrial and commercial sectors usually produce large quantities of source separated material (such as corrugated cardboard, wood pallets, etc.) and as such this material is more cost effective to collect and market (i.e. more material for less transportation and processing cost). In many instances, source separated materials can be sold direct to market or brought to a Intermediate Processing Center (IPC) for additional processing and market preparation.

With respect to the residential sector, recyclable materials are not as readily source separated. As such, significant additional labor and expense is needed to separate recyclable materials from the remaining trash and collect and process the materials for marketing. It also requires significant residential education and participation in the program. This is not as easily obtained as with the commercial sector since residents often do no directly feel the cost impacts of their non-participation.

Due to the strong markets and low capital investment associated with processing source separated materials, it is anticipated that the free markets will respond with the infrastructure required to meet the recycling needs of the industrial and commercial sectors once recycling mandates are in place.

Collection Programs

The success of reaching the islands recycling goals will greatly depend on three factors: 1) establishing and enforcing recyclable materials recovery mandates, 2) public participation in the separation process, and 3) having enough infrastructure capacity to manage the recyclable waste. Based on the experience of other jurisdictions in the United States, the public participation could be greatly increased by:

- **Providing curbside collection of designated recyclable materials.**

  Most residents in Puerto Rico are provided curbside collection of trash but not recyclables. While establishment of drop-off centers for disposition of recyclables may be cost effective from the standpoint of minimizing municipal curbside collection costs, it generally results in low participation and recyclable material recovery rates. Curbside collection of recyclables provides the greatest opportunity for participation and recyclable materials recovery.

- **The Municipalities providing residents with large containers for the collection of recyclable materials.**

  Some municipalities in Puerto Rico have already started recycling programs that provide these containers. Providing containers with sufficient capacity to hold all recyclables has reported to result in as much as a 20 percent increase in material recovery and participation in some communities in the US.

- **Minimizing the requirements for separation of recyclables by type.**

  This would make it easier for the public to participate by eliminating the process of categorizing the recyclable waste by material types. In Collier County, Florida switching from source separated curbside recyclables collection to single stream curbside recyclables collection increased residential recyclable material capture rates by 30 percent.

In order for this strategy to work, the existing ordinances/regulations that require the municipalities to prepare and submit recycling plans on how they will meet the goals of the ADS would need to be amended and/or new regulations passed. The regulations, at a minimum, should address the following:

- Clear specification of recycling goals (i.e., 15% within two years of municipal recycling plan approval, 25% within 5 years and 35% or above within 10 years of plan adoption).

- Clear specification of plan requirements including: definition of materials to be designated for recycling, identification of a recycling coordinator, establishment of

record keeping duties, reporting requirements, and creation of curbside collection program (communication, materials, transportation, coordination with recycling facilities and markets, etc.).

- Requirements for submission and implementation of individual recycling plans.
- Incentives for municipalities to implement single stream curbside collection.
- Establishment of an enforcement program that would define what enforcement actions will be taken to make the general public sector comply with the requirements.

Sufficient recyclable material markets exist for source separated recyclables, therefore, additional processing capacity would be required for single stream collected recyclables. For this reason, the development of one or two single stream material recovery facility(ies) should be considered for this purpose. The development of such processing capacity is discussed below.

Infrastructure System

The majority of current recycling efforts are focused on the collection of materials that have already been separated from the rest of the waste at the source of the collection point by either the resident, commercial establishment or waste hauler (i.e. source separated materials). As such, these source-separated materials require minimal processing and often can be sold direct to market or brought to an IPC to be sold in bulk. Under such a scenario, limited processing infrastructure is needed. The costs, however, associated with collecting source separated materials, particularly from residents, is often an inhibiter to achieving high recycling and participation rates. This is because it is more costly to procure compartmentalized trucks to collect the materials and/or have workers sort materials at the curb and because residents do not want to take the time to separate the material and/or store separated materials.

As discussed above, single-stream curbside collection of recyclables is a highly cost effective method for collection of recyclables and results in the highest participation rates. A single stream processing facility, however, is needed in conjunction with single stream collection to separate recyclables for market. Such facilities include high-tech components which require significant capital investment. Because of this capital investment, the free markets may not readily respond to development of such a facility until many entities have implemented single stream collection. Communities will not implement single stream collection until there is a facility to bring the materials to for processing. Therefore, the development of two single-stream materials recovery facility to encourage single stream curbside collection of recyclables is proposed. The single stream facility locations can also be used as an intermediate processing center to accept

and market source separated recyclable materials from residential and/or commercial sectors. Initially, a facility will be developed in the Metro area with a processing capacity of 250 tons per day on a single shift and 500 tons per day on a double shift for up to 140,000 tons per year of processing capacity.

A second single stream facility will be developed in the South Region to meet demands. This facility will have a processing capacity of 200 tons per day on a single shift and 400 tons per day on a double shift. Combined with the proposed Metro area facility, these facilities could provide up to 900 tons per day of recyclable material processing capacity to service almost all of the future residential material recovery processing needs. They can also be used as a location to accept and market source separated materials from the residential and/or commercial sector, as needed. It is anticipated, based on current recycling rate projections, that the facility in the South Region would go into operation in 2012 to once again provide approximately 100 percent of the residential processing capacity needs at that time. Current projections indicate total residential recyclable materials recovery of approximately 280,000 tons per year by 2012.

Currently, there are close to one hundred private companies and community entities recycling waste in Puerto Rico. These companies/entities are recycling most of the waste that is currently recycled. Many of the recovery facilities managed by these entities are working under capacity because not enough recyclables are received for processing. It is anticipated that as more municipalities successfully implement the curbside collection programs, this capacity will be utilized and the private sector will be encouraged to develop additional processing capacity to meet the demands.

Markets for Recycled Materials

There is an existing international market for recycled materials that could sustain the implementation of a recycling strategy that supports the 35% diversion goal. Currently most the recycled material is shipped overseas. However, opportunities exist to develop new recyclable material markets in the island that would use the material that was recycled and produce an end-product that could be sold to the local or international markets. For these reasons, the relationships between private facility operators and potential buyers for these materials should be fomented.

The ADS will promote local market for recyclable materials with the following strategies:

- Identify raw materials that are currently used by local manufacturing companies and look for opportunities.
- Promote the creation of potential business relationships between private recyclers and users.

- Lobby for the creation of incentives for manufacturers who use recycled materials in their process.
- Providing general education and technical assistance;
- Providing sample collaboration plans between producers, processors and users of recycled materials;
- Providing guidance on collection programs;
- Providing cooperative marketing arrangements;
- Identify recycling facilities/markets/processing capacity; and
- Providing priority consideration to persons engaged in the business of recycling.

Strategies to Aid Implementation

The ADS plans on undertaking the following activities to assist in diversion program implementation:

- Compile information related to the current diversion programs that exist in all 78 municipalities to develop a base line.
- Develop a model residential recycling plan based on a single stream separation-curbside collection program.
- Develop guidance documents as needed, such as recyclable material market directory, cooperative marketing programs, waste composition detail, education/awareness brochures and handouts, etc., for residential and commercial establishments regarding collection alternatives and methods, processing and marketing alternatives, etc;
- Communicate with municipalities the proposed requirements including, but not limited to: provision of recycling containers, collection and transportation of materials, education and promotion, enforcement, cost and funding opportunities, and delivery of material to recycling facilities and markets (destination negotiations).
- Communicate with existing recycling facilities. Assess current capacity, guide on negotiations with municipalities, and project future needs.
- Develop strategy for the procurement of single stream materials recovery facilities: ADS or privately owned.

- Implement a single stream materials recovery facility in the metropolitan area. The initial facility could have a capacity of 250 tons per day on a single shift, and up to 500 tons per day on a double shift and be operating by the year 2009.
- Implement a single stream materials recovery facility in the South Region. The facility could have a capacity of 200 tons per day on a single shift, and up to 400 tons per day on a double shift and be operating by the year 2012.
- Promote and foster private sector investment for the development of additional facilities in other regions of the island.
- Review funding mechanisms and establish new funding models
- Develop plans to fund diversion (i.e., rebates for recycled material, subsidizing material recovery facility capital costs, and/or implementation of pay as you throw programs with free recycling to further incentivize diversion);
- Fiscalize the implementation of the program and its enforcement.
- Advise the municipalities to establish a funding program to secure the financial stability of this program.
- To further enhance the implementation strategy, education of the public and private companies will continue as the program progresses.

5.1.1.3. Composting and Yard Waste Management Strategies

Regulations have been promulgated that prohibit the disposal of yard waste in landfills effective October 1, 2006. This regulation is contained under Chapter 9 of "Reglamento Número 6825" better known as "Reglamento para la Reducción, Reutilización y Reciclaje de los Desperdicios Sólidos en Puerto Rico" dated June 15th 2004. The regulation also establishes penalties for the entities or parties that don't comply with the regulations. Since the yard waste must be diverted from the landfills, several strategies need to be analyzed for the management of this material.

The estimated amount of yard waste that could be diverted by the establishment of this regulation could exceed 500,000 tons per year. This estimate is based on the waste composition study conducted by the 2003 Wehran Study which identified yard waste as comprising approximately 20% of the waste stream and assuming that approximately 63% of this material could be diverted for processing. Ideally, this yard waste should be composted and sold as a soil amendment. To handle this amount of yard waste ADS is

proposing several compost facilities with a combined capacity of approximately 1,800 tons per day (on a 6 day week).

As discussed in Section 3, currently, there are three known existing composting plants. There is also one future planned composting facility that should be in operation by 2010, the Puerto Rico Aqueduct and Sewer Authority (PRASA) plant in Mayaguez.. It is estimated that these four facilities can provide approximately 400 tpd of processing capacity when in full commercial operation. However, only one facility (Arecibo Compost Facility) is currently in operation that is capable of processing approximately 100 tpd of yard waste. It is also anticipated that communities will implement smaller alternative yard waste diversion programs, including back yard composting programs. Therefore, as individual communities begin to implement their programs to divert this waste from landfill disposal, re-evaluation of potential composting facility specific siting and sizing requirements is required.

Another option is grinding or mulching the material as pre-processing for use in another application. Currently, many municipalities have grinding or mulching machines that could be used as a way to process the yard waste that is received as diversion. In some applications, the grinded yard waste is used as a fuel source. Although this alternative succeeds in diverting the waste from landfill disposal it is typically not considered as being recycled. Often grinding is a pre-cursor to simple windrow composting. Multiple low tech mulch and windrow compost facilities could be established at existing landfill and/or transfer station sites and other locations.

To help develop these low tech mulching/composting facilities, the ADS will provide technical assistance and support in developing yard waste collection and education programs, developing and permitting compost sites, assisting in developing regional facilities or developing cooperating agreements for private composting outlets.

As additional information becomes available, ADS will evaluate additional opportunities for co-composting of yard waste with food waste and other biodegradable materials. In the short-term, however, it is anticipated that many communities will implement back yard composting programs, grinding or mulching programs, and/or their own low tech composting system or other alternatives to manage the yard waste in response to the October 2006 banning of yard waste from landfill disposal. In addition, it is also anticipated that the private sector will respond to assist in meeting community demands.

The ADS proposes the construction of approximately 500 tons per day of composting capacity to service approximately thirty (30) percent of the total amount of yard waste anticipated to be diverted. The location of these compost facilities was evaluated by utilizing the Waste Characterization Study of 2003. The study provided information on the amount of yard waste that was disposed in each one of the landfills in Puerto Rico.

An analysis was performed to measure the highest percentage of yard waste disposed at each one of the landfills. From this information, the Ponce, Toa Baja and Humacao landfills were found to have the greatest quantities of yard waste being disposed. As a result, three facilities are being proposed to be constructed in the North, South and East regions. Currently, the required space for the establishment of such facilities and technologies needs to be analyzed.

To promote the delivery of yard waste (e.g., mulch or compost) to any of the proposed low tech or high tech compost facilities, low cost tipping fees and/or surcharging waste disposed in landfills to offset diversion costs should be fomented. After the material is processed the end product could be sold at nominal prices or given away to whoever is interested in utilizing this product. There are several uses that have been identified for these products, among these are:

- Utilized in green areas at the municipalities or in residential areas;
- As a fertilizer (mostly compost);
- Bedding material for horse stables;
- Alternative cover material for landfills (will need previous authorization from the EQB); and
- Stabilizing material for landfill slopes.

No alternative technology was currently identified to have demonstrated economically sustainability to solely handle yard waste for the waste processing quantities currently estimated for Puerto Rico. If the strategies and facilities identified above to handle yard waste do not sufficiently address the entire yard waste required to be disposed of, then ADS may re-evaluate the status of alternative processing technologies for disposal of yard waste.

5.1.1.4. Other Strategies

Other strategies for diverting waste from the landfills include the following:

- Continue a public education regarding the benefits of source reduction and reuse strategy that complements the waste diversion education program.
- Continue to develop and implement source reduction and reuse programs.
- Develop electronic recycling program including battery recycling program to increase recyclables and reduce air emissions for any waste processed at a thermal processing facility.
- Continue to divert C&D and other wastes that may be recoverable or detrimental to operation away from landfills and future alternative processing facilities.

- Assist in developing markets for C&D recovered products to encourage C&D diversion.

Electronic Recycling (E-Cycling)

Electronic products make life more convenient. However, the stockpile of used, obsolete products continues to grow. E-Cycling is a program for reusing or recycling of these consumer electronics.

Computer monitors and older TV picture tubes contain an average of four pounds of lead and require special handling at the end of their useful lives. In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, among others. Toxic materials from electronics that are not disposed of or recycled properly pose many problems. Extending the life of or donating working electronics save money and valuable resources. Safely recycling outdated electronics promotes safe management of hazardous components and supports the recovery and reuse of valuable materials.

Recycling electronics reduces pollution that would be generated while manufacturing a new product and the need to extract valuable and limited resources. It also reduces the energy used in new product manufacturing and increases landfill useful life.

According to the USEPA, one thousand or more municipalities offer computer and electronics collections as part of household hazardous waste collections, special events, or other arrangements. In addition, public and private organizations emerged that accept computers and other electronics for recycling. In June 2007 the ADS conducted a special event to recover electronic equipment waste during which more than 60,000 lbs of this was collected.

At this moment there are about six (6) electronic recycling companies working in Puerto Rico. These companies reportedly recycle about 1,000 tons per year of this material. Most of this material is dismantled manually and the usable parts are exported to the US. In some companies the reusable materials are utilized as spare parts in the repair of computers, monitors and other electronic equipment.

The ADS will foster an e-Cycling program through the following:

- Divert the flow of e-Cycling from the landfills. considerate is projected to amend the existing “Reglamento Número 6825” to include ordinances requiring the diversion of electronic equipment to these and future identified recycling centers. Among the articles that should be recycled or reused are such as computers, monitors, televisions, cathode ray tubes, printers, scanners, fax machines and telephones, household batteries, etc. as part of the revised ordinances.

- Develop procedures for the establishment of host sites that secure the collection in a secure manner of the electronic equipment, as well as of re-manufature, recycling or reuse.
- Set-up events to collect such waste streams on given days at municipal properties and parks.
- Develop guidelines for how to become a host recycling center for such streams.
- Monitor the locations and investigate additional options to increase the number of collections and recycling of unwanted electronics.
- Promote a product stewardship approach that shares cost and responsibility for environmentally safe collection, reuse and recycling among those involved in the life cycle of the product. Such methods would be user charges to cover program costs and providing funding for sites that join the program for limited site development and direct costs to handle the products.
- Establish a public education and outreach program similar to the recycling efforts.
- Provide incentives could also be provided to these companies to expand their operations as well as an educational program to promote the disposal of this type of waste in these specialized centers.
- Assist in developing market outlets for electronic waste.
- Evaluate the need for additional e-Cycling facilities.

Construction & Demolition Recycling (C&D) Some C&D products are recyclable also such as wood, metal, concrete, stone, asphalt, tires, etc. Currently, there are five (5) companies in Puerto Rico that recycle such waste streams. It is projected to amend the existing "Reglamento 6825" to include ordinances encouraging the diversion of C&D to these and future identified recycling centers. C&D diversion programs have included such strategies as:

- Removing rebar from concrete to recycle the metal.
- Using crushed concrete as the road base material.
- Chipping woody wastes and grinding stumps for compost.
- Removing metal from tires, chipping, dyeing and selling as non-degradable compost.

The market for C&D recycling is dependent on the price of the raw material and need for private operators to modify operations accordingly. After the regulations are established and sufficient information regarding the capacities for the private recycling programs is analyzed, the need for additional ADS funded C&D diversion facilities will be

determined. Developing markets for recycled C&D through actions such as mandating recycled content in products and applications to encourage operators to modify operations to accommodate recovered materials should also be evaluated.

5.1.2. Disposal Strategies

5.1.2.1. Alternative Processing Strategies

In order to successfully implement the strategy of diverting waste from disposal in landfills, the Base Case Dynamic Itinerary includes the development of two thermal processing technology facilities with a total processing capacity of approximately 2,910 tons per day. It includes the development of a 1,350 ton per day facility in the North West Region to become operational in 2012 and a 1,560 ton per day facility in the North East Region to become operational in 2013. The siting of the facilities in the North West and North East Regions will provide adequate disposal capacity to service those areas impacted by the projected landfill closures and the need for additional disposal capacity given the projected waste generation for the region.

Thermal processing facilities have proven demonstrated experience both internationally and domestically. Over 63 operating advanced thermal processing facilities are currently operating successfully in the U.S. For the first time in the past ten years, new facilities are being planned, existing facilities are being expanded, and shuttered plants are re-opening. The energy generated by these facilities is substantial and reliable and do not result in the depletion of natural resources. With increasing energy costs and demand, the demand for these types of facilities will also increase.

Some of the waste to energy conversion technologies could generate residual products like gases and slag. These could be used in the chemical industry as well as construction., Advanced thermal recycling exhaust emissions are treated using maximum available air pollution control equipment to meet regulatory requirements. Modern thermal processing facilities have successfully demonstrated the ability to comply with the various federal and state environmental regulations to which they are subject.

There is a related concern to the impact that this technologies could have on the recycling program. However, studies have found this not to be true. In fact, many communities which use this technology boast recycling and re-use rates that is higher than other communities. In addition, many facilities conduct post-combustion ferrous and non-ferrous metal recovery further extending the landfill useful life and producing an additional revenue stream. At some facilities, post metals recovery has contributed to millions of dollars of revenues annually which would have otherwise been landfilled.

The developmet of these facilities will be carried through an RFP process that would further refine the procurement process and result in identifying the most appropriate responsive Proposer for a specific technology.

5.1.2.2. Landfill Disposal Enhancement Strategies

This section discusses the landfill disposal enhancements such as expansion and closure strategies and landfill operation enhancements. The landfill expansion strategies and capacity requirements take into account the development of the above thermal processing facilities.

5.1.2.2.1 Expansion Strategies

Based on the assumptions presented in Section 4, only six (6) landfill expansions are proposed. These landfills are: Fajardo, Humacao, Ponce, Yauco, Salinas and Juncos. These landfill expansions, in addition to the new Peñuelas landfill, will provide approximately 64 million tons of additional disposal capacity. The expansion of each of these landfills is based on the following assumptions: 1) A Preliminary Engineering Report (PER) will need to be performed to help identify, among other information, the expansion area that will need to be constructed to accommodate for the proposed expansion volume; 2) A title study will also need to be performed to verify ownership of the site proposed for expansion and identify any land acquisition that should be performed; and 3) the proposed expansion criteria presented below.

Fajardo

The Municipality of Fajardo is currently proposing the expansion of this landfill in an area comprised of approximately 59 acres. It is estimated that the expansion of this landfill can provide approximately 4,000,000 tons of additional capacity and extend the life of the landfill to 2044. Although this is the total capacity needed, the expansion could be performed in different stages with the construction of certain disposal cells to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2013.

Humacao

Waste Management reportedly owns a parcel of approximately 200 acres located to the south of the existing landfill. Waste Management reports the intention of expanding the landfill in this area at a later date. It is estimated that the expansion of this landfill can provide approximately 15,000,000 tons of additional capacity and extend the life of the landfill to 2036. Although this is the total capacity, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2012.

Ponce

The Ponce landfill has vertical expansion capabilities as well as horizontal expansions in areas privately owned. This expansion will require additional land acquisition to accommodate the space needed for the expansion. The area identified for the expansion is located in the west part of the landfill. It is estimated that the expansion of this landfill can provide approximately 8,000,000 tons of additional capacity and extend the life of the landfill to 2045. Although this is the total capacity, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2012.

Yauco

The Municipality of Yauco and L&M Waste are currently proposing the expansion of this landfill in an area comprised of 60 acres. The capacity needed for this landfill to operate and continue operating over 2030 has been calculated at approximately 3,500,000 tons. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2009.

Salinas

The Municipality of Salinas is currently proposing the expansion of this landfill in an area comprised of approximately 25 acres. It is estimated that the expansion of this landfill can provide approximately 4,000,000 tons of additional capacity and extend the life of the landfill to 2032. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. The permitting process has reportedly been completed. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2009.

Juncos

The Municipality of Juncos is currently proposing the expansion of this landfill in an area comprised of approximately 35 acres. It is estimated that the expansion of this landfill can provide approximately 6,200,000 tons of additional capacity and extend the life of the landfill to 2051. Although this is the total capacity, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2009.

5.1.2.2.2 Closure Strategies

The Base Case Scenario of the Itinerary takes into consideration the closure of twenty-five (25) landfills over a 25 year timeframe. These landfills will be in operation until they use their remaining useful life. The rest of them will be closed due to one or more of the following reasons: limited space for expansion, located in areas that no comply with the Subtitle D Siting Requirements, such as the Karst Region, near flood and wetlands areas.

Landfill Operation Enhancements

Operational enhancements can further improve the operational efficiency and the life of landfills. These enhancements could be implemented by shredding of the solid waste, bailing, mechanical compaction with vehicles, and utilizing alternative daily covers. Depending on the technology that is utilized, these strategies could enhance the operational life of landfills anywhere from 10% to 50%. It is critical that landfills begin the process of establishing, as a minimum requirement, the compaction of the solid waste with the proper equipment recommended for each individual landfill to maximize disposal capacity. Alternative cover is another enhancement that could be implemented but it depends on the approval by the Environmental Quality Board (EQB) for the implementation. There are several programs for the use of alternative cover materials that have been implemented so far. These programs range in the use of shredded tires, ash and concrete mix, and sludge mixed with soil, among others.

5.1.2.3. Transport Strategies

Landfill closures will force municipalities to divert their MSW and recyclables to other facilities or landfills. Under the Base Case, it is recommended in the Itinerary recommends that the transfer stations shown in Table 5-2 be designed and constructed to accommodate receipt and processing of waste diverted from closed landfills based on the following assumptions.

Table 5-2: New Transfer Stations for the Base Case

Location	Initial Throughput Capacity (tpd) [1]	Year of Startup	Closed Landfills that could be Served by Transfer Station	Possible waste transfer to processing or disposition facilities
Aguadilla	750	2007	Aguadilla and Moca	Cabo Rojo / Penuelas New
Mayaguez	250	2011	Mayaguez and Hormigueros	Peñuelas New / North West WTE
San German/Lajas	350	2014	Cabo Rojo and Lajas	Penuelas New
Juana Diaz	190	2026	Juana Diaz	Yauco
Cayey	130	2010	Cayey	Ponce
Vieques	30	2028	Vieques	Fajardo
Culebra	20	2008	Culebra	Fajardo
Toa Baja	1,900	2007	Toa Baja and Toa Alta,	Humacao / North East WTE
Guaynabo	350	2007	Guaynabo	Humacao / North East WTE
Barranquitas	100	2008	Barranquitas	Ponce

Location	Initial Throughput Capacity (tpd) [1]	Year of Startup	Closed Landfills that could be Served by Transfer Station	Possible waste transfer to processing or disposition facilities
Carolina	300	2015	Carolina	Humacao / North East WTE
Arecibo	1,000	2012	Arecibo and Florida	Peñuelas New / North West WTE

Notes:

1. The initial transfer station throughput capacity indicated in the table is a preliminary capacity sizing of the throughput required by the Service Area relating to that transfer station considering other landfill and diversion facilities.
2. The Guaynabo transfer station has been proposed following the closure of the Guaynabo Landfill.

5.1.3. Infrastructure Map for Every Five Year Interval

The infrastructure plays a major role in the development and successful execution of the Itinerary. Therefore, it is of great importance to visualize and understand the changes in infrastructure proposed in the Itinerary. The infrastructure maps with all the existing and proposed new facilities for the Base Case scenario are included in Appendix E-1.

The facilities shown in these maps include the following as of 2030: open landfills, closed landfills, existing operating mini transfer stations, out of service mini transfer stations, proposed new mini transfer stations, existing operating transfer stations, proposed new transfer stations, existing materials recovery facilities, proposed new materials recovery facilities, existing composting facilities, proposed new composting facilities, and proposed new alternative waste processing facilities.

In order to illustrate the evolution and operating status of the different facilities throughout Puerto Rico, a map was prepared for every five year interval of the planning period. This way it is possible to keep track of facilities that have closed and those that have opened or been rehabilitated and the strategic locations where they have been placed.

5.1.4. Summary of Dynamic Itinerary for Base Case

The Dynamic Itinerary proposes the construction of approximately $2.5 billion in infrastructure over the next 25 years to meet the processing and disposal capacity needs of the island through 2030. This investment in infrastructure and the life of these facilities, however, will extend beyond 2030 and as such also serve to provide more than 17 years of remaining processing and disposal capacity beyond 2030.

Table 5-3 summarizes the financial costs associated with the capital investment (public and private investments) and the net present value of the blended cost to process waste at the diversion facility or landfill over the 25-year planning period. Please note that the capital investment presented in this table is less than the $2.5 billion construction cost to account for life and capacity of facilities remaining beyond the 25-year planning period. More specifically, of the total $2.5 billion construction cost, $1.91 billion in debt service payments will be incurred during the 25-year planning period.

The blended cost to process waste includes estimated capital costs and operations and maintenance costs net any projected material revenues such as recyclable material sales or energy sales (from waste-to-energy).

Table 5-3: Base Case Scenario Financial Information

Facility	Estimated Net Present Value of Total Capital Investment (2006 dollars)	Net Present Value Estimate of Required Tipping Fee ($/ton in 2006 dollars – capital and O&M)
Composting Facility	$8,000,000	$18
Material Recovery Facility	$30,000,000	$12
Alternative Processing Facility	$461,000,000	$54
Landfill Expansion	$840,000,000	$31
Landfill Expansion Closure & Post Closure	$210,000,000	$8
Transfer Station	$78,000,000	$8
Waste Managed by Other Municipal or Private Facilities / Landfills	$229,000,000	$29
Waste Managed by Other Landfill Closure & Post Closure	$57,000,000	$8
Total Capital / Estimated Average Tip Fee	$1,910,000,000	$39

As illustrated, the above costs include the development of new composting and material recovery facilities, new alternative processing facilities, new landfill expansions and

development of new transfer stations. The net present value of the required tipping fee takes into account both the debt service payment requirements and the operation and maintenance cost of the facilities, net of anticipated revenues. For example, the anticipated tipping fee for the alternative processing facility would be net of energy revenues received for the sale of electricity produced by the facility and the material recovery facility tipping fee would be net of revenues received for the sale of the processed recyclables.

The above table also includes a category entitled "waste managed by other municipal or private facilities/landfills". This category was included to develop an estimate of the debt and operation and maintenance cost associated with continued operation of existing municipal and private facilities during the planning period. The purpose of including this category was to provide an assessment of the total cost of infrastructure and estimated total cost for disposal of solid waste in Puerto Rico.

It should be noted that the estimates provided above and in subsequent cost tables include all of the anticipated ancillary costs associated with the development of these facilities. These costs include land acquisition, permitting, design, engineering, construction, construction oversight, contingency and financing costs. In the case of the landfills, the costs also include landfill closure and post closure costs. They also assume the development of state-of-the art facilities in compliance with applicable regulations with useful lives of 20 to 30 years.

For a perspective on the alternative processing technology tipping fees, the tipping fee for the alternative processing technology in the above table is within the range of tip fees for advanced thermal recycling waste-to-energy facilities as reported in the Chartwell Publisher's Solid Waste Digest for January 2006 ($55 to $90 per ton).

The following sections summarize the short term, intermediate, and long term planning periods to understand the capital investment costs associated with the development of the various facilities and when they come on-line. For the purposes of this financial analysis, the capital investment costs for all facilities are designated in the year that the facility needs to become operational. Actual capital investment costs will require upfront spending in prior years for the study, engineering, construction, oversight, financing, legal and other project costs depending on whether the facility will be publicly or privately financed. The costs provided below illustrate the amount of funding or size of the bond issue that would be required in that year to finance the proposed infrastructure.

5.1.4.1. Short Term – Years 1 through 5

Table 5-4 summarizes the facilities that will be operational in the first five years of the planning period (2006-2010), the year that they need to be operational, and the estimated

capital investment required at that time. As illustrated, it is estimated that approximately $764 million in construction costs, in today's dollars (i.e. 2006 dollars) will be required over the next five-years to fund new solid waste systems in addition to existing landfill capacity and investments that have or are in the process of being made by municipalities and the private sector. As noted earlier, a portion of these costs will be incurred earlier as part of the upfront planning costs.

Table 5-4: Short Term Facility Financial Summary (Construction Cost - 2006 dollars)

Facility	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)
Composting Facility No. 1			$2.9 M		
Composting Facility No. 2					$2.9 M
Composting Facility No. 3					$1.4 M
Material Recovery Facility No. 1				$15.6 M	
New Landfill – Peñuelas New					$451 M
Landfill Expansion – Yauco				$66.9 M	
Landfill Expansion – Salinas		$62.3 M			
Landfill Expansion – Juncos				$119.2 M	
Transfer Station - Aguadilla		$10.8 M			
Transfer Station - Guaynabo		$6.7 M			
Transfer Station – Toa Baja		$20.0 M			
Transfer Station - Barranquitas			$1.9 M		
Transfer Station – Culebra			$0.4 M		
Transfer Station – Cayey					$1.8 M
Subtotal	**$0.0**	**$100 M**	**$5.2 M**	**$202 M**	**$457 M**

5.1.4.2. Intermediate Term – Years 6 through 15

Table 5-5 summarizes the facilities that will need to be constructed and operational in the Years 6 through 15 and their estimated capital cost at that time. As illustrated, it is estimated that over $1 billion in construction costs (2006 dollars) will be required from 2011 through 2020 to fund the proposed solid waste systems. It should be noted that this level of investment includes the full investment into the required landfill facilities to develop all of the capacity over the life of the landfill. It should be noted, however, that the landfill expansion would likely be implemented in stages and as such this estimate is overstated.

Table 5-5: Intermediate Term Facility Financial Summary (Construction Cost - 2006 dollars)

Facility	Year 6(2011)	Year 7(2012)	Year 8(2013)	Year 9(2014)	Years 10-15 (2015-20)
Material Processing Facility No. 2		$11.9 M			
Alternative Processing Facility West		$216 M			
Alternative Processing Facility North			$246 M		
Landfill Expansion – Fajardo					$77 M
Landfill Expansion – Humacao		$288M			
Landfill Expansion – Ponce					$154 M
Transfer Station - Mayaguez	$4.5 M				
Transfer Station - San German/Lajas				$6.1 M	
Transfer Station – Carolina					$3.9
Transfer Station – Arecibo		$13.4 M			
Subtotal	$4.5 M	$529 M	$246 M	$6.1 M	$235 M

5.1.4.3. Long Term – Years 15 through 25

Table 5-6 summarizes the additional facilities that are anticipated to be constructed in the years 15 through 25 and the capital investment that will be required at that time.

Table 5-6:Long Term Facility Financial Summary (Construction Cost - 2006 dollars)

Facility	Year 16 (2021)	Year 17 (2022)	Year 18 (2023)	Year 19 (2024)	Year 20-25 (2025-30)
Transfer Station – Juana Diaz					$2.8 M
Transfer Station - Vieques					$0.4 M
Subtotal	$0	$0	$0	$0	$3.2 M

5.2. Backup Case

As explained in Section 4, the Backup Case scenario focuses on providing an alternative in the case that the Base Case scenario is unachievable. The Backup Case proposes a slower or less aggressive diversion plan reaching 35 percent by the end of the studied timeframe, in year 2030. It also does not incorporate the participation of an alternative waste processing facility. Therefore, it mainly relies on landfill expansions and new transfer stations for long-term solid waste management.

The following sections discuss the implementation strategies necessary to meet these assumptions as separated into diversion strategies, disposal strategies, and transport strategies. This section also presents the infrastructure maps showing all facilities and summarizes the financial analysis for each five year period and the planning period as a total.

5.2.1. Diversion Strategies

5.2.1.1. Reuse Strategies

The residential and commercial reuse strategies for the Backup Case are the same as those for the Base Case**.** These strategies would include promoting grass cycling and on-site composting, promoting new product and packaging designs, expanding producer responsibility for waste generated by their products, promoting changes in consumption patterns, providing technical assistance to businesses to identify ways to reduce the amount of waste generated, promoting reuse businesses such as charities, used clothing and furniture stores, book exchanges, and others as noted above.

5.2.1.2. Recycling Strategies

The residential and commercial recycling strategies for the Backup Case are the same as those for the Base Case. The only difference is that participation and compliance is assumed to take longer than that anticipated in the Base Case. Specifically the Backup Case assumes the 35 percent diversion goal will not be met until 2026, whereas the Base Case assumes it will be achieved by 2016. As such, additional landfill capacity will be needed. The development of the north and south material recovery facilities at the planned capacities are anticipated to stay the same with single shift operations continuing until two shift days are required to meet demand.

5.2.1.3. Composting and Yard Waste Management Strategies

The composting and yard waste strategies for the Backup Case are the same as for the Base Case. As with the recycling strategies, the only difference is that anticipated recovery rates will take longer to achieve and as such additional landfill capacity may be needed.

5.2.1.4. Other Strategies

The other strategies recommended under the Base Case, including education, reuse, electronics recycling, C&D processing and others, are the same strategies assumed and recommended for the Backup Case.

5.2.2. Disposal Strategies

5.2.2.1. Alternative Processing Strategies

The Base Case assumed the implementation of two thermal processing facilities capable of processing 2,910 tons per day of municipal solid waste beginning 2012. The Backup Case assumes that these facilities are never developed and as such the development of additional landfill capacity is required.

5.2.2.2. Landfill Management Strategies

5.2.2.2.1. Expansion Strategies

The Base Case proposed the expansion of six landfills in addition to the new Penuelas landfill to provide approximately 64,000,000 tons of disposal capacity and resulted in approximately 17 years of remaining processing/disposal capacity after the 25-year planning period (i.e. beyond 2030). This Backup Case requires a larger expansion of three (3) of these six (6) landfills (Fajardo, Humacao and Ponce). This Backup Case also requires the expansion of two additional landfills (Cabo Rojo and Peñuelas New) that were not anticipated to receive any expansion under the Base Case. These additional expansions would increase the disposal capacity from 64,000,000 tons to approximately 70,600,000 tons. At the end of the planning period (i.e. beyond 2030), however, only 7 years of disposal capacity will remain under this Backup Case vs. the 17 years under the Base Case.

The following presents a summary of the landfills requiring expansion under this Backup Case, including the following expansion assumptions: 1) A Preliminary Engineering Report (PER) will need to be performed to help identify, among other information, the expansion area that will need to be constructed to accommodate for the proposed expansion volume; 2) A title study will also need to be performed to verify ownership of the site proposed for expansion and identify any land acquisition that should be performed; and 3) the proposed expansion criteria presented below.

Fajardo

The Municipality is currently proposing the expansion of this landfill in an area comprised of 59 acres. The capacity needed for this landfill to operate and continue operating over 2030 under this Backup Case has been calculated at approximately 5,900,000 tons. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. Construction would take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2014.

Humacao

Waste Management reportedly owns a parcel of around 200 acres located to the south of the existing landfill. The company has the intentions of expanding in this area at a later date. The capacity needed for this landfill to operate and continue operating over 2030 has been calculated at approximately 19,000,000 tons under this Backup Case. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. The landfill expansion would need to start operations by the year 2017 .

Ponce

The Ponce landfill has vertical expansion capabilities as well as horizontal expansions in areas privately owned. This expansion will require additional land acquisition to accommodate the space needed for the expansion. The area identified for the expansion is located in the west part of the landfill. The capacity needed for this landfill to operate and continue operating over 2030 has been calculated at approximately 10,100,000 tons. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2012.

Yauco

The Municipality and L&M Waste are currently proposing the expansion of this landfill in an area comprised of 60 acres. The capacity needed for this landfill to operate and continue operating over 2030 has been calculated at approximately 6,500,000 tons. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2009.

Salinas

The Municipality of Salinas is currently proposing the expansion of this landfill in an area comprised of approximately 25 acres. It is estimated that the expansion of this landfill can provide approximately 4,000,000 tons of additional capacity and extend the life of the landfill to 2032. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. The permitting process has reportedly been completed. Construction should take from 1 to 2

years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2009.

Juncos

The Municipality of Juncos is currently proposing the expansion of this landfill in an area comprised of approximately 35 acres. It is estimated that the expansion of this landfill can provide approximately 6,200,000 tons of additional capacity and extend the life of the landfill to 2051. Although this is the total capacity, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2009.

Cabo Rojo

The Cabo Rojo landfill has expansion capabilities in adjacent areas west of the landfill. This expansion will require additional land acquisition to accommodate the space needed for the expansion. The area identified for the expansion is located in the west part of the landfill. The capacity needed for this landfill to operate and continue operating over 2030 has been calculated at approximately 1,500,000 tons. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2012.

Peñuelas New

The capacity needed for this landfill to operate to provide long-term disposal capacity has been calculated at approximately 4,000,000 tons. Although this is the total capacity needed, the expansion could be performed in different stages to minimize the extent of the construction. This capacity has been assumed based on the projected demand for the area. Construction should take from 1 to 2 years, depending on site and design considerations. The landfill expansion has been calculated to start operations by the year 2029.

5.2.2.2.2. Closure Strategies

This Backup Case Scenario takes into consideration the closure of twenty-four (24) landfills over a 25 year timeframe (vs. 25 landfills under the Base Case) due to the same reasons mentioned on the Base Case. In the Base Case the Cabo Rojo Landfill was

assumed to close in 2021 with the future waste consolidated into another landfill. Under this Backup Case the Cabo Rojo landfill is not closed within the 25-year planning period, but is expanded via additional land acquisition to provide 1.5 million tons of capacity and extend the life of the landfill to 2030.

5.2.2.2.3. Landfill Operation Enhancements

The landfill operation enhancement strategies are the same under the Backup Case as those recommended under the Base Case.

5.2.2.3. Transport Strategies

As previously discussed, landfill closures will force municipalities to transport their MSW and recyclables to other diversion facilities or landfills. The transport strategies for the Backup Case are similar to the Base Case; however, the capacities and start-up dates for the facilities will vary to accommodate the revised landfill closure and expansion requirements. Specifically, the proposed Juana Diaz, Vieques and Arecibo transfer stations will need to be constructed several years earlier than that under the Base Case because of the faster landfill capacity depletion rate for the Backup Case. Construction of the Lajas transfer station, however, will not be needed until after 2030 because of the requirement to expand the Cabo Rojo landfill instead of closing this landfill as proposed under the Base Case. The following Table 5-7 presents a summary of the transfer stations anticipated to be required under the Backup Case.

Table 5-7: New Transfer Stations for the Backup Case

Location	Initial Throughput Capacity (tpd) [1]	Year of Startup	Closed Landfills that could be Served by Transfer Station	Possible waste transfer to processing or disposition facilities
Aguadilla	790	2007	Aguadilla, Moca and Isabela	Cabo Rojo / Peñuelas New
Mayagüez	370	2011	Mayaguez, Añasco, and Hormigueros	Peñuelas New
Juana Diaz	190	2022	Juana Diaz	Yauco
Vieques	30	2025	Vieques	Fajardo
Culebra	20	2008	Culebra	Fajardo
Toa Baja	1830	2007	Toa Baja and Toa Alta	Humacao
Guaynabo[2]	300	2007	Guaynabo	Humacao
Arecibo	1,100	2010	Arecibo and Florida	Peñuelas New
Barranquitas	80	2008	Barranquitas	Ponce
Cayey	130	2010	Cayey	Ponce

Notes:

1. The initial transfer station throughput capacity indicated in the table is a preliminary capacity sizing of the throughput required by the Service Area relating to that transfer station considering other landfill and diversion facilities.
2. The Guaynabo transfer station has been proposed following the closure of the Guaynabo Landfill.

5.2.3. Infrastructure Map for Every Five Year Interval

As explained in this Section 5 the infrastructure plays a major role in the development and successful execution of the Itinerary. Therefore, it is of great importance to visualize and understand the changes in infrastructure proposed in the Itinerary. The infrastructure maps with all the existing and proposed new infrastructure facilities for the Backup Case scenario are included in Appendix D-3.

The facilities shown in these map include: open landfills, closed landfills, existing operating mini transfer stations, out of service mini transfer stations, proposed new mini transfer stations, existing operating transfer stations, proposed new transfer stations, existing materials recovery facilities, proposed new materials recovery facilities, existing composting facilities and proposed new composting facilities,.

In order to illustrate the evolution of the different facilities around the island, a map was prepared for every five year interval. This way it is possible to keep track of facilities that have closed and those that have opened or been rehabilitated and the strategic locations where they have been placed.

5.2.4. Summary of Dynamic Itinerary for Backup Case

Table 5-8 summarizes the financial costs associated with the capital investment and the net present value of the blended cost to process waste at the diversion facility or landfill. The blended cost to process waste includes capital costs and operations and maintenance costs net any material revenues such as recyclable material sales.

As previously discussed, these costs include the development of new composting and material recovery facilities, new landfill expansions and development of new transfer stations. In addition, it includes a category entitled “waste managed by other municipal or private facilities/landfills”. This category was included to develop an estimate of the debt and operation and maintenance cost associated with continued operation of existing municipal and private facilities during the planning period. The purpose of including this category waste to provide an assessment of the total cost of infrastructure and estimated total cost for disposal of solid waste in Puerto Rico.

Table 5-8: Backup Case Financial Information

Facility	Estimated Net Present Value of Total Capital Investment (2006 dollars)	Net Present Value Estimate of Required Tipping Fee ($/ton in 2006 dollars – capital and O&M)
Composting Facility	$8,000,000	$18
Material Recovery Facility	$30,000,000	$12
Alternative Processing Facility	NA	NA
Landfill Expansion	$1,190,000,000	$34
Landfill Expansion – Closure & Post Closure	$298,000,000	$9
Transfer Station	$72,000,000	$8
Waste Managed by Other Municipal or Private Facilities / Landfills	$288,000,000	$29
Waste Managed by Other Landfill Closure & Post Closure	$72,000,000	$8
Total Capital Cost / Estimated Average Tip Fee	$1,960,000,000	$41

As illustrated in the above table the capital cost over the 25-year planning period under the Backup Case is slightly higher than that under the Base Case even though the total construction cost of the infrastructure is less under the Backup Case then under the Base Case. As previously discussed, the primary difference is that the Base Case scenario provides for an additional 17 years of capacity beyond 2030, whereas the Backup Case only provides 7 years of capacity beyond 2030. The tipping fee is also slightly higher under the Backup Case then under the Base Case due in part to the higher capital cost as well as due to higher operation and maintenance costs. The operation and maintenance costs are higher under the Backup Case scenario because of the reduced recycling rates which require landfilling this waste at a cost which is greater than the cost to recycle this material.

5.2.4.1. Short Term – Years 1 through 5

Table 5-9 summarizes the facilities that will be operational in the first five years, the year that they need to be operational, and the estimated capital investment required at that time. As illustrated, it is estimated that approximately $774 million in construction cost

(2006 dollars) will be required over the next five-years to fund new solid waste systems in addition to existing landfill capacity and investments that have or are in the process of being made by municipalities and the private sector.

Table 5-9: Short Term Facility Financial Summary – Backup Case (Construction Cost - 2006 dollars)

Facility	Year 1 (2006)	Year 2 (2007)	Year 3 (2008)	Year 4 (2009)	Year 5 (2010)
Composting Facility No. 1			$2.9 M		
Composting Facility No. 2					$2.9 M
Composting Facility No. 3					$1.4 M
Material Recovery Facility No. 1				$15.6 M	
Landfill Expansion – Salinas		$62.3 M			
Landfill Expansion – Juncos				$119.2 M	
Landfill Expansion – Yauco				$66.9 M	
New Landfill – Peñuelas New					$451M
Transfer Station – Aguadilla		$11.4 M			
Transfer Station – Culebra			$0.4 M		
Transfer Station – Toa Baja		$19.4 M			
Transfer Station - Guaynabo		$4.3 M			
Transfer Station – Arecibo					$15.2 M
Transfer Station - Barranquitas			$1.5 M		
Subtotal	$ 0	$97 M	$4.8 M	$202 M	$471 M

In addition, as previously noted, the estimates provided in the above and subsequent cost tables include all of the anticipated ancillary costs associated with the development of these facilities. These costs include land acquisition, permitting, design, engineering, construction, construction oversight, contingency and financing costs. In the case of the landfills it also includes landfill closure and post closure costs. They also assume the development of state-of-the art facilities with useful lives of 20 to 30 years. As such, these costs may appear to be high in comparison to published costs for construction of comparable facilities.

5.2.4.2. Intermediate Term – Years 6 through 15

Table 5-10 summarizes the facilities that will be operational in the Years 6 through 15, and their estimated capital cost at that time. As illustrated, it is estimated that approximately $721 million construction costs (2006 dollars) will be required from 2011 through 2020 to fund the proposed solid waste systems.

Table 5-10: Intermediate Term Facility Financial Summary (Construction Cost - 2006 dollars)

Facility	Year 6 (2011)	Year 7 (2012)	Year 8 (2013)	Year 9 (2014)	Years 10-15 (2015-20)
Material Processing Facility No. 2		$11.9			
Alternative Processing Facility			$0 M		
Landfill Expansion – Cabo Rojo		$28.8 M			
Landfill Expansion – Fajardo				$114 M	
Landfill Expansion – Humacao		$365 M			
Landfill Expansion – Ponce		$194 M			
Transfer Station – Mayaguez	$6.7 M				
Subtotal	$6.7 M	$600 M	$0 M	$114 M	$0

5.2.4.3. Long Term – Years 15 through 25

Table 5-11 summarizes the additional facilities that are anticipated to be constructed in the Years 15 through 25 and the capital investment that will be required at that time. As illustrated below, approximately $80 million (2006 dollars) is anticipated to be required for investment in disposal capacity. .

Table 5-11: Long Term Facility Financial Summary (Construction Cost - 2006 dollars)

Facility	Year 16 (2021)	Year 17 (2022)	Year 18 (2023)	Year 19 (2024)	Year 20-25 (2025-30)
Landfill – Peñuelas New					$77 M
Transfer Station – Juana Diaz		$2.9 M			
Transfer Station – Vieques					$0.4 M
Subtotal	$0	$2.9 M	$0	$0	$77 M

APPENDIX A-1
COMMONWEALTH OF PUERTO RICO
SOLID WASTE MANAGEMENT AUTHORITY
LANDFILL INFORMATION

Landfill	Operator	Hours of Operation	Tons per week (2006)	Municipalities that Dispose	Tipping Fee
Aguadilla	**Landfill Technologies**	**M-Sun 6:00-3:00**	**1,012**	Aguadilla	$7.00/CU.YD
Añasco	**Municipality**	**M-F 7:00-3:30**	**815**	Anasco	$6.00/CU.YD
Arecibo	**Landfill Technologies**	**M-F 7:00-3:30 M-F 6:00 - 5:00 Sat**	**6,510**	Arecibo, Camuy, Utuado, Manati, Lares, Hatillo	$31.00/TON
Arroyo	**L&M Waste**	**6:00-12:00**	**715**	Arroyo, Patillas	$35.00/TON
Barranquitas	**Municipality**	**M-F 7:00-3:30**	**468**	Barranquitas, Orocovis	$25-100/CU.YD
Cabo Rojo	**Landfill Technologies**	**M-F 6:30 - 4:00 Sat 7:00-12:00**	**1,018**	Cabo Rojo	$6.00/CU.YD (Domestic) $18.00/ea Scrap/Auto
Carolina	**Landfill Technologies**	**M-F 6:30 - 4:00 Sat 6:30-2:00**	**2,356**	Carolina	$100/ton (Private) $90.00 (state)
Cayey	**Municipality**	**M-F 6:00 - 1:00 SAT 6:00-11:00**	**792**	Cayey	$12.00/CU.YD $16.00/CU.YD Scrap $30.00/CU.YD C&D
Culebra	**Municipality**	**M-F 6:00-3:30 SAT 6:30-10:30**	**89**	Culebra	N/A
Fajardo	**Landfill Technologies**	**M-F 6:30-4:30 SAT 7:00-12:00**	**4,095**	Fajardo, Luquillo, Ceiba, Loiza, Rio Grande, Canovanas, Naguabo	$9.00/CU.YD
Florida	**Waste Disposal Management**	**M-F 6:00-2:00**	**312**	Florida	$35.00/TON
Guayama	**Carlos Rental Equipment**	**M-F 6:00-5:00 SAT 6:00 -12:00**	**358**	Guayama	$7.35/CU.YD
Guaynabo	**Landfill Technologies**	**M-F 7:00-4:00**	**2,000**	Guaynabo	N/A
Hormigueros	**Municipality**	**M-F 7:00-4:00 SAT 7:00-12:00**	**302**	Hormigueros	$25.00/ pickup truck $40/ pickup 350 $100/ 6 cu.mt truck
Humacao	**Waste Management**	**M-F 5:00 -7:00 SAT 5:00-2:00**	**13,800**	Gurabo, Caguas, Humacao, San Juan, Las Piedras	$42/ton
Isabela	**Municipality**	**M-F 7:00-1:00**	**455**	Isabela	$12.50/cu.yd
Jayuya	**Municipality**	**M-F 6:00-6:30 SAT 8:00-4:00**	**315**	Jayuya	$80 per 10 cu.yd $160 per 20 cu.yd to Utuado
Juana Díaz	**L&M Waste**	**M-F 7:00-4:00 SAT 7:00-12:00**	**1,527**	Juana Diaz, Villalba, Coamo	$7.50/cu.yd (domestic) $9/cu.yd C&D
Juncos	**Municipality**	**M-F 6:00-5:00 SAT 6:00 -12:00**	**4,296**	Canovanas, Aguas Buenas (C&D), Trujillo Alto, Juncos, San Lorenzo (C&D)	$7.00/cu.yd (domestic) $10/cu.yd (C&D)
Lajas	**Prime Inc.**	**M-F 7:00-3:30 SAT 7:00-12:00**	**1,080**	Lajas	$6/cu.yd
Mayagüez	**Waste Management**	**M-F 6:00-3:00 SAT 6:00-12:00**	**1,375**	Mayaguez, Maricao	$40/ton
Moca	**Municipality**	**M-F 6:00-3:00**	**3,855**	Moca, San Sebastian, Las Marias, Aguada, Rincon, Quebradillas	$6/cu.yd
Peñuelas	**Waste Management**	**M-F 7:30-4:30**	**3,000**	Industrial	N/A
Ponce	**BFI**	**M-F 3:00-7:00 SAT 3:00-12:00**	**6,620**	Adjuntas, Ponce, Comerio, Aguas Buenas, Cidra (Part of it)	$9/cu.yd (domestic) $11.75/cu.yd (C&D) $40/cyd seizures $45.75/cuyd (Auto) $10-14/cuyd (sludge)
Salinas	**BFI**	**M-F 6:00-4:00 SAT 6:00-12:00**	**2,750**	Aibonito, Salinas, Cidra	$9.00/CU.YD
Santa Isabel	**Municipality**	**M-F 6:00-3:00 SAT 6:00-12:00**	**286**	Santa Isabel	$7.00/cu.yd
Toa Alta	**Landfill Technologies**	**M-F 6:30-4:00 SAT 7:00-12:00**	**2,887**	Comerio, Corozal, Toa Alta, Naranjito	$9.00/CU.YD
Toa Baja	**Landfill Technologies**	**M-F 6:00-6:00**	**9,000**	Bayamon, Catano, Toa Baja, Morovis, Dorado	$31.00/ton
Vega Baja	**AR Waste Disposal**	**M-F 7:00-3:00 SAT 7:00-12:00**	**550**	Vega Alta, Manati, Ciales, Vega Baja	$6.75/cyd (municipality) $9.00/cyd (Private)
Vieques	**Municipality**	**M-F 6:00-3:00**	**256**	Vieques	N/A
Yabucoa	**Landfill Technologies**	**M-F 6:00-4:00**	**763**	Yabucoa, Maunabo	N/A
Yauco	**L&M Waste**	**M-F 7:00-4:00 SAT 7:00-12:00**	**2,410**	Yauco, Guanica, San German, Sabana Grande, Penuelas, Guayanilla	$7.25/cyd (domestic) $9.50/cyd (C&D)
			76,067		

Appendix B-1: Population Projections

Municipio	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025
Adjuntas	19,143	19,168	19,193	19,218	19,243	19,268	19,259	19,250	19,241	19,232	19,224	19,552	19,787	20,057
Aguada	42,158	42,652	43,152	43,658	44,170	44,687	45,126	45,569	46,016	46,468	46,923	48,401	49,599	50,283
Aguadilla	64,791	65,254	65,720	66,190	66,663	67,139	67,483	67,829	68,177	68,527	68,878	69,993	70,764	71,136
Aguas Buenas	29,096	29,373	29,653	29,936	30,221	30,510	30,746	30,983	31,222	31,463	31,706	32,524	33,172	33,543
Aibonito	26,515	26,632	26,750	26,868	26,987	27,106	27,192	27,278	27,365	27,452	27,539	28,124	28,553	28,872
Añasco	28,406	28,650	28,896	29,144	29,394	29,645	29,841	30,038	30,237	30,437	30,638	31,276	31,767	32,006
Arecibo	100,256	100,793	101,333	101,876	102,422	102,971	103,326	103,683	104,041	104,400	104,760	105,963	106,708	107,004
Arroyo	19,128	19,185	19,242	19,299	19,356	19,414	19,442	19,470	19,498	19,526	19,555	19,962	20,275	20,528
Barceloneta	22,349	22,470	22,592	22,715	22,838	22,963	23,041	23,120	23,199	23,278	23,357	23,816	24,228	24,579
Barranquitas	28,961	29,219	29,480	29,743	30,008	30,276	30,511	30,748	30,987	31,227	31,469	32,690	33,737	34,590
Bayamón	224,153	224,672	225,192	225,714	226,237	226,761	226,815	226,869	226,923	226,977	227,033	229,070	230,107	231,381
Cabo Rojo	47,033	47,545	48,063	48,586	49,115	49,649	50,090	50,535	50,984	51,437	51,896	52,665	53,256	53,227
Caguas	140,650	141,281	141,914	142,550	143,189	143,831	144,191	144,552	144,914	145,277	145,640	147,640	148,953	149,881
Camuy	35,343	35,764	36,190	36,621	37,057	37,498	37,883	38,272	38,665	39,062	39,463	40,624	41,637	42,139
Canóvanas	43,437	43,884	44,336	44,792	45,253	45,718	46,115	46,515	46,919	47,326	47,738	49,297	50,565	51,349
Carolina	186,297	187,269	188,246	189,228	190,215	191,208	191,718	192,230	192,743	193,257	193,773	196,295	197,753	198,898
Cataño	30,027	29,887	29,747	29,608	29,470	29,332	29,152	28,973	28,795	28,618	28,443	28,801	29,020	29,513
Cayey	47,397	47,550	47,703	47,857	48,011	48,165	48,231	48,297	48,363	48,429	48,495	49,138	49,553	49,901
Ceiba	18,016	18,100	18,184	18,268	18,353	18,438	18,472	18,506	18,540	18,574	18,607	18,958	19,224	19,511
Ciales	19,837	19,961	20,086	20,212	20,338	20,465	20,573	20,681	20,790	20,899	21,009	21,613	22,138	22,549
Cidra	42,880	43,426	43,979	44,539	45,106	45,680	46,183	46,691	47,205	47,725	48,250	49,946	51,374	52,209
Coamo	37,660	37,942	38,226	38,512	38,801	39,092	39,328	39,565	39,804	40,044	40,285	41,390	42,346	43,088
Comerio	20,006	20,044	20,082	20,120	20,158	20,197	20,207	20,217	20,227	20,237	20,246	20,642	20,906	21,184
Corozal	36,935	37,247	37,562	37,880	38,200	38,523	38,786	39,051	39,318	39,587	39,857	41,090	42,103	42,849
Culebra	1,872	1,893	1,915	1,937	1,959	1,981	2,002	2,023	2,045	2,067	2,089	2,103	2,103	2,067
Dorado	34,079	34,348	34,619	34,892	35,168	35,446	35,657	35,870	36,084	36,299	36,515	37,379	38,023	38,420
Fajardo	40,763	41,008	41,254	41,502	41,751	42,002	42,177	42,352	42,528	42,705	42,883	43,592	44,183	44,596
Florida	12,399	12,538	12,679	12,821	12,965	13,111	13,236	13,362	13,490	13,619	13,749	14,365	14,938	15,179
Guánica	21,924	22,083	22,243	22,404	22,567	22,731	22,857	22,983	23,110	23,238	23,366	23,851	24,234	24,464
Guayama	44,355	44,605	44,856	45,109	45,363	45,618	45,813	46,008	46,204	46,401	46,599	47,684	48,551	49,207
Guayanilla	23,099	23,229	23,360	23,492	23,624	23,757	23,857	23,957	24,058	24,159	24,260	24,762	25,122	25,387
Guaynabo	100,148	100,564	100,982	101,401	101,822	102,245	102,462	102,680	102,898	103,117	103,337	104,278	104,836	105,052
Gurabo	36,878	37,439	38,009	38,588	39,175	39,772	40,306	40,847	41,395	41,950	42,513	44,054	45,417	46,091
Hatillo	39,035	39,505	39,981	40,462	40,949	41,442	41,869	42,300	42,736	43,176	43,621	44,936	46,051	46,640
Hormigueros	16,639	16,736	16,833	16,931	17,030	17,129	17,191	17,253	17,316	17,379	17,442	17,499	17,448	17,337
Humacao	59,115	59,481	59,850	60,221	60,594	60,970	61,217	61,465	61,714	61,964	62,217	63,343	64,104	64,582
Isabela	44,532	44,913	45,297	45,685	46,076	46,470	46,796	47,124	47,455	47,788	48,124	49,097	49,866	50,188
Jayuya	17,345	17,474	17,604	17,735	17,867	18,002	18,116	18,230	18,345	18,461	18,578	19,180	19,710	20,106
Juana Díaz	50,630	51,058	51,490	51,926	52,365	52,809	53,176	53,546	53,918	54,293	54,670	56,436	57,964	59,149
Juncos	36,558	37,017	37,482	37,953	38,430	38,912	39,327	39,747	40,171	40,600	41,034	42,412	43,634	44,420
Lajas	26,304	26,498	26,694	26,891	27,089	27,289	27,442	27,596	27,751	27,907	28,064	28,410	28,615	28,609

Municipio	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015	2020	2025
Lares	34,496	34,851	35,209	35,571	35,937	36,307	36,632	36,960	37,291	37,625	37,961	38,996	39,859	40,287
Las Marías	11,093	11,231	11,370	11,511	11,654	11,798	11,928	12,059	12,191	12,325	12,460	12,887	13,240	13,448
Las Piedras	34,600	35,090	35,587	36,091	36,602	37,121	37,576	38,037	38,504	38,976	39,454	40,827	41,949	42,520
Loíza	32,617	32,953	33,293	33,636	33,983	34,334	34,641	34,951	35,263	35,578	35,896	37,467	38,870	40,048
Luquillo	19,847	19,970	20,094	20,219	20,345	20,472	20,563	20,654	20,746	20,838	20,930	21,319	21,623	21,824
Manatí	45,519	45,969	46,424	46,883	47,347	47,815	48,206	48,601	48,999	49,400	49,804	51,028	51,987	52,447
Maricao	6,453	6,487	6,521	6,555	6,589	6,624	6,652	6,680	6,708	6,736	6,764	6,961	7,111	7,251
Maunabo	12,751	12,808	12,865	12,922	12,980	13,038	13,086	13,134	13,182	13,231	13,280	13,592	13,822	13,986
Mayagüez	98,393	98,552	98,711	98,871	99,031	99,191	98,995	98,799	98,604	98,409	98,215	98,513	98,281	98,454
Moca	39,820	40,333	40,852	41,378	41,911	42,451	42,915	43,384	43,858	44,338	44,823	46,376	47,727	48,586
Morovis	30,039	30,367	30,699	31,035	31,374	31,717	32,023	32,332	32,644	32,959	33,276	34,655	35,910	36,879
Naguabo	23,783	23,911	24,040	24,170	24,300	24,431	24,524	24,618	24,712	24,807	24,902	25,370	25,703	25,944
Naranjito	29,739	29,895	30,052	30,210	30,369	30,529	30,649	30,769	30,890	31,011	31,133	31,984	32,678	33,251
Orocovis	23,881	24,053	24,226	24,400	24,575	24,752	24,911	25,071	25,232	25,394	25,559	26,402	27,146	27,726
Patillas	20,160	20,216	20,272	20,328	20,384	20,441	20,471	20,501	20,531	20,561	20,590	20,887	21,066	21,197
Peñuelas	26,794	27,115	27,440	27,769	28,102	28,439	28,746	29,056	29,369	29,686	30,006	31,249	32,338	33,099
Ponce	186,524	186,823	187,122	187,422	187,722	188,022	188,023	188,024	188,025	188,026	188,026	190,608	192,285	194,172
Quebradillas	25,519	25,809	26,103	26,400	26,700	27,004	27,269	27,536	27,806	28,079	28,354	29,205	29,895	30,257
Rincón	14,799	14,945	15,092	15,241	15,391	15,542	15,665	15,789	15,914	16,040	16,167	16,382	16,507	16,423
Río Grande	52,477	52,974	53,476	53,983	54,495	55,011	55,422	55,836	56,253	56,673	57,098	58,538	59,680	60,328
Sabana Grande	25,982	26,184	26,388	26,593	26,800	27,009	27,173	27,338	27,504	27,671	27,840	28,357	28,769	28,979
Salinas	31,161	31,371	31,582	31,795	32,009	32,224	32,393	32,563	32,734	32,905	33,077	33,941	34,688	35,268
San Germán	37,137	37,298	37,460	37,623	37,787	37,951	38,051	38,151	38,252	38,353	38,454	38,800	38,955	38,951
San Juan	434,519	435,319	436,120	436,923	437,727	438,533	438,488	438,443	438,398	438,353	438,309	441,041	442,152	443,778
San Lorenzo	41,098	41,540	41,987	42,439	42,896	43,357	43,754	44,155	44,559	44,967	45,378	46,707	47,833	48,497
San Sebastián	44,287	44,638	44,992	45,348	45,707	46,069	46,352	46,637	46,924	47,213	47,504	48,231	48,750	48,864
Santa Isabel	21,704	21,879	22,055	22,232	22,411	22,591	22,739	22,888	23,038	23,189	23,342	24,051	24,677	25,168
Toa Alta	64,261	65,662	67,094	68,557	70,052	71,580	72,989	74,426	75,891	77,385	78,908	83,069	86,996	89,125
Toa Baja	94,212	94,761	95,313	95,868	96,427	96,989	97,351	97,715	98,080	98,447	98,815	100,986	102,603	104,026
Trujillo Alto	75,970	76,993	78,030	79,081	80,146	81,224	82,148	83,082	84,027	84,982	85,948	88,726	91,101	92,351
Utuado	35,348	35,426	35,505	35,584	35,663	35,742	35,770	35,798	35,826	35,854	35,882	36,416	36,795	37,140
Vega Alta	37,981	38,290	38,602	38,916	39,233	39,552	39,802	40,053	40,306	40,560	40,816	41,942	42,841	43,525
Vega Baja	62,032	62,476	62,923	63,374	63,828	64,285	64,636	64,989	65,344	65,701	66,058	67,634	68,892	69,754
Vieques	9,107	9,120	9,133	9,146	9,159	9,173	9,175	9,177	9,179	9,181	9,183	9,185	9,145	9,063
Villalba	27,981	28,276	28,574	28,876	29,181	29,489	29,757	30,027	30,300	30,575	30,852	32,001	33,020	33,774
Yabucoa	39,313	39,595	39,879	40,165	40,453	40,743	40,965	41,188	41,412	41,638	41,865	42,968	43,893	44,647
Yauco	46,458	46,781	47,107	47,435	47,765	48,097	48,351	48,606	48,862	49,120	49,378	50,376	51,131	51,579
Puerto Rico	**3,814,004**	**3,838,318**	**3,862,861**	**3,887,634**	**3,912,634**	**3,937,869**	**3,956,003**	**3,974,292**	**3,992,749**	**4,011,368**	**4,030,152**	**4,110,528**	**4,172,242**	**4,214,387**

Solid Waste Processing Capacity Model

Scenario 1 Base Case
East WTE online year 7
North WTE online year 6
Consolidation to 8 landfills
High diversion rate

Assumed generation rate = 5.56 lbs/person/day

Year #			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Generation																											
Projected population	3,905,116	3,929,885	3,956,003	3,974,292	3,992,749	4,011,368	4,030,152	4,045,869	4,061,648	4,077,488	4,093,391	4,110,528	4,122,859	4,135,228	4,147,633	4,160,076	4,172,242	4,180,586	4,188,947	4,197,325	4,205,720	4,214,387	4,222,559	4,231,005	4,239,467	4,247,945	4,256,441
Generation rate/person entering landfills (lbs/pers*day)	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56
Annual generated waste in Tons	3,962,521	3,987,654	4,014,156	4,032,714	4,051,442	4,070,335	4,089,395	4,105,343	4,121,354	4,137,427	4,153,564	4,170,953	4,183,465	4,196,016	4,208,603	4,221,229	4,233,574	4,242,041	4,250,525	4,259,026	4,267,544	4,276,338	4,284,631	4,293,201	4,301,787	4,310,390	4,319,011
Waste diversion																											
Waste Diversion Rate (**The reported ADS diversion rate from the "Tasa Reciclaje Informe Final 2004 y 2005" does not include C&D in the waste stream. To calculate the percentage, the amount of waste diverted reported by the ADS was divided by the amount of waste generated on this model.**)	13.11%	11.56%	15.3%	17%	19%	21%	23%	25%	27%	29%	31%	33%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
Total waste diversion volume w/o C&D in Tons	329,421	341,457	614,567	685,561	769,774	854,770	940,561	1,026,336	1,112,766	1,199,854	1,287,605	1,376,414	1,464,213	1,468,606	1,473,011	1,477,430	1,481,751	1,484,714	1,487,684	1,490,659	1,493,640	1,496,718	1,499,621	1,502,620	1,505,626	1,508,636	1,511,654
C&D Waste before entering WTE	-	-	-	-	-	-	-	-	69,855	160,835	156,914	166,163	161,686	162,171	162,658	163,146	163,623	163,950	165,936	166,268	166,601	166,944	167,268	167,602	167,937	168,273	168,610
Total volume reduced by waste diversion efforts in Tons	329,421	341,457	614,567	685,561	769,774	854,770	940,561	1,026,336	1,182,621	1,360,689	1,444,519	1,542,577	1,625,899	1,630,777	1,635,669	1,640,576	1,645,374	1,648,664	1,653,620	1,656,927	1,660,241	1,663,662	1,666,888	1,670,222	1,673,563	1,676,910	1,680,264
Volume requiring disposal at landfill or WTE facilities in tons	3,633,100	3,646,198	3,399,589	3,347,153	3,281,668	3,215,565	3,148,834	3,079,007	2,938,733	2,776,738	2,709,045	2,628,376	2,557,566	2,565,239	2,572,934	2,580,653	2,588,200	2,593,376	2,596,905	2,602,099	2,607,303	2,612,676	2,617,742	2,622,978	2,628,224	2,633,480	2,638,747
Annual waste diversion volume growth rate		0.36%	-6.76%	-1.54%	-1.96%	-2.01%	-2.08%	-2.22%	-4.56%	-5.51%	-2.44%	-2.98%	-2.69%	0.30%	0.30%	0.30%	0.29%	0.20%	0.14%	0.20%	0.20%	0.21%	0.19%	0.20%	0.20%	0.20%	0.20%
Waste to Energy Diversion North WTE Facility																											
1. Annual Capacity at new technology facility in Tons (1,560 tpd at 85% capability)	0	0	0	0	0	0	0	0	0	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990	483,990
2. Actual Annual Disposal Rate at North WTE new technology facility in Tons	0	0	0	0	0	0	0	0	0	436,888	426,237	423,859	468,073	469,477	470,885	472,298	473,679	474,627	475,272	476,223	477,175	478,159	479,086	480,044	481,004	481,966	482,930
3. Ash produced from WTE facility (25% by weight)-Transferred to Humacao Landfill	0	0	0	0	0	0	0	0	0	109,222	106,559	105,965	117,018	117,369	117,721	118,075	118,420	118,657	118,818	119,056	119,294	119,540	119,771	120,011	120,251	120,492	120,733
4. Available Capacity at North WTE (1-2)	0	0	0	0	0	0	0	0	0	47,102	57,753	60,131	15,917	14,513	13,105	11,692	10,311	9,363	8,718	7,767	6,815	5,831	4,904	3,946	2,986	2,024	1,060
West WTE Facility																											
1. Annual Capacity at new technology facility in Tons (1,350 tpd at 85% capability)	0	0	0	0	0	0	0	0	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838	418,838
2. Actual Annual Disposal Rate at West WTE new technology facility in Tons	0	0	0	0	0	0	0	0	338,655	420,002	409,763	397,561	386,851	388,011	389,175	390,343	391,484	392,267	401,348	402,151	402,955	403,785	404,568	405,378	406,188	407,001	407,815
3. Ash produced from WTE facility (25% by weight)-Transferred to Penuelas New Landfill	0	0	0	0	0	0	0	0	84,664	105,000	102,441	99,390	96,713	97,003	97,294	97,586	97,871	98,067	100,337	100,538	100,739	100,946	101,142	101,344	101,547	101,750	101,954
4. Available Capacity at West WTE (1-2)	0	0	0	0	0	0	0	0	80,182	(1,164)	9,075	21,276	31,987	30,826	29,662	28,495	27,353	26,570	17,489	16,687	15,882	15,052	14,269	13,460	12,649	11,837	11,023
Net volume requiring disposal at landfill facilities in tons	3,633,100	3,646,198	3,399,589	3,347,153	3,281,668	3,215,565	3,148,834	3,079,007	2,684,742	2,121,586	2,069,865	2,000,493	1,904,875	1,910,589	1,916,321	1,922,070	1,927,691	1,931,546	1,927,764	1,931,619	1,935,483	1,939,471	1,943,232	1,947,119	1,951,013	1,954,915	1,958,825

Assumptions

Landfill Disposal

Closure in 2007 — **1. Aguadilla**
Move to Cabo Rojo
West WTE

Annual disposal rate in Tons / yr	48,335	48,509	45,228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	145,451	96,942	51,713	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Growth of volume of Aguadilla				44,531	43,660	42,780	41,892	40,963	39,097	36,942	36,041	34,968	34,026	34,128	34,230	34,333	34,434	34,502	34,549	34,618	34,688	34,759	34,827	34,896	34,966	35,036	35,106
C&D Waste Recovered before entering WTE (17.1%)				7,615	7,466	7,315	7,164	7,005	6,686	6,317	6,163	5,980	5,818	5,836	5,853	5,871	5,888	5,900	5,908	5,920	5,932	5,944	5,955	5,967	5,979	5,991	6,003
Volume transferred to WTE				***36,916***	***36,194***	***35,465***	***34,729***	***33,959***	***32,411***	***30,625***	***29,878***	***28,989***	***28,208***	***28,292***	***28,377***	***28,462***	***28,545***	***28,603***	***28,641***	***28,699***	***28,756***	***28,815***	***28,871***	***28,929***	***28,987***	***29,045***	***29,103***

Closure in 2011 — **2. Anasco**
Move to Penuelas New
West WTE

Annual disposal rate in Tons / yr	38,926	39,066	36,424	35,862	35,161	34,452	33,737	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	6.7	5.7	5.1	4.2	3.2	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	260,424	221,358	184,934	149,072	113,911	79,459	45,721	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Growth of volume of Anasco								32,989	31,486	29,751	29,025	28,161	27,402	27,485	27,567	27,650	27,731	27,786	27,824	27,880	27,935	27,993	28,047	28,103	28,159	28,216	28,272
C&D Waste Recovered before entering WTE (17.1%)								5,641	5,384	5,087	4,963	4,816	4,686	4,700	4,714	4,728	4,742	4,751	4,758	4,767	4,777	4,787	4,796	4,806	4,815	4,825	4,835
Volume transferred to WTE								***27,348***	***26,102***	***24,663***	***24,062***	***23,346***	***22,717***	***22,785***	***22,853***	***22,922***	***22,989***	***23,035***	***23,066***	***23,112***	***23,158***	***23,206***	***23,251***	***23,298***	***23,344***	***23,391***	***23,438***

Closure in 2012 — **3. Arecibo**
Move to North WTE
West WTE

Annual disposal rate in Tons / yr	310,930	312,051	290,945	324,388	318,041	311,635	305,168	298,401	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	8.1	7.0	6.5	4.9	4.0	3.1	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	2,508,443	2,196,392	1,905,447	1,581,059	1,263,018	951,383	646,215	347,814	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0	0	0	38,525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vega Baja Transferred to North WTE										20,077																	
Growth of volume of Arecibo									284,806	249,029	242,958	235,723	229,373	230,061	230,751	231,444	232,120	232,585	232,901	233,367	233,834	234,315	234,770	235,239	235,710	236,181	236,654
C&D Waste Recovered before entering WTE (17.1%)									48,702	42,584	41,546	40,309	39,223	39,340	39,458	39,577	39,693	39,772	39,826	39,906	39,986	40,068	40,146	40,226	40,306	40,387	40,468
Volume transferred to West WTE									***236,104***	***206,445***	***201,412***	***195,415***	***190,150***	***190,721***	***191,293***	***191,867***	***192,428***	***192,813***	***193,075***	***193,461***	***193,848***	***194,248***	***194,624***	***195,013***	***195,404***	***195,794***	***196,186***

Closure in 2009 — **4. Arroyo**
Move to Salinas

Annual disposal rate in Tons / yr	34,150	34,273	31,955	31,462	30,846	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	5.0	4.0	3.3	2.3	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	171,449	137,176	105,221	73,759	42,913	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Closure in 2008 — **5. Barranquitas**
Move to Ponce

Annual disposal rate in Tons / yr	22,353	22,433	20,916	20,593	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	4.0	3.0	2.2	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	89,302	66,869	45,953	25,360	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Closure in 2014 — **6. Cabo Rojo**
Move to Penuelas New

Annual disposal rate in Tons / yr	48,622	48,797	45,496	89,325	87,578	85,814	84,033	82,169	39,329	37,161	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	13.6	12.5	12.4	5.3	4.4	3.5	2.6	1.7	2.5	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	659,345	610,548	565,052	475,726	388,148	302,335	218,302	136,132	96,803	59,642	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0	0	0	45,228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capacity added through expansion																											
Volume transferred to WTE									39,097																		

Closure in 2015 — **7. Carolina**
Move to East WTE
North WTE

Annual disposal rate in Tons / yr	112,527	112,933	105,294	103,670	101,642	99,595	97,528	95,365	91,020	86,003	83,906	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remaining actual useful life in yrs	6.5	5.4	4.8	3.9	3.0	2.0	4.5	3.6	2.8	1.9	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume available in Tons	725,859	612,926	507,632	403,962	302,320	202,725	437,429	342,064	251,043	165,040	81,134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix C-1: Base Case Scenario Model
Puerto Rico Solid Waste Management Authority

			Year #			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
			Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
			Volume added by expansion w/in property limits						-	332,232																				
			Growth of volume of Carolina												81,408	79,215	79,452	79,691	79,930	80,164	80,324	80,433	80,594	80,755	80,922	81,079	81,241	81,403	81,566	81,729
			C&D Waste Recovered before entering WTE (17.1%)												13,921	13,546	13,586	13,627	13,668	13,708	13,735	13,754	13,782	13,809	13,838	13,864	13,892	13,920	13,948	13,976
			Volume transferred to WTE												***67,487***	***65,669***	***65,866***	***66,064***	***66,262***	***66,456***	***66,588***	***66,679***	***66,812***	***66,946***	***67,084***	***67,214***	***67,349***	***67,483***	***67,618***	***67,753***
Closure in		2010	**8. Cayey**																											
Move to	Ponce		Annual disposal rate in Tons / yr	37,827	37,964	35,396	34,850	34,168	33,480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	5.5	4.5	3.8	2.9	1.9	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	208,701	170,737	135,341	100,491	66,323	32,843	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2008	**9. Culebra**																											
Move to	Fajardo		Annual disposal rate in Tons / yr	4,251	4,266	3,978	3,916	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	3.3	2.3	1.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	14,035	9,769	5,791	1,875	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expansion in		2013	**10. Fajardo**																											
			Annual disposal rate in Tons / yr	195,585	196,290	183,014	268,196	266,789	261,415	255,990	250,313	238,909	152,732	149,009	144,572	140,677	141,099	141,522	141,947	142,362	142,646	142,841	143,126	143,412	143,708	143,987	144,275	153,408	153,715	154,023
			Remaining actual useful life in yrs	11.1	10.0	9.7	5.6	4.7	3.8	2.9	1.9	1.0	26.8	26.4	26.2	26.0	24.9	23.8	22.8	21.7	20.6	19.6	18.6	17.5	16.5	15.5	14.4	12.6	11.6	10.5	
			Volume available in Tons	2,162,040	1,965,750	1,782,736	1,514,540	1,247,751	986,336	730,346	480,033	241,123	4,088,391	3,939,382	3,794,811	3,654,134	3,513,035	3,371,513	3,229,567	3,087,205	2,944,559	2,801,718	2,658,592	2,515,179	2,371,471	2,227,485	2,083,210	1,929,802	1,776,086	1,622,064	
			Volume transflered from others			0	89,384	3,916	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,828	0	0	
			Capacity added through expansion										4,000,000																		
			Growth of volume transferred from Guaynabo	95,524	95,868	89,384	88,005	86,284	84,546	82,791	80,955	77,267	73,008	71,228	69,107	67,245	67,447	67,649	67,852	68,051	68,187	68,279	68,416	68,553	68,694	68,827	68,965	69,103	69,241	69,380	
			C&D Waste Recovered before entering WTE (17.1%)				15,049	14,755	14,457	14,157	13,843	13,213	12,484	12,180	11,817	11,499	11,533	11,568	11,603	11,637	11,660	11,676	11,699	11,723	11,747	11,769	11,793	11,817	11,840	11,864
			Volume transferred to WTE				72,956	71,529	70,088	68,634	67,112	64,054	60,523	59,048	57,290	55,746	55,913	56,081	56,249	56,414	56,527	56,604	56,717	56,830	56,947	57,058	57,172	57,286	57,401	57,516
Closure in		2007	**11. Florida**																											
Move to	Arecibo		Annual disposal rate in Tons / yr	14,902	14,955	13,944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	16.7	15.7	15.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	249,535	234,580	220,636	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2011	**12. Guayama**																											
Move to	Salinas		Annual disposal rate in Tons / yr	17,099	17,160	16,000	15,753	15,445	15,134	14,820	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	6.5	5.5	4.9	4.0	3.1	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	111,623	94,463	78,463	62,710	47,265	32,131	17,312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2007	**13. Guaynabo**																											
Move to	Fajardo		Annual disposal rate in Tons / yr	95,524	95,868	89,384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North WTE			Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	286,551	190,683	101,299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2022	**14. Hormigueros**																											
Move to	West WTE		Annual disposal rate in Tons / yr	14,424	14,476	13,497	13,289	13,029	12,766	12,501	12,224	11,667	11,024	10,755	10,435	10,154	10,184	10,215	10,246	10,276	10,296	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	14.8	13.8	13.8	13.0	12.2	11.5	10.7	10.0	9.4	9.0	8.2	7.5	6.7	5.7	4.6	3.6	2.6	1.6	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	213,692	199,216	185,719	172,430	159,401	146,635	134,133	121,909	110,242	99,218	88,462	78,027	67,873	57,689	47,474	37,228	26,952	16,656	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Growth of volume of Hormigueros																			10,310	10,331	10,351	10,373	10,393	10,414	10,435	10,455	10,476
			C&D Waste Recovered before entering WTE (17.1%)																			1,763	1,767	1,770	1,774	1,777	1,781	1,784	1,788	1,791
			Volume transferred to WTE																			***8,547***	***8,564***	***8,581***	***8,599***	***8,616***	***8,633***	***8,650***	***8,668***	***8,685***
Expansion in		2012	**15. Humacao**																											
			Annual disposal rate in Tons / yr	659,113	661,490	616,750	1,163,871	1,141,101	1,118,115	1,094,912	1,070,632	1,021,856	715,028	697,597	679,402	675,007	677,032	679,063	681,100	683,092	684,458	685,390	686,760	688,134	689,552	690,889	692,271	693,656	695,043	696,433	
			Remaining actual useful life in yrs	15.3	14.2	14.3	6.6	5.7	4.8	3.9	3.0	16.8	23.0	22.6	22.2	21.4	20.3	19.2	18.2	17.1	16.1	15.1	14.0	13.0	12.0	11.0	9.9	8.9	7.9	6.9	
			Volume available in Tons	10,074,141	9,412,651	8,795,901	7,632,030	6,490,929	5,372,814	4,277,902	3,207,270	17,185,414	16,470,386	15,772,790	15,093,387	14,418,380	13,741,348	13,062,285	12,381,185	11,698,092	11,013,634	10,328,245	9,641,484	8,953,350	8,263,798	7,572,909	6,880,638	6,186,982	5,491,940	4,795,507	
			Volume transflered from others			-	565,354	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Ash from North WTE										109,222	106,559	105,965	117,018	117,369	117,721	118,075	118,420	118,657	118,818	119,056	119,294	119,540	119,771	120,011	120,251	120,492	120,733
			Volume added by expansion	10,043,987	-	-	-	0	0	0	0	15,000,000	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Growth of volume transferred from Toa Baja	429,857	431,406	402,228	396,024	388,276	380,455	372,560	364,298	347,701	328,535	320,525	310,981	302,603	303,511	304,421	305,334	306,227	306,840	307,257	307,872	308,488	309,123	309,723	310,342	310,963	311,585	312,208	
			Growth of volume transferred from Toa Alta	137,888	138,386	129,026	127,036	124,550	122,042	119,509	116,859	111,535	105,387	102,817	99,756	97,068	97,360	97,652	97,945	98,231	98,427	98,561	98,758	98,956	99,160	99,352	99,551	99,750	99,949	100,149	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			C&D Waste Recovered before entering WTE (17.1%)										74,201	72,392	70,236	68,344	68,549	68,754	68,961	69,162	69,301	69,395	69,534	69,673	69,816	69,952	70,092	70,232	70,372	70,513
			Volume transferred to WTE				-						***359,721***	***350,951***	***340,501***	***331,327***	***332,321***	***333,318***	***334,318***	***335,296***	***335,967***	***336,424***	***337,097***	***337,771***	***338,467***	***339,123***	***339,801***	***340,481***	***341,162***	***341,844***
Closure in		2050	**16. Isabela**																											
			Annual disposal rate in Tons / yr	21,732	21,810	20,335	20,021	19,630	19,234	18,835	18,417	17,578	16,609	16,204	15,722	15,298	15,344	15,390	15,436	15,481	15,512	15,534	15,565	15,596	15,628	15,658	15,690	15,721	15,752	15,784	
			Remaining actual useful life in yrs	4.0	3.0	2.2	1.2	33.7	33.4	33.1	32.8	33.4	34.3	34.2	34.2	34.2	33.1	32.0	30.9	29.8	28.7	27.7	26.7	25.6	24.5	23.5	22.5	21.4	20.4	19.3	
			Volume available in Tons	86,223	64,413	44,078	24,057	660,992	641,758	622,923	604,506	586,928	570,319	554,114	538,392	523,094	507,750	492,360	476,923	461,442	445,929	430,396	414,831	399,236	383,608	367,949	352,260	336,539	320,787	305,003	
			Volume transflered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Capacity added through expansion					656,565																						
Closure in		2025	**17. Jayuya**																											
Move to	Penuelas New		Annual disposal rate in Tons / yr	15,045	15,099	14,078	13,861	13,590	13,316	13,040	12,750	12,170	11,499	11,218	10,884	10,591	10,623	10,655	10,687	10,718	10,739	10,754	10,776	10,797	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	16.7	15.6	15.8	15.0	14.3	13.6	12.9	12.2	11.8	11.5	10.8	10.1	9.4	8.3	7.3	6.3	5.3	4.3	3.3	2.2	1.2	0	0	0	0	0	0	0
			Volume available in Tons	251,251	236,152	222,074	208,213	194,623	181,307	168,268	155,517	143,348	131,849	120,631	109,746	99,155	88,532	77,878	67,191	56,473	45,734	34,980	24,204	13,407	0	0	0	0	0	0	0
			Volume transflered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2026	**18. Juana Díaz**																											
Move to	Yauco		Annual disposal rate in Tons / yr	72,932	73,195	68,245	67,192	65,878	64,551	63,211	61,809	58,993	55,741	54,382	52,763	51,342	51,496	51,650	51,805	51,957	52,060	52,131	52,236	52,340	52,448	0	0	0	0	0	0
			Remaining actual useful life in yrs	17.1	16.0	16.2	15.4	14.8	14.1	13.4	12.7	12.3	12.0	11.3	10.6	9.9	8.9	7.9	6.8	5.8	4.8	3.8	2.8	1.8	0.8	0	0	0	0	0	0
			Volume available in Tons	1,246,272	1,173,077	1,104,832	1,037,640	971,762	907,212	844,001	782,192	723,198	667,457	613,074	560,311	508,970	457,474	405,824	354,019	302,062	250,002	197,870	145,635	93,295	40,847	0	0	0	0	0	0
			Volume transflered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2051	**19. Juncos**																											
			Annual disposal rate in Tons / yr	205,185	205,925	191,997	189,036	185,337	181,604	177,835	173,892	165,969	156,821	152,997	148,442	144,442	144,876	145,310	145,746	146,173	146,465	146,664	146,957	147,251	147,555	147,841	148,137	148,433	148,730	149,027	
			Remaining actual useful life in yrs	5.0	4.0	3.3	2.3	1.4	34.6	34.3	34.1	34.7	35.7	35.6	35.7	35.7	34.6	33.5	32.4	31.3	30.2	29.2	28.1	27.1	26.0	25.0	23.9	22.9	21.8	20.8	
			Volume available in Tons	1,030,130	824,205	632,208	443,173	257,836	6,275,360	6,097,524	5,923,633	5,757,663	5,600,843	5,447,845	5,299,404	5,154,961	5,010,086	4,864,775	4,719,029	4,572,856	4,426,391	4,279,727	4,132,770	3,985,518	3,837,964	3,690,123	3,541,986	3,393,553	3,244,823	3,095,796	
			Volume transflered from others		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Capacity added through expansion						6,199,128																					
Closure in		2018	**20. Lajas**																											
Move to	Penuelas New		Annual disposal rate in Tons / yr	51,583	51,769	48,267	47,523	46,593	45,655	44,707	43,716	41,724	39,424	38,463	37,318	36,312	36,421	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	3.5	2.4	1.6	9.5	8.7	7.9	7.1	6.2	5.5	4.9	4.0	3.1	2.2	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	178,313	126,544	78,277	453,498	406,905	361,250	316,543	272,827	231,103	191,679	153,216	115,898	79,586	43,165	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume added by expansion w/in property limits				422,744																							
Closure in		2011	**21. Mayaguez**																											
Move to	Penuelas New		Annual disposal rate in Tons / yr	65,673	65,909	61,452	60,504	59,320	58,125	56,919	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West WTE			Remaining actual useful life in yrs	6.5	5.5	4.9	4.0	3.1	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	428,771	362,862	301,410	240,906	181,586	123,461	66,543	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			-			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Growth of volume of Mayaguez								55,657	53,121	50,193	48,969	47,511	46,231	46,370	46,509	46,648	46,785	46,878	46,942	47,036	47,130	47,227	47,319	47,413	47,508	47,603	47,698
			C&D Waste Recovered before entering WTE (17.1%)								9,517	9,084	8,583	8,374	8,124	7,906	7,929	7,953	7,977	8,000	8,016	8,027	8,043	8,059	8,076	8,092	8,108	8,124	8,140	8,156
			Volume transferred to WTE								***46,139***	***44,037***	***41,610***	***40,595***	***39,387***	***38,325***	***38,440***	***38,556***	***38,671***	***38,785***	***38,862***	***38,915***	***38,993***	***39,071***	***39,151***	***39,227***	***39,306***	***39,384***	***39,463***	***39,542***
Closure in		2013	**22. Moca**																											
Move to	North WTE		Annual disposal rate in Tons / yr	184,122	184,786	172,288	169,630	166,312	162,962	159,580	156,041	148,932	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West WTE			Remaining actual useful life in yrs	8.0	7.0	6.5	5.6	4.7	3.8	2.9	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	1,479,856	1,295,070	1,122,783	953,152	786,840	623,879	464,299	308,258	159,326	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transflered from others			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Growth of volume of Moca										140,722	137,292	133,203	129,615	130,004	130,394	130,785	131,167	131,430	131,609	131,872	132,136	132,408	132,665	132,930	133,196	133,462	133,729
			C&D Waste Recovered before entering WTE (17.1%)										24,064	23,477	22,778	22,164	22,231	22,297	22,364	22,430	22,474	22,505	22,550	22,595	22,642	22,686	22,731	22,776	22,822	22,868

			Year #			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
			Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
			Volume transferred to North WTE										***116,659***	***113,815***	***110,426***	***107,451***	***107,773***	***108,096***	***108,421***	***108,738***	***108,955***	***109,103***	***109,322***	***109,540***	***109,766***	***109,979***	***110,199***	***110,419***	***110,640***	***110,861***
Closure in		2026	**23. Penuelas**																											
Move to	Penuelas New		Annual disposal rate in Tons / yr	143,286	143,802	134,076	132,008	129,425	126,818	124,187	121,433	115,900	109,512	106,842	103,660	100,868	101,170	101,474	101,778	102,076	102,280	102,419	102,624	102,829	103,041	0	0	0	0	0
			Remaining actual useful life in yrs	17.3	16.3	16.5	15.7	15.0	14.3	13.7	13.0	12.6	12.3	11.6	11.0	10.3	9.3	8.2	7.2	6.2	5.2	4.2	3.2	2.1	1.1	0	0	0	0	0
			Volume available in Tons	2,485,923	2,342,121	2,208,045	2,076,037	1,946,611	1,819,793	1,695,606	1,574,174	1,458,273	1,348,762	1,241,920	1,138,260	1,037,392	936,222	834,748	732,970	630,894	528,614	426,195	323,571	220,742	117,701	0	0	0	0	0
			Volume transffered from others			-	-	-	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transferred to North WTE									-			-															
Expansion in		2015	**24. Ponce**																											
			Annual disposal rate in Tons / yr	316,183	317,323	295,861	303,883	318,128	311,720	338,036	330,540	315,481	298,090	290,823	282,163	274,562	275,385	276,212	277,040	277,850	278,406	278,785	279,342	279,901	280,478	281,022	281,584	282,147	282,711	283,277
			Remaining actual useful life in yrs	12.1	11.1	10.9	9.6	8.2	7.3	5.8	4.9	4.1	3.4	2.4	29.9	29.7	28.6	27.5	26.4	25.4	24.3	23.3	22.2	21.2	20.1	19.1	18.1	17.0	16.0	15.0
			Volume available in Tons	3,831,018	3,513,695	3,217,833	2,913,951	2,595,823	2,284,104	1,946,068	1,615,528	1,300,047	1,001,956	711,133	8,428,970	8,154,408	7,879,023	7,602,811	7,325,771	7,047,921	6,769,515	6,490,730	6,211,387	5,931,486	5,651,008	5,369,987	5,088,403	4,806,256	4,523,544	4,240,268
			Volume transffered from others			-	12,782	20,593		33,480		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Capacity added through expansion												8,000,000															
Closure in		2032	**25. Salinas**																											
			Annual disposal rate in Tons / yr	131,345	131,819	122,903	121,007	118,640	146,475	143,436	154,746	147,696	139,554	136,152	132,098	128,539	128,925	129,311	129,699	130,079	130,339	130,516	130,777	131,039	131,309	131,563	131,826	132,090	132,354	132,619
			Remaining actual useful life in yrs	3.0	2.0	1.1	26.9	26.5	20.4	19.9	17.4	17.2	17.3	16.7	16.2	15.6	14.6	13.6	12.5	11.5	10.5	9.4	8.4	7.4	6.4	5.4	4.4	3.4	2.4	1.3
			Volume available in Tons	395,248	263,429	140,526	3,258,275	3,139,635	2,993,160	2,849,724	2,694,978	2,547,283	2,407,728	2,271,576	2,139,479	2,010,940	1,882,015	1,752,704	1,623,004	1,492,926	1,362,587	1,232,071	1,101,294	970,255	838,946	707,383	575,557	443,466	311,112	178,493
			Volume transffered from others			-	-	-	30,846	-	14,820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Capacity added through expansion w/in property limits				3,238,756																							
Closure in		2007	**26. Santa Isabel**																											
Move to	Ponce		Annual disposal rate in Tons / yr	13,660	13,709	12,782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	8.8	7.8	7.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	120,414	106,705	93,923	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transffered from others				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2007	**27. Toa Alta**																											
Move to	Humacao		Annual disposal rate in Tons / yr	137,888	138,386	129,026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North WTE			Remaining actual useful life in yrs	2.6	1.6	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	358,609	220,223	91,198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transffered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2007	**28. Toa Baja**																											
Move to	Humacao		Annual disposal rate in Tons / yr	429,857	431,406	402,228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North WTE			Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	1293538	862,132	459,903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transffered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2007	**29. Vega Baja**																											
Move to	Arecibo		Annual disposal rate in Tons / yr	26,269	26,364	24,581	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North WTE			Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	79,050	52,686	26,106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transffered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Growth of volume of Vega Baja				24,201	23,728	23,250	22,768	22,263	21,248	20,077	19,588	19,004	18,492	18,548	18,604	18,659	18,714	18,751	18,777	18,814	18,852	18,891	18,928	18,965	19,003	19,041	19,079
			C&D Waste Recovered before entering WTE (17.1%)				4,138	4,057	3,976	3,893	3,807	3,633	3,433	3,349	3,250	3,162	3,172	3,181	3,191	3,200	3,206	3,211	3,217	3,224	3,230	3,237	3,243	3,250	3,256	3,263
			Volume transferred to North WTE				***20,063***	***19,671***	***19,274***	***18,874***	***18,456***	***17,615***	***16,644***	***16,238***	***15,755***	***15,330***	***15,376***	***15,422***	***15,469***	***15,514***	***15,545***	***15,586***	***15,597***	***15,628***	***15,661***	***15,691***	***15,722***	***15,754***	***15,785***	***15,817***
Closure in		2028	**30. Vieques**																											
Move to	Fajardo		Annual disposal rate in Tons / yr	12,227	12,271	11,441	11,265	11,044	10,822	10,597	10,362	9,890	9,345	9,117	8,846	8,607	8,633	8,659	8,685	8,710	8,728	8,740	8,757	8,775	8,793	8,810	8,828	0	0	0
			Remaining actual useful life in yrs	19.0	17.9	18.2	17.5	16.9	16.2	15.5	14.9	14.6	14.5	13.8	13.3	12.6	11.6	10.5	9.5	8.5	7.5	6.5	5.4	4.4	3.4	2.4	1.4	0	0	0
			Volume available in Tons	232,215	219,944	208,503	197,238	186,194	175,372	164,775	154,412	144,522	135,177	126,060	117,214	108,607	99,974	91,315	82,630	73,919	65,191	56,452	47,694	38,920	30,127	21,317	12,489	0	0	0
			Volume transffered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closure in		2007	**31. Yabucoa**																											
Move to	Humacao		Annual disposal rate in Tons / yr	36,442	36,574	34,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume available in Tons	109663	73,089	38,989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Volume transffered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expansion in		2009	**32. Yauco**																											
			Annual disposal rate in Tons / yr	115,106	115,521	107,708	106,046	103,972	101,877	99,763	97,551	93,107	87,974	85,830	83,274	81,030	81,273	81,517	81,762	82,001	82,165	82,277	82,441	82,606	82,776	135,486	135,757	136,029	136,301	136,574
			Remaining actual useful life in yrs	5.2	4.2	3.5	2.6	1.6	34.8	34.5	34.3	34.9	36.0	35.9	36.0	36.0	34.9	33.8	32.7	31.6	30.5	29.5	28.4	27.3	26.3	15.1	14.0	13.0	12.0	11.0
			Volume available in Tons	601,040	485,519	377,811	271,765	167,793	3,543,545	3,443,782	3,346,231	3,253,124	3,165,150	3,079,321	2,996,047	2,915,016	2,833,743	2,752,226	2,670,464	2,588,463	2,506,298	2,424,022	2,341,580	2,258,974	2,176,198	2,040,711	1,904,954	1,768,925	1,632,624	1,496,050
			Volume transffered from others			-	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	-	52,448	0	0	0	0
			Capacity added through expansion				-		3,477,630																			-	-	-
			Volume transferred to WTE																										-	-
New Capacity		2011	**33. Penuelas - New**																											
			Annual disposal rate in Tons / yr			0	0	0	0	0	88,646	84,664	105,000	138,696	134,566	130,940	131,333	168,258	168,763	169,256	169,595	171,962	172,306	172,651	183,826	287,423	287,998	288,574	289,151	289,729
			Remaining actual useful life in yrs			0	0	0	0	0	264.6	276.0	221.5	166.7	170.8	174.6	173.0	134.1	132.7	131.3	130.0	127.2	126.0	124.7	116.1	73.3	72.1	71.0	69.9	68.7
			Volume available in Tons			0	0	0	0	0	23,452,380	23,367,716	23,262,716	23,124,020	22,989,454	22,858,514	22,727,181	22,558,923	22,390,160	22,220,904	22,051,310	21,879,348	21,707,042	21,534,391	21,350,565	21,063,142	20,775,144	20,486,570	20,197,419	19,907,689
			Volume transffered from others			0	0	0	0	0	90,656			37,161	0	0	0	36,421			-				10,797	103,041			-	
			Volume transferred to WTE									84,607				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Ash from West WTE									84,664	105,000	102,441	99,390	96,713	97,003	97,294	97,586	97,871	98,067	100,337	100,538	100,739	100,946	101,142	101,344	101,547	101,750	101,954
			Total annual disposal rate	3,633,100	3,646,198	3,399,589	3,347,153	3,281,668	3,215,565	3,148,834	3,079,007	2,684,742	2,121,586	2,069,865	1,929,400	1,904,875	1,910,589	1,916,321	1,922,070	1,927,691	1,931,546	1,927,764	1,931,619	1,935,483	1,939,471	1,943,232	1,947,119	1,951,013	1,954,915	1,958,825
			Net volume requiring disposal at landfill facilities in tons	3,633,100	3,646,198	3,399,589	3,347,153	3,281,668	3,215,565	3,148,834	3,079,007	2,684,742	2,121,586	2,069,865	2,000,493	1,904,875	1,910,589	1,916,321	1,922,070	1,927,691	1,931,546	1,927,764	1,931,619	1,935,483	1,939,471	1,943,232	1,947,119	1,951,013	1,954,915	1,958,825
			Difference in annual tons	-	-	-	-	-	-	-	-	-	-	-	71,093	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Total volume capacity in Tons	32,088,125	28,441,927	25,042,338	24,270,919	21,618,580	28,036,861	25,187,416	45,519,858	57,557,157	59,366,313	57,324,679	63,399,401	61,591,031	59,777,236	57,914,835	56,090,141	54,260,110	52,426,420	50,581,752	48,750,084	46,914,753	45,062,232	43,061,005	41,214,640	39,352,093	37,498,335	35,640,870
			Total useful life for all facilities in years			7.4	7.3	6.6	8.7	8.0	14.8	21.4	28.0	27.7	32.9	32.3	31.3	30.2	29.2	28.1	27.1	26.2	25.2	24.2	23.2	22.2	21.2	20.2	19.2	18.2

Solid Waste Processing Capacity Model

Scenario 2 Back-up Case Assumed generation rate = 5.56 lbs/person/day
Moderate Diversion

	Year #			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
	Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Consolidation to 8 landfills	**Generation**																												
	Projected population	3,905,116	3,929,885	3,956,003	3,974,292	3,992,749	4,011,368	4,030,152	4,045,869	4,061,648	4,077,488	4,093,391	4,110,528	4,122,859	4,135,228	4,147,633	4,160,076	4,172,242	4,180,586	4,188,947	4,197,325	4,205,720	4,214,387	4,222,559	4,231,005	4,239,467	4,247,945	4,256,441	x
	Generation rate/person entering landfills (lbs/pers*day)	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	
	Annual generated waste in Tons	3,962,521	3,987,654	4,014,156	4,032,714	4,051,442	4,070,335	4,089,395	4,105,343	4,121,354	4,137,427	4,153,564	4,170,953	4,183,465	4,196,016	4,208,603	4,221,229	4,233,574	4,242,041	4,250,525	4,259,026	4,267,544	4,276,338	4,284,631	4,293,201	4,301,787	4,310,390	4,319,011	x
																													xx
	Waste diversion																												
	Waste Diversion Rate (**The reported ADS diversion rate from the "Tasa Reciclaje Informe Final 2004 y 2005" does not include C&D in the waste stream. To calculate the percentage, the amount of waste diverted reported by the ADS was divided by the amount of waste generated on this model.**)	13.11%	11.56%	15.3%	16.00%	17.00%	18.00%	19.00%	20.00%	21.00%	22.00%	23.00%	24.00%	25.00%	26.00%	27.00%	28.00%	29.00%	30.00%	31.00%	32.00%	33.00%	34.00%	35.00%	35.00%	35.00%	35.00%	35.00%	x
	Total waste diversion volume in Tons	329,421	341,457	614,567	645,234	688,745	732,660	776,985	821,069	865,484	910,234	955,320	1,001,029	1,045,866	1,090,964	1,136,323	1,181,944	1,227,736	1,272,612	1,317,663	1,362,888	1,408,290	1,453,955	1,499,621	1,502,620	1,505,626	1,508,636	1,511,654	x
	Total volume reduced by waste diversion efforts in Tons	329,421	341,457	614,567	645,234	688,745	732,660	776,985	821,069	865,484	910,234	955,320	1,001,029	1,045,866	1,090,964	1,136,323	1,181,944	1,227,736	1,272,612	1,317,663	1,362,888	1,408,290	1,453,955	1,499,621	1,502,620	1,505,626	1,508,636	1,511,654	x
																													x
	Volume requiring disposal at landfill in tons	3,633,100	3,646,198	3,399,589	3,387,480	3,362,697	3,337,675	3,312,410	3,284,275	3,255,870	3,227,193	3,198,244	3,169,924	3,137,599	3,105,052	3,072,280	3,039,285	3,005,838	2,969,428	2,932,862	2,896,137	2,859,255	2,822,383	2,785,010	2,790,581	2,796,162	2,801,753	2,807,357	x
	Annual waste diversion volume growth rate		0.36%	-6.76%	-0.36%	-0.73%	-0.74%	-0.76%	-0.85%	-0.86%	-0.88%	-0.90%	-0.89%	-1.02%	-1.04%	-1.06%	-1.07%	-1.10%	-1.21%	-1.23%	-1.25%	-1.27%	-1.29%	-1.32%	0.20%	0.20%	0.20%	0.20%	x

Assumptions **Landfill Disposal** x

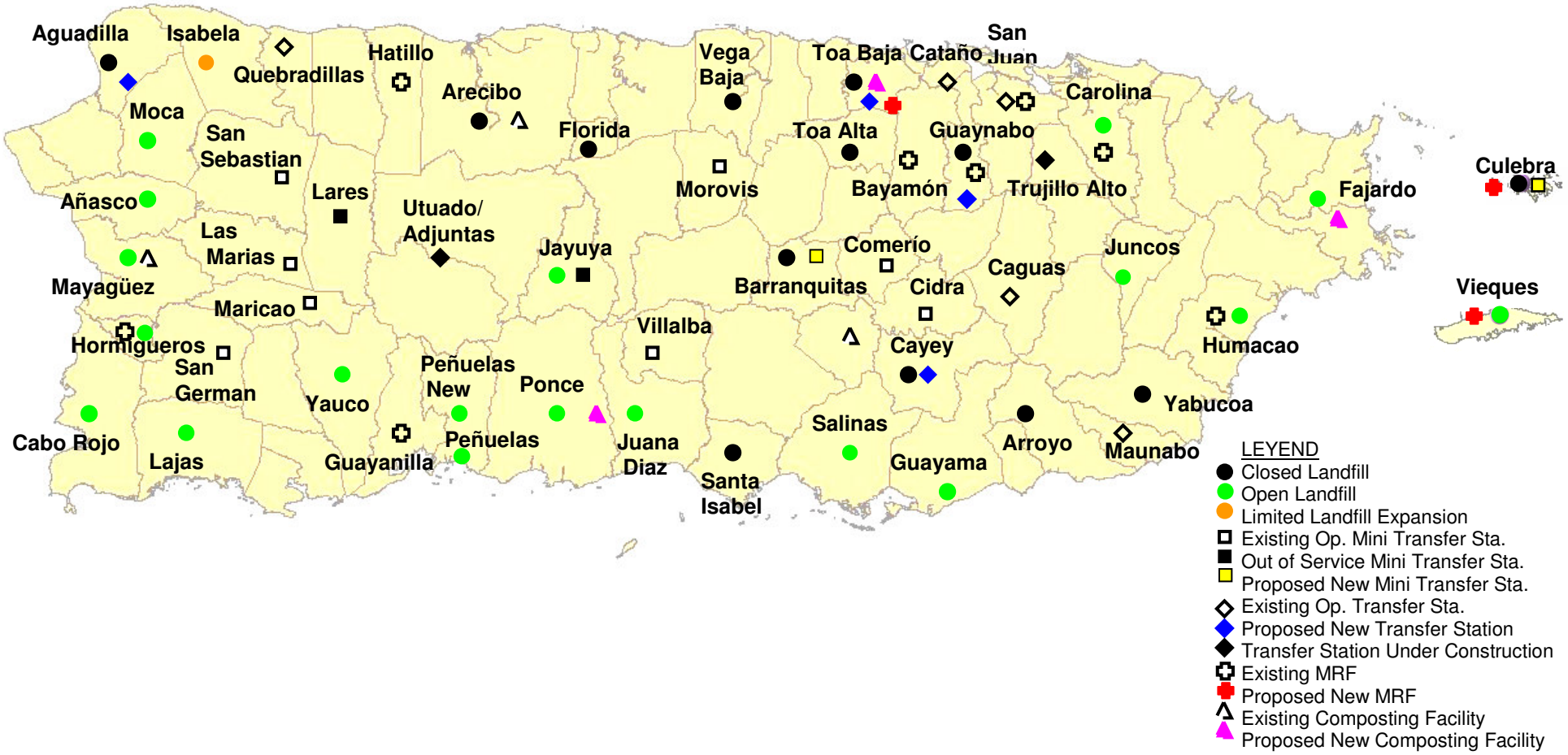
Closure in	2007	**1. Aguadilla**																											
Move to	Cabo Rojo	Annual disposal rate in Tons / yr	48,335	48,509	45,228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Volume available in Tons	145,451	96,942	51,713	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Volume transfered from others	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Closure in	2011	**2. Anasco**																										xx	
Move to	Penuelas New	Annual disposal rate in Tons / yr	38,926	39,066	36,424	36,294	36,029	35,761	35,490	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	6.7	5.7	5.1	4.1	3.1	2.1	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	260,424	221,358	184,934	148,639	112,611	76,850	41,360	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Closure in	2010	**3. Arecibo**																											x
Move to	Penuelas New	Annual disposal rate in Tons / yr	310,930	312,051	290,945	456,862	453,520	450,145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Remaining actual useful life in yrs	8.1	7.0	6.5	3.2	2.2	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Volume available in Tons	2,508,443	2,196,392	1,905,447	1,448,585	995,065	544,919	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Volume transfered from others	0	0	0	167,550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
																													x
Closure in	2009	**4. Arroyo**																											x
Move to	Salinas	Annual disposal rate in Tons / yr	34,150	34,273	31,955	31,841	31,608	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	5.0	4.0	3.3	2.3	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	171,449	137,176	105,221	73,380	41,772	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Closure in	2008	**5. Barranquitas**																											x
Move to	Ponce	Annual disposal rate in Tons / yr	22,353	22,433	20,916	20,841	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	4.0	3.0	2.2	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	89,302	66,869	45,953	25,112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Expansion in	2012	**6. Cabo Rojo**																											x
		Annual disposal rate in Tons / yr	48,622	48,797	45,496	90,402	89,740	89,073	88,398	87,647	86,889	86,124	85,352	84,596	83,733	82,865	81,990	81,109	80,217	79,245	78,269	77,289	76,305	75,321	74,324	74,472	74,621	74,770	74,920	x
		Remaining actual useful life in yrs	13.6	12.5	12.4	5.3	4.3	3.3	2.3	1.4	17.6	16.8	16.0	15.1	14.2	13.4	12.5	11.7	10.8	9.9	9.1	8.2	7.3	6.4	5.5	4.5	3.4	2.4	1.4	x
		Volume available in Tons	659,345	610,548	565,052	474,650	384,910	295,837	207,439	119,791	1,532,902	1,446,778	1,361,426	1,276,831	1,193,098	1,110,233	1,028,243	947,134	866,917	787,672	709,402	632,113	555,808	480,487	406,164	331,692	257,070	182,300	107,380	x
		Volume transfered from others	0	0	0	45,228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	x
		Capacity added through expansion									1,500,000																		
																													x
Closure in	2014	**7. Carolina**																											x
Move to	Fajardo	Annual disposal rate in Tons / yr	112,527	112,933	105,294	104,919	104,152	103,377	102,594	101,723	100,843	99,955	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	6.5	5.4	4.8	3.8	2.9	1.9	4.1	3.2	2.2	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	725,859	612,926	507,632	402,713	298,561	195,184	424,822	323,099	222,256	122,301	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume added by expansion w/in property limits						-	332,232																				
																													x
Closure in	2010	**8. Cayey**																											x
Move to	Ponce	Annual disposal rate in Tons / yr	37,827	37,964	35,396	35,270	35,012	34,751	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	5.5	4.5	3.8	2.8	1.9	0.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	208,701	170,737	135,341	100,071	65,059	30,308	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Closure in	2008	**9. Culebra**																											x
Move to	Fajardo	Annual disposal rate in Tons / yr	4,251	4,266	3,978	3,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	3.3	2.3	1.5	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	14,035	9,769	5,791	1,828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Expansion in	2014	**10. Fajardo**																											x
		Annual disposal rate in Tons / yr	195,585	196,290	183,014	182,362	184,962	183,586	182,196	180,649	179,086	177,509	274,975	272,540	269,761	266,963	264,145	261,308	258,432	255,302	252,158	249,001	245,830	242,660	248,819	249,317	249,815	250,315	250,816	x
		Remaining actual useful life in yrs	11.1	10.0	9.7	8.8	7.7	6.7	5.8	4.8	3.9	2.9	22.3	21.5	20.7	20.0	19.2	18.4	17.6	16.8	16.0	15.2	14.4	13.6	12.3	11.2	10.2	9.2	8.2	x
		Volume available in Tons	2,162,040	1,965,750	1,782,736	1,600,374	1,415,412	1,231,826	1,049,630	868,981	689,895	512,386	6,137,411	5,864,871	5,595,110	5,328,147	5,064,003	4,802,694	4,544,262	4,288,960	4,036,802	3,787,801	3,541,971	3,299,312	3,050,493	2,801,176	2,551,360	2,301,045	2,050,230	x
		Volume transfered from others			0		3,963	0	0	0	0	0	99,955	0	0	0	0	0	0	0	0	0			9,499	0	0	0	0	x
		Capacity added through expansion											5,900,000																
																													x
Closure in	2007	**11. Florida**																											x
Move to	Arecibo	Annual disposal rate in Tons / yr	14,902	14,955	13,944	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	16.7	15.7	15.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	249,535	234,580	220,636	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Closure in	2011	**12. Guayama**																											x
Move to	Salinas	Annual disposal rate in Tons / yr	17,099	17,160	16,000	15,943	15,826	15,708	15,589	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	6.5	5.5	4.9	3.9	3.0	2.0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	111,623	94,463	78,463	62,520	46,694	30,986	15,396	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Closure in	2007	**13. Guaynabo**																											x
Move to	Humacao	Annual disposal rate in Tons / yr	95,524	95,868	89,384	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	286,551	190,683	101,299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Closure in	2021	**14. Hormigueros**																											x
Move to	Penuelas New	Annual disposal rate in Tons / yr	14,424	14,476	13,497	13,449	13,351	13,251	13,151	13,039	12,926	12,813	12,698	12,585	12,457	12,328	12,198	12,067	11,934	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	14.8	13.8	13.8	12.8	11.9	11.0	10.1	9.2	8.2	7.3	6.4	5.4	4.5	3.5	2.6	1.6	0.6	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	213,692	199,216	185,719	172,270	158,919	145,668	132,517	119,478	106,552	93,739	81,042	68,456	56,000	43,672	31,475	19,408	7,474	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																													x
Expansion in	2012	**15. Humacao**																											x
		Annual disposal rate in Tons / yr	659,113	661,490	616,750	737,597	732,201	726,753	721,252	715,125	708,940	702,696	696,393	690,226	683,188	676,101	668,965	661,781	654,498	646,570	638,608	630,611	622,581	614,552	606,414	607,627	608,843	610,060	611,280	x
		Remaining actual useful life in yrs	15.3	14.2	14.3	10.9	10.0	9.1	8.1	7.2	6.3	5.3	4.4	3.4	2.5	29.6	28.9	28.2	27.5	26.9	26.2	25.5	24.9	24.2	23.5	22.5	21.4	20.4	19.3	x
		Volume available in Tons	10,074,141	9,412,651	8,795,901	8,058,304	7,326,103	6,599,350	5,878,098	5,162,973	4,454,032	3,751,336	3,054,943	2,364,717	1,681,529	20,005,428	19,336,463	18,674,682	18,020,184	17,373,614	16,735,006	16,104,395	15,481,814	14,867,262	14,260,848	13,653,220	13,044,378	12,434,318	11,823,037	x
		Volume transfered from others			-	123,484	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x

			Year #			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
			Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
			Volume added by expansion w/in property limits	10,043,987		-	-	-	-	-	-		-	-	-	-	19,000,000	-	-	-	-	-	-	-	-	-	-	-	-	-	
																															x
Expansion in	2008	**16. Isabela**																													x
		Annual disposal rate in Tons / yr	21,732	21,810	20,335	20,262	20,114	19,965	19,813	19,645	19,475	19,304	19,131	18,961	18,768	18,573	18,377	18,180	17,980	17,762	17,543	17,323	17,103	16,882	16,659	16,692	16,725	16,759	16,792	x
		Remaining actual useful life in yrs	4.0	3.0	2.2	1.2	32.8	32.1	31.3	30.6	29.9	29.1	28.4	27.6	26.9	26.2	25.5	24.8	24.0	23.3	22.6	21.9	21.2	20.5	19.7	18.7	17.7	16.6	15.6	x
		Volume available in Tons	86,223	64,413	44,078	23,816	660,266	640,302	620,489	600,843	581,368	562,065	542,934	523,973	505,205	486,632	468,255	450,075	432,096	414,334	396,791	379,467	362,364	345,482	328,823	312,131	295,406	278,647	261,855	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Capacity added through expansion					656,565																								
																															x
Closure in	2023	**17. Jayuya**																													x
Move to	Penuelas New	Annual disposal rate in Tons / yr	15,045	15,099	14,078	14,028	13,925	13,822	13,717	13,600	13,483	13,364	13,244	13,127	12,993	12,858	12,723	12,586	12,447	12,297	12,145	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	16.7	15.6	15.8	14.8	13.9	13.0	12.1	11.2	10.3	9.4	8.5	7.6	6.7	5.7	4.8	3.9	2.9	1.9	1.0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	251,251	236,152	222,074	208,046	194,121	180,299	166,582	152,982	139,499	126,135	112,891	99,764	86,771	73,912	61,190	48,604	36,156	23,860	11,714	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume added by expansion w/in property limits	251,251																												
																															x
Closure in	2023	**18. Juana Diaz**																													x
Move to	Yauco	Annual disposal rate in Tons / yr	72,932	73,195	68,245	68,002	67,504	67,002	66,495	65,930	65,360	64,784	64,203	63,634	62,985	62,332	61,674	61,012	60,340	59,610	58,875	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	17.1	16.0	16.2	15.2	14.4	13.5	12.6	11.7	10.8	9.9	9.0	8.0	7.1	6.2	5.3	4.3	3.4	2.4	1.4	0	0	0	0	0	0	0	0	x
		Volume available in Tons	1,246,272	1,173,077	1,104,832	1,036,830	969,326	902,324	835,830	769,900	704,540	639,756	575,553	511,919	448,934	386,601	324,927	263,915	203,575	143,965	85,090	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Expansion in	2009	**19. Juncos**																													x
		Annual disposal rate in Tons / yr	205,185	205,925	191,997	191,313	189,913	188,500	187,073	185,484	183,880	182,261	180,626	179,026	177,201	175,363	173,512	171,648	169,759	167,703	165,638	163,564	161,481	159,398	157,288	157,602	157,918	158,233	158,550	x
		Remaining actual useful life in yrs	5.02	4.0	3.3	2.3	1.3	33.2	32.5	31.7	31.0	30.3	29.6	28.8	28.1	27.4	26.7	26.0	25.3	24.6	23.9	23.2	22.5	21.8	21.1	20.1	19.0	18.0	17.0	x
		Volume available in Tons	1,030,130	824,205	632,208	440,895	250,982	6,261,610	6,074,536	5,889,052	5,705,172	5,522,911	5,342,285	5,163,259	4,986,058	4,810,696	4,637,184	4,465,536	4,295,776	4,128,073	3,962,436	3,798,872	3,637,391	3,477,993	3,320,705	3,163,103	3,005,185	2,846,952	2,688,402	x
		Volume transfered from others		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Capacity added through expansion						6,199,128																							
																															x
Closure in	2016	**20. Lajas**																													x
Move to	Penuelas New	Annual disposal rate in Tons / yr	51,583	51,769	48,267	48,095	47,744	47,388	47,030	46,630	46,227	45,820	45,409	45,007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	3.5	2.4	1.6	9.4	8.5	7.6	6.6	5.7	4.7	3.8	2.8	1.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	178,313	126,544	78,277	452,925	405,182	357,793	310,764	264,134	217,907	172,087	126,678	81,672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume added by expansion w/in property limits				422,744																									
																															x
Closure in	2011	**21. Mayaguez**																													x
Move to	Penuelas New	Annual disposal rate in Tons / yr	65,673	65,909	61,452	61,233	60,785	60,332	59,876	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	6.5	5.5	4.9	3.9	3.0	2.0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	428,771	362,862	301,410	240,178	179,393	119,060	59,185	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2013	**22. Moca**																													x
Move to	Penuelas New	Annual disposal rate in Tons / yr	184,122	184,786	172,288	171,674	170,418	169,150	167,870	166,444	165,004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	8.0	7.0	6.5	5.5	4.6	3.6	2.6	1.7	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	1,479,856	1,295,070	1,122,783	951,108	780,690	611,540	443,671	277,227	112,223	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2010	**23. Penuelas**																													x
Move to	Penuelas New	Annual disposal rate in Tons / yr	143,286	143,802	134,076	534,394	530,485	526,537	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	17.3	16.3	16.5	3.1	2.2	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	2,485,923	2,342,121	2,208,045	1,673,651	1,143,166	616,629	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	402,228		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume added by expansion w/in property limits																							-						
																															x
Expansion in	2012	**24. Ponce**																													x
Closure in	2033	Annual disposal rate in Tons / yr	316,183	317,323	295,861	307,544	325,983	323,557	355,596	352,576	349,527	346,448	343,340	340,300	336,830	333,336	329,818	326,276	322,685	318,776	314,851	310,908	306,949	302,991	298,978	299,576	300,176	441,587	442,470	x
		Remaining actual useful life in yrs	12.1	11.1	10.9	9.5	7.9	7.0	5.4	4.4	3.4	2.5	21.9	21.1	20.3	19.5	18.7	17.9	17.1	16.3	15.5	14.7	13.9	13.1	12.3	11.3	10.2	6.0	4.9	x
		Volume available in Tons	3,831,018	3,513,695	3,217,833	2,910,290	2,584,307	2,260,750	1,905,154	1,552,578	1,203,051	856,603	7,513,263	7,172,963	6,836,133	6,502,797	6,172,980	5,846,704	5,524,019	5,205,243	4,890,392	4,579,484	4,272,535	3,969,545	3,670,566	3,370,990	3,070,814	2,629,227	2,186,757	x
		Volume transfered from others			-	12,782	20,841		34,751		0	0	0	0	0	0	0	0	0	0	0	-	-	0				140,530	0	x
		Volume added by expansion w/in property limits	3,598,757										7,000,000		-	-															
																															x
Expansion in	2007	**25. Salinas**																													x
Closure in 2029		Annual disposal rate in Tons / yr	131,345	131,819	122,903	122,465	121,569	152,038	150,887	165,062	163,635	162,193	160,738	159,315	157,690	156,055	154,408	152,749	151,068	149,238	147,401	145,555	143,701	141,848	139,970	140,250	140,530	0	0	x
Move to	Ponce	Remaining actual useful life in yrs	3.0	2.0	1.1	26.6	25.8	19.6	18.8	16.2	15.3	14.4	13.6	12.7	11.8	10.9	10.1	9.2	8.3	7.4	6.5	5.5	4.6	3.7	2.7	1.7	0.7	0	0	x
		Volume available in Tons	395,248	263,429	140,526	3,256,817	3,135,248	2,983,210	2,832,323	2,667,261	2,503,627	2,341,433	2,180,695	2,021,380	1,863,689	1,707,635	1,553,227	1,400,478	1,249,409	1,100,171	952,770	807,215	663,514	521,665	381,695	241,446	100,915	0	0	x
		Volume transfered from others			-	-	-	31,608	-	15,589	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	x
		Capacity added through expansion w/in property limits				3,238,756																									
																															x
Closure in	2007	**26. Santa Isabel**																													x
Move to	Ponce	Annual disposal rate in Tons / yr	13,660	13,709	12,782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	8.8	7.8	7.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	120,414	106,705	93,923	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2007	**27. Toa Alta**																													x
Move to	Arecibo	Annual disposal rate in Tons / yr	137,888	138,386	129,026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	2.6	1.6	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	358,609	220,223	91,198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2007	**28. Toa Baja**																													x
Move to	Penuelas	Annual disposal rate in Tons / yr	429,857	431,406	402,228	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	1293538	862,132	459,903	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2007	**29. Vega Baja**																													x
Move to	Arecibo	Annual disposal rate in Tons / yr	26,269	26,364	24,581	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	79,050	52,686	26,106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2025	**30. Vieques**																													x
Move to	Fajardo	Annual disposal rate in Tons / yr	12,227	12,271	11,441	11,400	11,317	11,233	11,148	11,053	10,957	10,861	10,764	10,668	10,559	10,450	10,340	10,229	10,116	9,993	9,870	9,747	9,623	9,499	0	0	0	0	0	x
		Remaining actual useful life in yrs	19.0	17.9	18.2	17.3	16.4	15.5	14.7	13.8	12.9	12.0	11.1	10.2	9.3	8.4	7.5	6.6	5.7	4.7	3.8	2.9	1.9	0.9	0	0	0	0	0	x
		Volume available in Tons	232,215	219,944	208,503	197,102	185,785	174,553	163,405	152,352	141,394	130,533	119,770	109,101	98,542	88,092	77,752	67,524	57,408	47,414	37,544	27,797	18,175	8,676	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Closure in	2007	**31. Yabucoa**																													x
Move to	Humacao	Annual disposal rate in Tons / yr	36,442	36,574	34,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Remaining actual useful life in yrs	3.0	2.0	1.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume available in Tons	109663	73,089	38,989	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x
																															x
Expansion in	2009	**32. Yauco**																													x
		Annual disposal rate in Tons / yr	115,106	115,521	107,708	107,324	106,539	105,746	104,946	104,054	103,154	102,246	101,329	100,431	99,407	98,376	97,338	96,292	95,233	94,079	92,921	149,895	147,986	146,078	144,144	144,432	144,721	145,010	145,300	x
		Remaining actual useful life in yrs	5.2	4.2	3.5	2.5	1.5	33.4	32.7	32.0	31.3	30.5	29.8	29.1	28.4	27.7	27.0	26.3	25.5	24.9	24.2	14.0	13.2	12.3	11.5	10.5	9.5	8.4	7.4	x
		Volume available in Tons	601,040	485,519	377,811	270,487	163,948	3,535,832	3,430,886	3,326,832	3,223,677	3,121,432	3,020,103	2,919,671	2,820,264	2,721,888	2,624,550	2,528,258	2,433,025	2,338,946	2,246,025	2,096,130	1,948,143	1,802,065	1,657,921	1,513,489	1,368,768	1,223,758	1,078,458	x
		Volume transfered from others			-	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0		58,875	0	0	0	0	0	0	0	0	x
		Capacity added through expansion				-		3,477,630																							x
New Capacity	2010	**33. Penuelas - New**																													x
Expansion in	2029	Annual disposal rate in Tons / yr			0	0	0	0	969,289	1,055,612	1,046,482	1,200,816	1,190,044	1,179,507	1,212,026	1,199,454	1,186,794	1,174,049	1,161,128	1,158,853	1,144,582	1,142,243	1,127,697	1,113,155	1,098,414	1,100,611	1,102,813	1,105,018	1,107,228	x
		Remaining actual useful life in yrs			0	0	0	0	24.2	21.2	20.4	16.8	15.9	15.1	13.7	12.8	11.9	11.1	10.2	9.2	8.3	7.4	6.4	5.5	4.6	3.6	2.6	5.2	4.2	x
		Volume available in Tons			0	0	0	0	23,452,380	22,396,768	21,350,286	20,149,470	18,959,426	17,779,919	16,567,893	15,368,439	14,181,645	13,007,596	11,846,468	10,687,615	9,543,033	8,400,790	7,273,093	6,159,939	5,061,524	3,960,913	2,858,100	5,753,082	4,645,854	x
		Volume transfered from others			0	0	0	0	976,682	95,366		165,004	0	0	45,007	-	0			11,934		12,145	-	0	0			-	-	x
		Capacity added through expansion																										4,000,000		x
																														x

Appendix C-2: Backup Scenario Model
Puerto Rico Solid Waste Management Authority

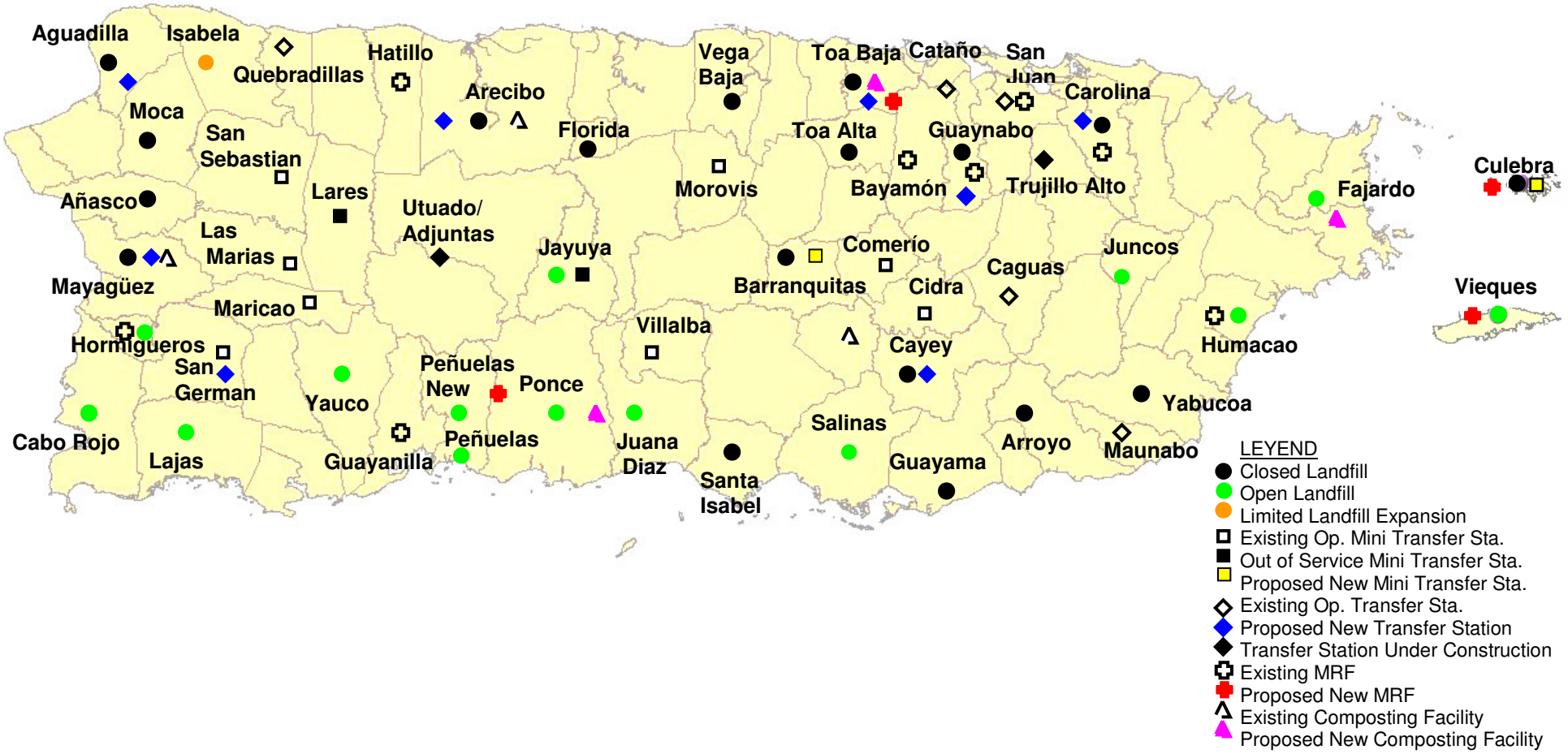
Year #			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Total annual disposal rate	3,633,100	3,646,198	3,399,589	3,387,480	3,362,697	3,337,675	3,312,410	3,284,275	3,255,870	3,227,193	3,198,244	3,169,924	3,137,599	3,105,052	3,072,280	3,039,285	3,005,838	2,969,428	2,932,862	2,896,137	2,859,255	2,822,383	2,785,010	2,790,581	2,796,162	2,801,753	2,807,357	x
Net volume requiring disposal at landfill facilities in tons	3,633,100	3,646,198	3,399,589	3,387,480	3,362,697	3,337,675	3,312,410	3,284,275	3,255,870	3,227,193	3,198,244	3,169,924	3,137,599	3,105,052	3,072,280	3,039,285	3,005,838	2,969,428	2,932,862	2,896,137	2,859,255	2,822,383	2,785,010	2,790,581	2,796,162	2,801,753	2,807,357	
Difference in annual tons	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x
																												x
Total volume capacity in Tons			25,042,338	24,230,592	21,497,520	27,794,831	48,044,466	44,644,250	42,888,380	39,548,965	49,128,419	45,958,495	42,739,225	58,634,173	55,561,893	52,522,608	49,516,770	46,539,868	43,607,006	40,614,064	37,754,809	34,932,426	32,138,740	29,348,160	26,551,998	27,649,329	24,841,972	x
																												x
Total useful life for all facilities in years			7.4	7.2	6.4	8.3	14.5	13.6	13.2	12.3	15.4	14.5	13.6	18.9	18.1	17.3	16.5	15.7	14.9	14.0	13.2	12.4	11.5	10.5	9.5	9.9	8.8	x

BASE CASE 2010



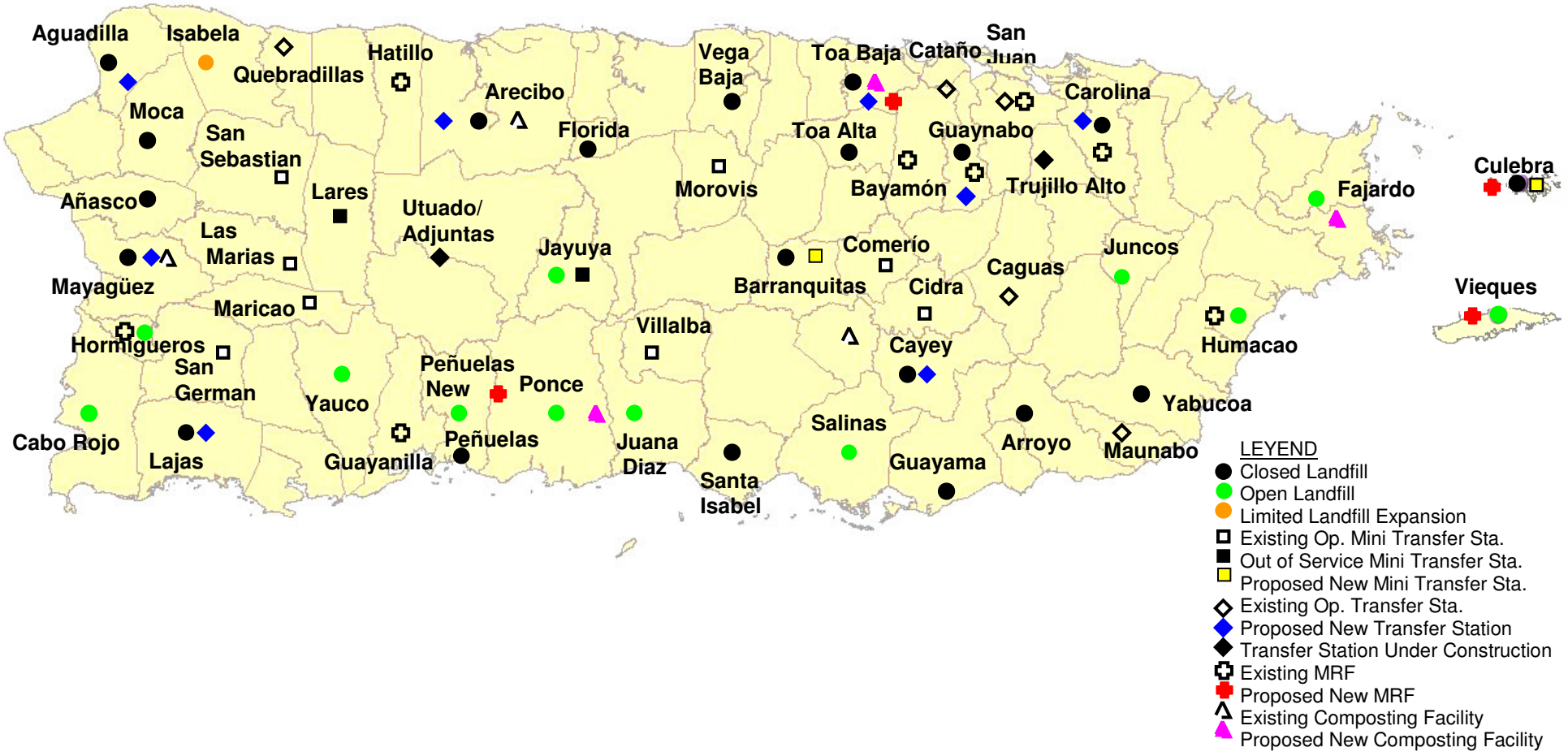
BASE CASE 2015

Two thermal processing facilities in the Northwest and Northeast Regions



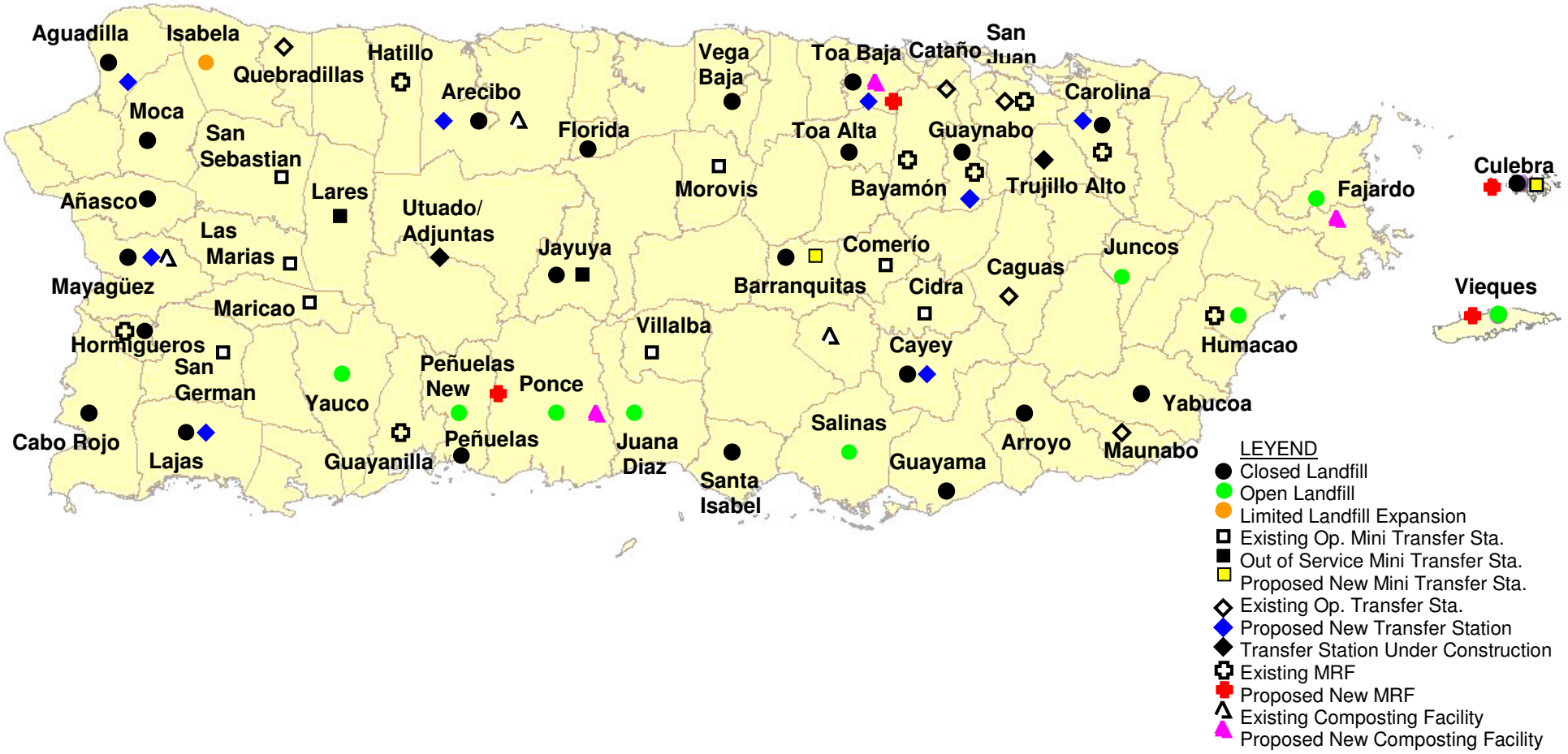
BASE CASE 2020

Two thermal processing facilities in the Northwest and Northeast Regions



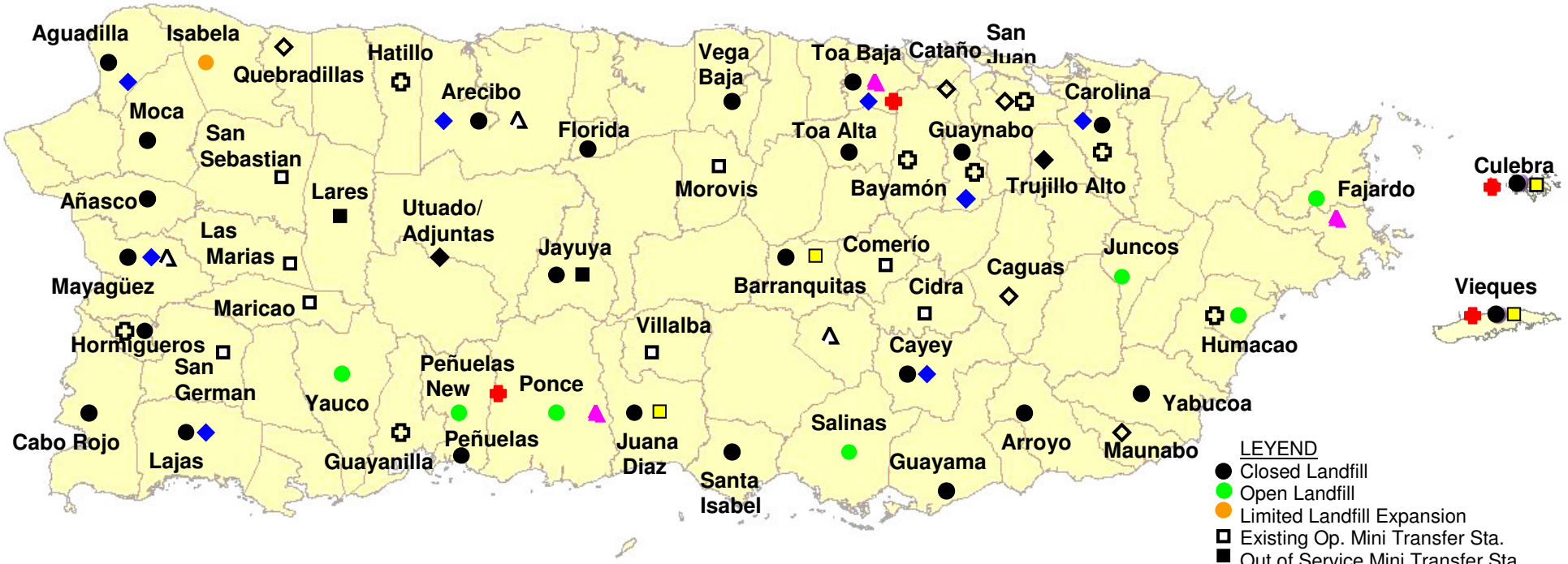
BASE CASE 2025

Two thermal processing facilities in the Northwest and Northeast Regions

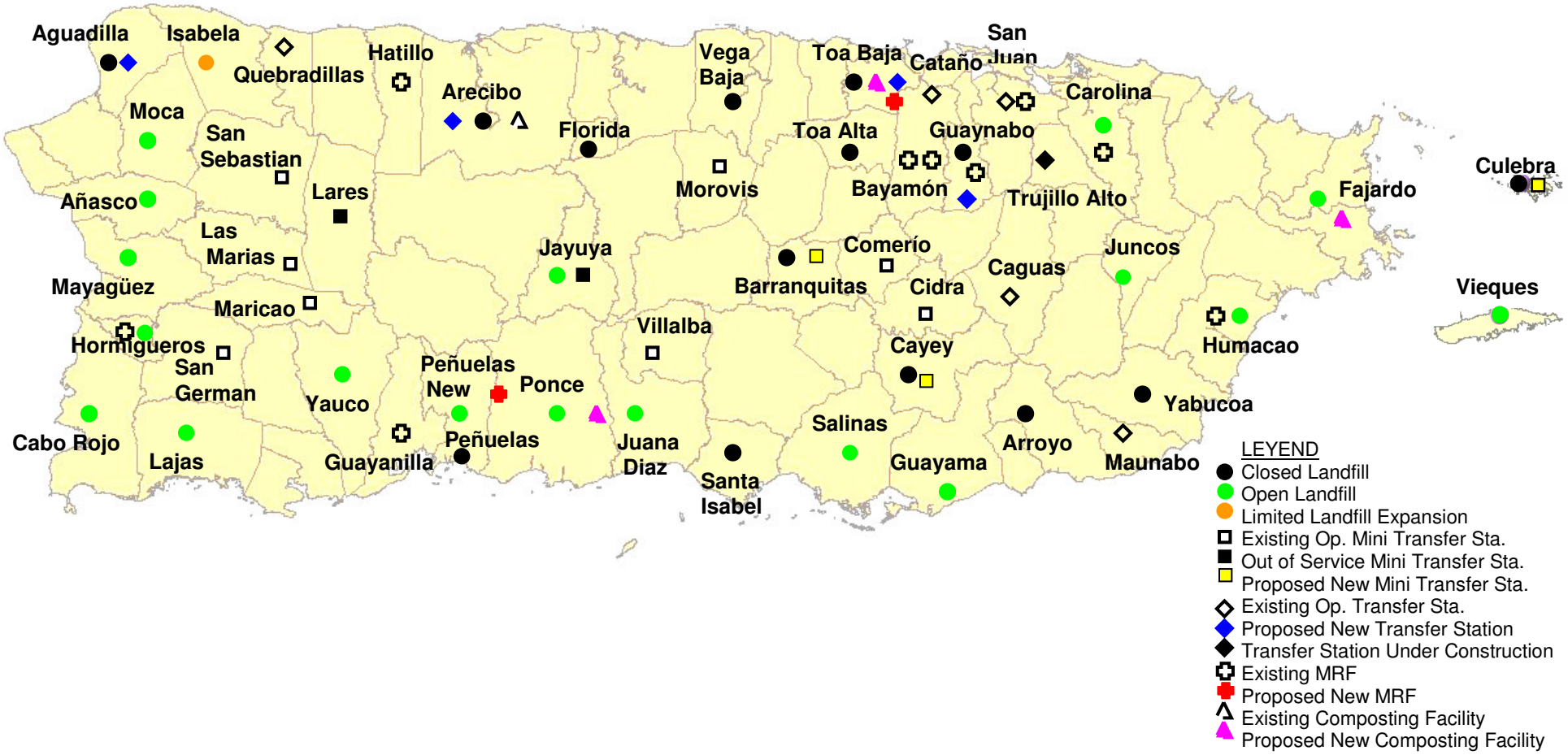


BASE CASE 2030

Two thermal processing facilities in the Northwest and Northeast Regions

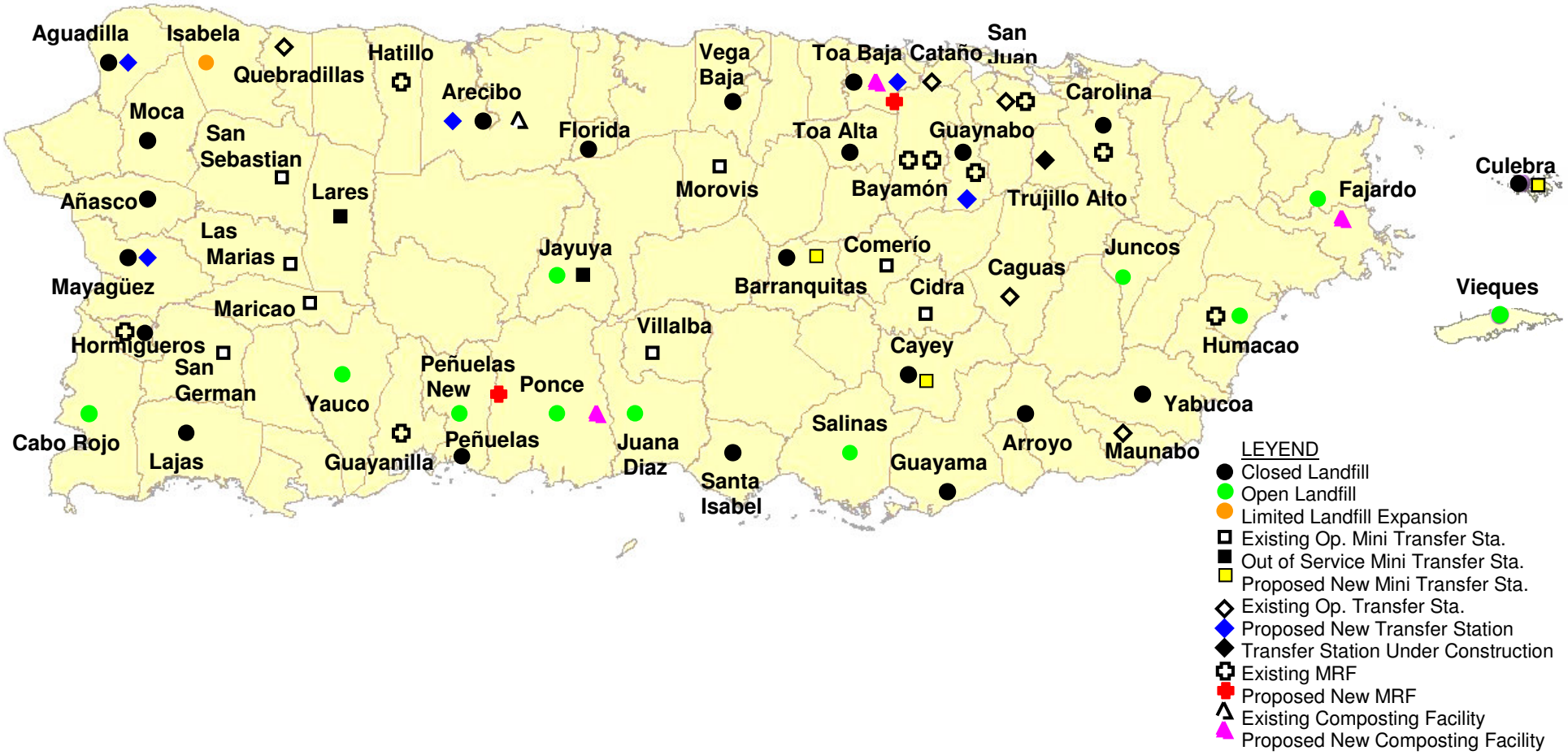


BACKUP CASE 2010

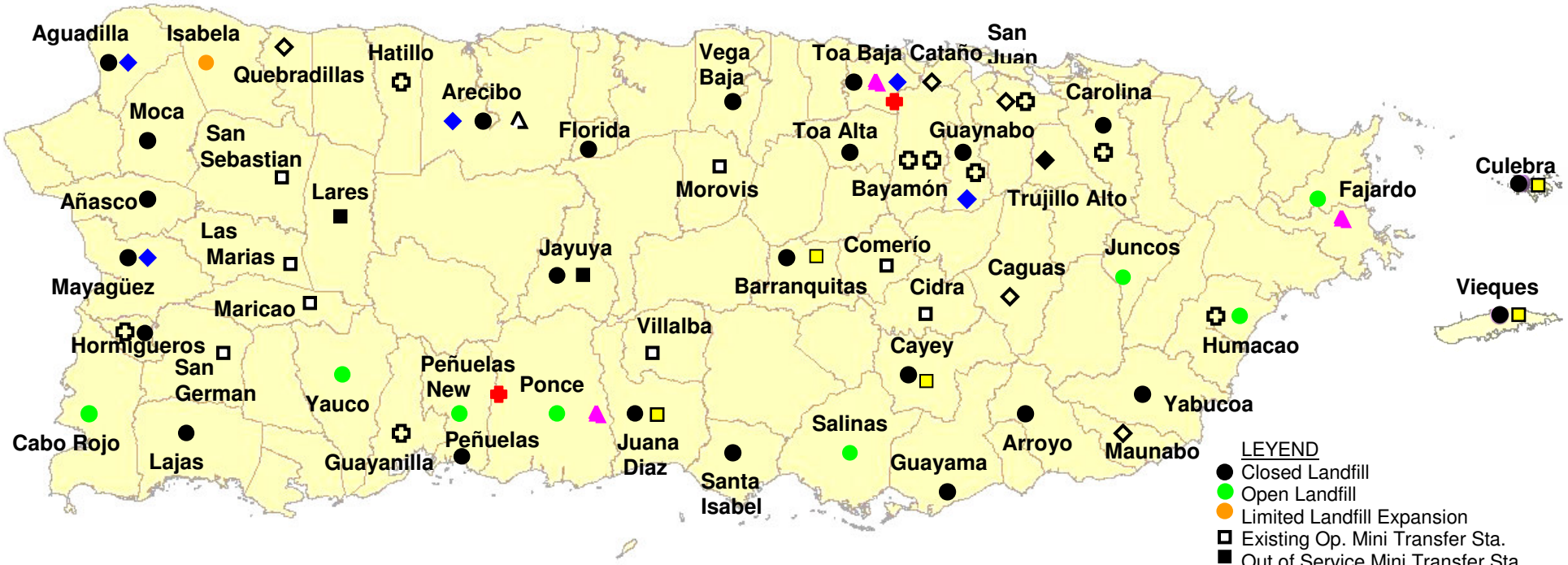


BACKUP CASE 2015

BACKUP CASE 2020



BACKUP CASE 2025



BACKUP CASE 2030