2009 WASTE STREAM CHARACTERIZATION STUDY

Prepared for:

Virgin Islands Waste Management Authority

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1. Project Background

The U.S. Virgin Islands are part of the Virgin Islands Archipelago situated where the Caribbean Sea meets the North Atlantic Ocean. Figure 1 shows the location of the Virgin Islands approximately 1,100 miles southeast of Miami, Florida, and 500 miles north of Caracas, Venezuela. They lie about 90 miles east of Puerto Rico. The Archipelago was divided into two territorial units in the 17th century: British and Danish Virgin Islands. The U.S. purchased the Danish part in 1917, renamed the islands as U.S. Virgin Islands, and administers it as a U.S. Territory. U.S. citizenship was granted to the inhabitants in 1927.

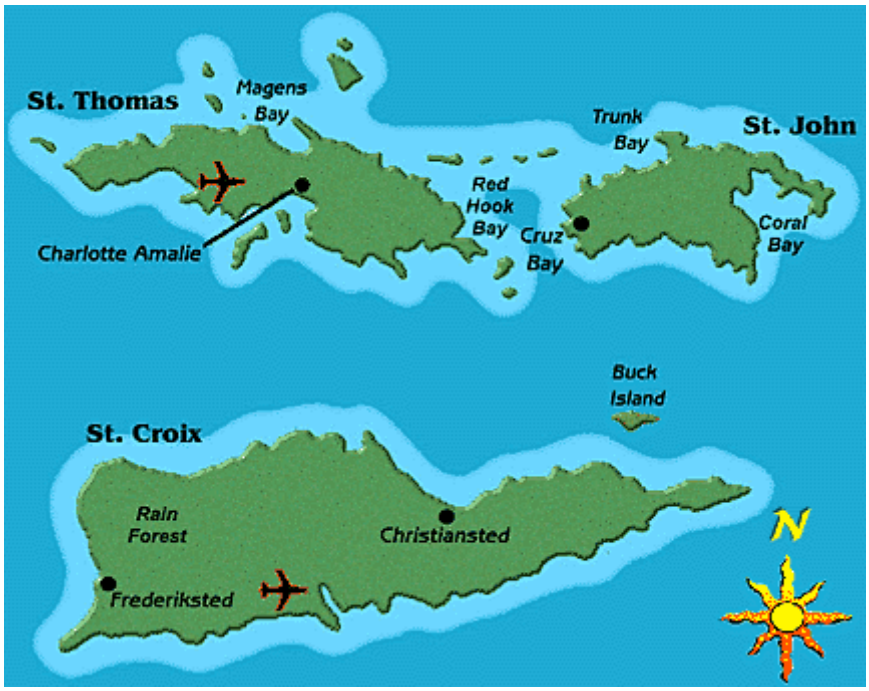
Figure 1 – Location of United States Virgin Islands

Source: Google Maps

The Territory is comprised of four islands which are inhabited and other roughly 50 smaller islands and cays. The three main inhabited islands, which can be seen in Figure 2, are St. Croix, St. Thomas and St. John. Water Island is a fourth inhabited island south of St. Thomas and helps form the harbor of the capital city, Charlotte Amalie. The total land area comprising all the islands is approximately 135 square miles. St. Croix is the largest island with a length of 28

miles and an area of 83 square miles. St. Croix lies 40 miles south of St. Thomas and St. John; note that the distance is foreshortened in Figure 2.

Figure 2 – The United States Virgin Islands



Source: U.S. Government of the Virgin Islands

The terrain in the islands is mostly hilly, with mountains rising as high as 1,500 feet above sea level at Crown Mountain on St. Thomas. The U.S. Virgin Islands have a subtropical climate, moderated by the trade winds. This climate results in low temperature variations with averages around 91°F in the summer to 86°F in the winter, and a rainy season in September through November.

This hot dry climate and the beauty of its beaches, ocean and geographic scenery attract more than two million tourists a year. Many of the tourists visit the islands by means of cruise ships. Tourism accounts for around 80 percent of the GDP and employment. The islands also have other sources of income and employment from the manufacturing sector. Industries include petroleum refining, rum distilling, textiles, electronics, pharmaceuticals, and watch assembly. One of the world's largest petroleum refineries is in St. Croix.

The Virgin Islands Waste Management Authority (VIWMA) retained Gershman, Brickner & Bratton, Inc. (GBB), through its contractor, the Maguire Group, to conduct a "snapshot" waste characterization study. In 1993, GBB conducted a more extensive waste characterization study, and in 2006, Austin Moorehead conducted a waste characterization on St. Croix for the Antilitter and Beautification Commission. The VIWMA is planning waste processing and energy-from-waste facilities on St. Thomas and St. Croix, and desires additional waste composition

data. This report has been prepared to present the results of the 2009 Waste Stream Characterization Study.

In 2008, approximately 110,000 people resided in the Territory. This shows a growth of 1.3 percent over the eight years since U.S. Census data were taken in 2000, or approximately 0.2 percent per year. The data on population and housing for the three islands from the 2000 Census are shown in Table 1.

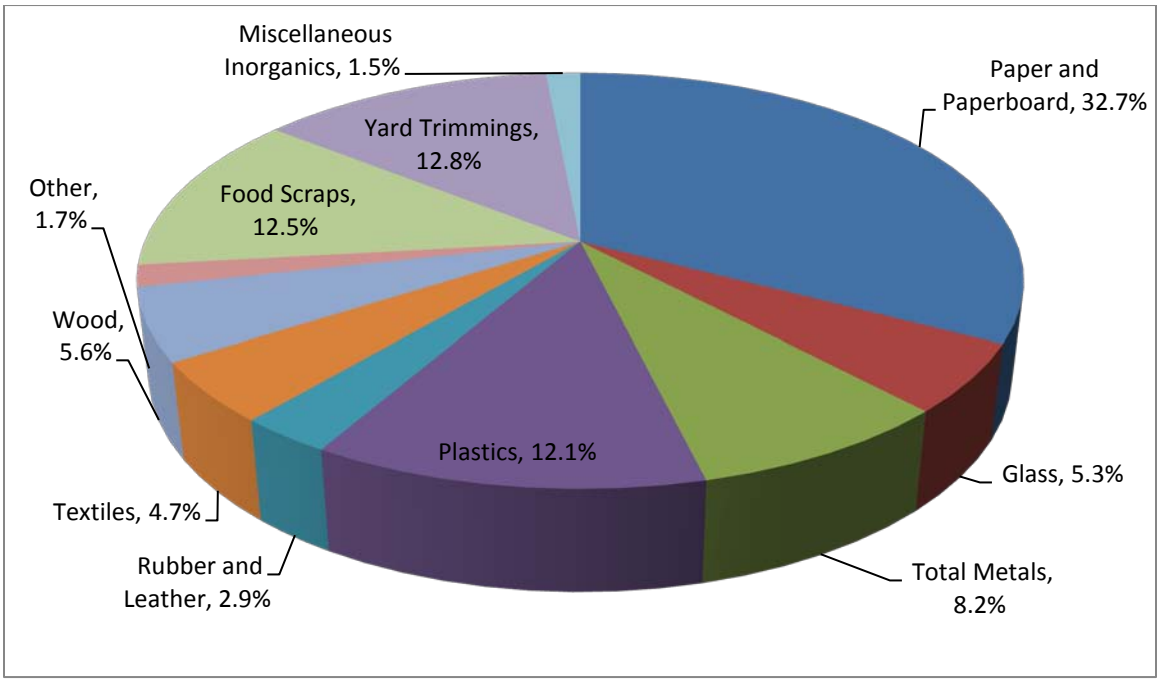
Table 1 – Population and Housing in 2000

Island	Population	Households & Occupied Residences	Single Family Detached Residences	Median Family Income
St. Croix	53,234	19,455	12,960	$21,401
St. John	4,197	1,735	1,247	$32,482
St. Thomas	51,181	19,458	7,514	$26,893
TOTAL	108,612	40,648	21,721	$24,704

Waste generation is a function of population and economic activity. The U.S. EPA uses an econometric model to estimate the waste generation per person in the U.S. In 2007, generation was 4.6 pounds per person per day or 0.84 tons per year. The U.S. EPA does not count industrial waste or construction and demolition waste (C&D waste) in these figures. In general, waste generation increases with income. Nationwide, U.S. EPA estimates that one-third of the waste generated in the U.S. was recycled or composted. Applying the EPA generation rate to the Virgin Islands results in an estimated waste generation of only about 91,000 tons per year, exclusive of tourist waste, industrial waste, and C&D waste.

EPA waste composition for municipal solid waste (MSW) as generated in the United States in 2007 is shown in Figure 3. Paper and paperboard form the largest single category in MSW at 32.7 percent. Plastics, food waste and yard waste essentially tie for second at approximately 12 percent of the waste each.

Figure 3 – EPA Waste Composition, 2007



BioCycle Magazine,[1] in its "state of garbage" survey of U.S. communities, estimates that the average U.S. per-capita generation rate is 1.38 tons per person per year or 7.56 pounds per person per day. Applying the MSW generation rates for the U.S. from BioCycle to the U.S. Virgin Islands, we would expect to see waste quantities similar to those shown in Table 2.

Table 2 – Estimated 2008 Waste Generation Based on BioCycle Generation Factor

Island	Estimated 2008 Population	Estimated 2008 MSW By Island (tons)	Estimated 2008 MSW At Landfills (tons)
St. Croix (Anguilla)	53,914	74,401	74,401
St. John	4,251	5,866	See Note
St. Thomas (Bovoni)	51,835	71,532	77,399
TOTAL	110,000	151,800	151,800

Note: Solid waste from St. John is transferred to St. Thomas and disposed in the Bovoni Landfill.

The 1993 waste characterization calculated the per-capita waste generation for both St. Croix and St. Thomas. The report[2] estimated, based upon data collected during the sort, that these generation rates were 11.1 and 8.6 pounds per person per day, respectively. The report pointed out that the generation rate for St. Thomas was very low and concluded that waste was entering the Bovoni Landfill without being fully reported. The report estimated this under-

[1] The State of Garbage in America, BioCycle Magazine, December 2008.
[2] Final Sort Report, Waste Characterization Analysis, Prepared for the Government of the Virgin Islands, Department of Public Works by Gershman, Brickner & Bratton, Inc., January 1994.

reporting to be approximately 20 percent. When this adjustment was made, the report estimated the St. Thomas waste generation rate to be 10.75 pounds per person per day. These generation rates have been applied to estimate the 2008 waste generation on the islands, as shown in Table 3. The St. John generation rate was estimated at 12.4 pounds per person per day. These generation rates from the 1993 waste sort are more than double the U.S. EPA rates. Also, since Hurricane Katrina in 2005, which caused significant damage in the Virgin Islands, tourist trade dollar volume has dropped by 29 percent.[3] Waste generation is also considered to be significantly lower than before the storm.

Table 3 – Estimated 2008 Waste Generation Based on 1993 Report Generation Factors

Island	Estimated 2008 Population	Estimated 2008 MSW by Island (tons)	Estimated 2008 MSW at Landfills (tons)
St. Croix (Anguilla)	53,914	109,216	109,216
St. John	4,251	9,620	See Note
St. Thomas (Bovoni)	51,835	101,694	111,314
TOTAL	110,000	220,530	220,530

Note: Solid waste from St. John is transferred to St. Thomas and disposed in the Bovoni Landfill.

In April 2000, the Antilitter and Beautification Commission conducted a waste sort at the Anguilla Landfill. The report[4] for this activity estimated the St. Croix solid waste generation between 110,000 and 130,000 tons per year. Unlike the waste sorts which are the subject of this 2009 report, the samples included trucks with only metal and C&D waste. The lower number of the range at 110,000 tons per year for St. Croix is very close to the figure shown in Table 3. This would appear to overestimate the MSW due to the inclusion of metal and C&D in the tallies, which are not included in MSW.

2. Project Objectives

The objective of the 2009 Waste Stream Characterization Study is to provide an estimate of the quantities and composition of the solid waste generated on the inhabited three islands that comprise the U.S. Virgin Islands: St. Croix, St. Thomas, and St. John. This waste characterization study identifies the recyclable and combustible materials present in the waste and that are potentially recoverable or that can be utilized in the production of a refuse-derived fuel. Also, any significant differences between the three islands' waste streams that are generated on the individual islands are identified. In addition, separate compositions are shown for residential and commercial generators. The types and quantities of specific materials from the sources and generators will be factors in considering the design of the waste processing and energy-from-waste facilities and their economic and environmental impacts.

[3] Travel & Tourism Economic Impact, U.S. Virgin Islands 2009, World Travel and Tourism Council, March 1, 2009
[4] Final Waste Sort Report, Antilitter and Beautification Commission, Revised April, 4, 2006.

3. Collection and Disposal

3.1 Collection

The VIWMA provides solid waste collection for residences using several techniques:

1. House-to-house collection in packer trucks
2. Drop-off locations utilizing 20-cubic-yard roll-off boxes
3. Urban street containers utilizing refuse carts serviced by packer trucks

For the weekly house-to-house collection provided by VIWMA, either VIWMA crews or contractors are used. Each single-family residence is allowed to place curbside a maximum of two 64-gallon containers. Apartment buildings of up to four units are allowed one 64-gallon receptacle per unit. Multi-family buildings greater than four units are required to obtain commercial service from private haulers.

The drop-off locations are technically for use for the disposal of household waste only by local residents. Businesses are mandated by law to utilize a contracted private hauler to collect and properly dispose of their waste. Businesses, including apartment buildings (defined as buildings with more than four apartments), are required to use a hauler or to take their waste directly to either the Anguilla Landfill on St. Croix or Bovoni Landfill on St. Thomas, or the transfer station located on St. John. The commercial solid waste is collected in packers, compactors, and roll-off box collection vehicles. Some locations, such as Housing Authority residences and government buildings, are collected by the VIWMA utilizing dumpsters (4, 6 and 8 cubic yards) that are collected using rear-load packers. Some are collected by the VIWMA's packers and some by contract haulers. The collection of solid waste on the three islands varies due to the geography, topography, and economic structures of the islands.

St. Croix has 11,556 residences (about 20 percent) that are provided house-to-house collection by private contractors under contract to the VIWMA. In addition, four drop-off locations (see Figure 4) referred to as "bin sites," are provided by VIWMA. A single contractor collects the urban street containers in Christiansted, and a second contractor collects them in Fredericksted. St. Thomas, however, has very few residences collected by VIWMA packer trucks and 28 bin site locations as shown in Figure 5 (See VIWMA website for current bin sites as the number may change from time to time).

Figure 4 shows the bin site locations on St. Thomas and St. John. The reliance on bin sites in St. Thomas is due to the fact that many of the streets/roads are so narrow and steep that traditional large collection vehicles cannot be used. Collection of solid waste on St. John is only through bin sites because of terrain; no house-to-house service is provided by VIWMA. There are 28 bin sites on St. John. The waste from St. John is transferred to St. Thomas for disposal in compacting transfer trailers and roll-off boxes.

Figure 4 – Map of St. Croix Bin Site Locations

Figure 5 – Map of St. Thomas/St. John Bin Site Locations

There are 41 private companies licensed to collect solid waste in the Virgin Islands. These companies provide refuse collection for the private businesses and multi-family apartments with more than four units.

3.2 Disposal

VIWMA owns and manages the only two landfills in the U. S. Virgin Islands. The two landfills are operated under contract by A-9 Enterprise, Inc.

Solid waste on St. Croix is disposed in the Anguilla Landfill located on the south side of the island, just off Route 66 near the international airport. For the 12 months beginning September 2008, the Anguilla Landfill received an estimated 104,402 tons of solid waste for disposal, as shown in Table 4. GBB estimated annual waste quantities based upon the scalehouse data provided by VIWMA.[5] Spreadsheets for these calculations are provided in Appendix 1. As shown in Table 4, an estimated 81,558 tons, or about 78 percent, were processable. The processable waste includes waste collected from residences, bin sites, and commercial facilities.

Table 4 – Estimated 12-Month Anguilla Landfill Waste Quantity (1)

	Estimated Annual		
Waste Source Category	**Minimum**	**Expected**	**Maximum**
	(tons)	**(tons)**	**(tons)**
Total VIWMA In-house & Contracted Rear Packers (2)	26,023	30,355	34,688
Total VIWMA 20-yd Contracted Bins (2),(3)	21,868	29,971	38,073
Total Green Waste	7,797	11,399	15,000
Total Scrap Metal (3)	2,735	3,881	5,026
Total C&D	5,085	7,564	10,043
Total Special Waste	0	0	0
Total Commercial Waste (2)	15,605	21,233	26,861
	0	0	0
TOTAL ALL CATEGORIES	79,112	104,402	129,691
TOTAL PROCESSABLE (1)	63,496	81,558	99,621

Notes:

(1) 12 months from September 2008 through August 2009. However, data for certain materials and days were unavailable from VIWMA and were estimated.

(2) Processable waste includes VIWMA in-house and contracted rear-loading packers, contracted bins, and commercial waste.

(3) Total tons for VIWMA 20 yd Contracted bins for Jun 2008, Feb 09, Mar 09 and Apr 09 was not provided. The total tons for Scrap Metal for the months of Mar 09, Apr 09 was not provided either. The estimated annual tons for these materials were calculated on the available months of data, and modifications to calculations were made accordingly.

[5] The VIWMA provided 12 months, September 2008 through August 2009, of scalehouse data. These data were weight data for trucks. Sample statistics, including mean, standard deviation, and 90% confidence limits were calculated. The confidence limits were used to compute the Minimum and Maximum shown in Table 4.

On St. Thomas, the waste disposal site is the Bovoni Landfill on the south side of the island toward the east end, just off Route 30 (Bovoni Road). In 12 months starting September 2008, the Bovoni Landfill received an estimated 76,368 tons of solid waste for disposal, as shown in Table 5. This includes the solid waste from the St. John transfer station, which is transferred via ferry to the Bovoni Landfill on St. Thomas for disposal. The St. John solid waste tonnage is estimated to be approximately 8,638 for the 12 months, which is included in the Bovoni total. As shown in Table 5, an estimated 65,515 tons, or 86 percent, were processable. The processable waste includes residential, bin site, and commercial waste.

Table 5 – Estimated 12-Month Bovoni Landfill Waste Quantity [(1)]

	Estimated Annual Tonnage		
Waste Source Category	**Minimum**	**Expected**	**Maximum**
	(tons)	**(tons)**	**(tons)**
Total VIWMA In-house & Contracted Rear-loading Packers [(2)]	11,345	12,686	14,028
Total VIWMA 20-yd Contracted Bins [(2)]	14,899	16,080	17,261
Total St. John Waste Compactor and Bins [(2)]	7,035	8,638	10,242
Total Green Waste	2,012	2,545	3,079
Total Scrap Metal	1,287	2,116	2,944
Total C&D	2,376	3,101	3,826
Total Special Waste	585	791	997
Total Commercial Waste [(2)]	23,670	28,110	32,550
Total Mixed Waste	1,372	2,318	3,265
TOTAL ALL CATEGORIES	64,581	76,386	88,192
TOTAL PROCESSABLE	56,948	65,515	74,082

Notes:

[(1)] 12 months: February, August, September, and October 2008; January through August 2009.

[(2)] Processable waste includes waste from VIWMA in-house and contracted rear-loading packers, contracted bins, St. John compactor and bins, and commercial waste.

At both the Anguilla and Bovoni Landfills, trucks with loads of C&D waste consisting of nothing but inert materials, such as broken concrete, are diverted from the working face, and the material is used to construct roads on the landfills. Spreadsheets with the calculations for the annual quantity estimates made by GBB are provided in Appendix 2.

4. Methodology

This 2009 Waste Stream Characterization Study separately analyzes the residential, commercial and bulk waste streams. The waste samples were selected and characterized into categories. MSW, from both residential and commercial sources, was physically sorted into material categories and recorded using Exhibit A, MSW Characterization Form. Bulk waste, including C&D waste, was spread out and a visual inspection made of the volume for each of the eight composition categories using Exhibit B, Bulk Load Visual Survey Form.[6]

4.1 Schedule

The sampling schedule called for five (5) days of sampling at each of the landfills on St. Thomas and St. Croix, starting on Monday of the sampling week. The Friday or Saturday preceding the sampling week was used for training and equipment check. The schedule was conducted as follows:

Training Day, St. Croix – Anguilla Landfill	February 20, 2009
Waste Sorting, St. Croix – Anguilla Landfill	February 23 -27, 2009
Training Day, St. Thomas – Bovoni Landfill	February 28, 2009
Waste Sorting, St. Thomas – Bovoni Landfill	March 2 - 6, 2009[7]

The waste sort day began at 7:00 a.m. and ended at 4:00 p.m. with a one-hour break for lunch.

4.2 Project Staffing

The waste characterization project at each landfill was staffed for five days with the following complement:

- **Site Manager**: The Site Manager had lead responsibility for planning each sampling and sorting event, and for interacting with the landfill personnel whose cooperation was needed throughout the field data collection. The Site Manager led the sampling selection process and oversaw the physical taking of the 200 to 250-pound samples. Frank Bernheisel from GBB performed this function.

- **Assistant Site Manager**: The Assistant Site Manager had responsibilities that paralleled those of the Site Manager. He functioned as Site Manager in absence of the Site Manager. Eric Douglas and Jim Jackson from the Maguire Group performed this function.

[6] GBB's tasks in preparation for the waste sort included preparation of a Waste Characterization Protocol and a Health and Safety Plan for the U.S. Virgin Islands 2009 Waste Stream Characterization Study, which were used during the sort crew training.

[7] Heavy rain started Thursday afternoon, March 5, 2009, and continued through Friday. The rain caused cancellation of the sorting activity on Friday.

- **Crew Supervisor**: The Crew Supervisor, who was one of the sort crew, was responsible for managing the sorting area, including crew management, personnel paperwork, and cleaning up at the end of the day. The VIWMA provided the Crew Supervisor.

- **Sort Crew:** The VIWMA provided six people (including the Crew Supervisor) to work as sorters at each landfill. These were temporary employees of VIWMA. While all six people reported to work initially, the sort crew consisted at times of only four or five members.

4.3 Crew Training

On the schedule above and prior to the beginning of sorting, the Site Manager trained the five sorters and their Crew Supervisor as to their roles. Following this orientation, the sort crew set up and checked the sorting equipment. This was followed by a review of the sort procedures and the Health and Safety Plan developed by GBB.

4.4 Sort Locations

The waste characterization sorting was conducted at the Anguilla Landfill on St. Croix and at the Bovoni Landfill on St. Thomas. The selection of the sorting areas was made in coordination with the landfill managers and VIWMA representatives. In both cases, a flat area adjacent to the travel paths of the refuse trucks coming to dump and after the landfill scalehouse was selected. The areas were selected upwind of the travel path and working face to minimize the dust impacting the sorters. At Anguilla Landfill, the sort area was located less than 100 feet from the normal dump area for collection trucks, as can be seen in Figure 6. At Bovoni Landfill, the sort area was located approximately 700 feet from the normal dump area and still adjacent to the truck travel path. This larger distance made coordination with the spotter located at the working face unworkable; therefore, either the VIWMA loader operator or the Site Manager directed the trucks to dump. This was done as the trucks made the first of the two left-hand turns that would lead to the working face. This can be seen in Figure 7.

Figure 6 – Anguilla Landfill

Figure 7 – Bovoni Landfill

4.5 Sample Selection

The Site Manager used a standardized selection procedure to select the vehicles to be sampled. This was intended to remove any sampling bias that may arise from an individual selecting a specific incoming vehicle. In order to obtain representative samples, a stratified sampling approach was utilized. For each of the source categories, the total number of incoming trucks from each source - residential, commercial, and bulk - was divided by the number of samples needed from that source category for that day. The resulting number was the sampling frequency and determined which vehicle was selected for sampling. This strategy is known as the "Nth Truck" approach. Table 6 shows the total number of trucks sampled for St. Croix and St. Thomas in each category. For trucks from residential and commercial sources, every sixth truck was targeted for selection. The sampling goal was that the number of samples be in proportion to the estimated waste quantity generated by each source category (residential, commercial or bulk load) on each island. However, in practice, there was a high number of trucks with mixed loads, which warranted identifying them as a separate category, as shown in Table 6.

Table 6 – Number of Trucks Sampled

Generator Source Category	St. Croix (Anguilla)	St. Thomas (Bovoni)	St. John*
Residential	9	13	0
Commercial (incl. Industrial and Institutional)	7	5	0
Mixed, Residential and Commercial	10	5	2
Bulk Loads (Visually Surveyed)	32	8	1
Total	58	31	3

* Solid waste from St. John is transferred to St. Thomas and disposed in the Bovoni Landfill.

The bulk waste vehicles, done by visual inspection, were selected partially by the Nth Truck method and partially by opportunity. Many of these were completed during the lunch break of the sort crew, which provided the Site Manager a period without supervisory requirements of the sorts. Because the bulk waste loads were visually inspected, and this was a relatively quick procedure, a large number of bulk samples were surveyed, especially on St. Croix. This was facilitated by the physical layout of the sorting area at the Anguilla Landfill, which was immediately adjacent to the tipping area and near the working face of the landfill. When the designated Nth Truck from each waste source arrived, the Site Manager, with the help of the spotter or the VIWMA loader operator, directed that truck to the sampling area. Fewer samples were inspected on St. Thomas because of the heavy rain on Thursday afternoon and Friday at the Bovoni Landfill, which produced so much mud that the trucks could not reach the normal dumping area at the top of the landfill.

The Site Manager interviewed the drivers of the selected vehicles to obtain information, including: origin of the load, waste generating source, hauler, vehicle type and number, and other data. This information was noted on the Survey Data Forms, along with the date. A Vehicle Selection Form was initially envisioned and developed, but it proved simpler to record the identification information directly on the Survey Data Form. Figure 8 shows a load from a selected vehicle prior to sampling at Anguilla Landfill.

The trucks selected for sampling included rear-load packers, both single and tandem-axle, front-load packers, compactors, and open-top roll-off containers. The roll-offs were primarily from the VIWMA bin sites (convenience centers).

Figure 8 – Sample Load at Anguilla Landfill

4.6 MSW Sample Sizes

Industry literature and GBB's experience in waste sorting indicate that samples of residential and commercial waste that weigh between 200 and 250 pounds will yield statistically valid results. This sample size range has been applied successfully in numerous other waste characterization studies and has been found to provide consistent statistical results. With smaller samples, results may degenerate; larger samples provide better results, especially when large items (outliers) are present. Samples of 250 pounds were targeted for all manually-sorted samples. The samples were taken using a single bucket-load scoop of the front-loader. Due to moisture and other variables, the sample weights were heavier than the target, as shown in Table 7. Also, a number of samples fell below the 200-pound minimum target.

Table 7 – Sample Size

Sample Weights	St. Croix (Anguilla)	St. Thomas (Bovoni)	St. John*
Average Weight (pounds)	349.5	286.1	211.0
Minimum Weight (pounds)	138.9	139.1	189.6
Maximum Weight (pounds)	764.2	557.2	232.4

* Solid waste from St. John is transferred to St. Thomas and disposed in the Bovoni Landfill.

The bulk waste (including C&D waste) samples that arrived in 20-cubic-yard (or larger) roll-off containers had the entire container contents tipped. The bulk material was visually surveyed, photographed, and the data recorded using the Bulk Load Visual Survey Form shown in Exhibit B.

4.7 MSW Sort Categories

The original sort task description identified a list of 38 material categories based on the previous waste characterizations conducted in the U.S. Virgin Islands. This list, shown in MSW Characterization Form, Exhibit A, was shortened to facilitate the MSW sorts based on the field conditions during the first day of sorting. The samples showed that there was a significant amount of wet and dirty papers and plastics contaminated with food waste, feces, etc. These materials were assigned individual categories, Dirty Paper and Dirty Plastic. Diapers were moved to the Dirty Paper category. The metal categories were collapsed into two: Ferrous Metals and Non-ferrous Metals. There was almost no non-container glass; therefore, the small amount of window glass found was categorized as Clear Glass. Very few dry cell batteries and no individual wet cell batteries were found in the samples. Dry cell batteries were combined with Appliances and Electronics. This field adjustment resulted in a total of 31 categories, shown in Table 8, which were used for the detailed sorts.

Table 8 – MSW Material Categories

Category	Material
PAPER	Newsprint
	Office Paper
	Magazines
	Old Corrugated Cardboard (OCC) and Kraft Paper
	Paper Board
	Other Paper - Dirty
PLASTIC	PET (#1) Containers
	HDPE (#2) Containers - Natural
	HDPE (#2) Containers - Colored
	Dirty Plastic
	Foam - Polystyrene (#6)
	Other Rigid Plastic (#4, #6, #7 or no number)
	LDPE - Film Plastic (bags, sheet, etc.)
GLASS	Glass-Clear
	Glass-Green
	Glass- Brown
METAL	Ferrous Metals
	Aluminum and Other Non-ferrous Metals (Al Cans)
ORGANIC	Yard Waste
	Construction Wood Waste
	Food Waste
	Miscellaneous Organics
SPECIAL WASTES	Rubber – Except Tires
	Textiles/Cloth
	Household Hazardous Waste (HHW)
	Tires
	Appliances and Electronics Incl. Dry Cell Batteries
	Used Oil
	C&D
	Miscellaneous Inorganic
	Fines

4.8 Sampling Procedure

The procedure for taking the samples to be sorted involved the following steps:

1. The trucks selected for the detailed categorization of materials, shown in Table 8, were chosen by the Nth Truck method of random selection by the Site Manager.
2. The selected trucks were directed by the spotter to the sort tipping area, which was located near the normal tipping area, and the entire truck was dumped.
3. The Site Manager interviewed the driver to obtain the hauler name, type of waste collected (residential, commercial, governmental, or mixed), and location or locations on the island where the waste originated. In addition, the tag number of the truck was recorded. The truck was directed to dump the entire load at the sampling unload site.
4. The Site Manager directed the front-end loader operator to take a single-grab sample from a randomly designated section of the load and place it on a plastic sheet used to isolate the sample. The grab location was selected using a random number between 1 and 12 previously generated for each day. The numbers correspond to the 12-grid location for the unloaded waste as shown in Exhibit C.
5. The sample placed into the plastic sheet by the front-end loader bucket was moved in stages to the sort table for sorting into the material categories.

4.9 Sorting

As mentioned above, the selected sample was moved in stages from the plastic sheet to the sort table. The sort table was located in a circle of waste carts provided by the VIWMA. One or more carts were used for each material. The carts were labeled with the material type using a felt-tip marker. Literacy was an issue, which was addressed by fastening a sample to each cart to illustrate the type of material collected in that cart. For example, the Natural HDPE cart had a milk jug stuck in the hinge. Also, nicknames were used to identify some materials; for example, “milk jug” was used for material made of high-density polyethylene (HDPE). Figure 9 shows the sorting setup at the Anguilla Landfill with the sorters, sorting table, individual material carts, front-loader, and the plastic sheet with the sample (on the ground behind the sorter in the blue coveralls). The sorting table was loaded with a number of bags of waste or loose waste to be sorted. The sorters then identified materials and placed the separated materials in the appropriate cart. The sorters manually opened bags and placed the materials in the appropriate cart. Sorters were asked to specialize in certain material groups: one for the paper categories, another plastic, another glass and metals, etc. In this way, sorters became knowledgeable in a short period of time as to the characteristics of their individual material category.

The Site Manager and Assistant Site Manager had to do a quality control check to ensure that the material sorts were correct. This was done visually by inspecting the carts, removing miss-sorts, pointing out the error to the sorters and moving the item.

Figure 9 – Anguilla Landfill Sorting Setup

Once the sample was broken down into the 31 material categories, each of the carts was weighed and the weights recorded. After the sample was completely sorted and the containers weighed, they were emptied. The front-end loader moved the entire sample back to the landfill face.

4.10 Data Recording

The Site Manager was responsible for overseeing all weighing and data recording of each sample. Once each sample was sorted into its material categories and Fines swept from the table into a container, the weighing was performed. Each container of sorted materials from the completed samples was weighed on a digital platform scale provided by GBB. Sorters carried the containers of sorted material, placed them on the scale, and the Site Manager recorded all data. The sorters then emptied the containers, and each was weighed empty. This weight was also recorded.

The MSW Characterization Form (Exhibit A) was used to record the weights of each component, as well as to record other sampling data. The data on the MSW Characterization Form were entered into a Microsoft Excel spreadsheet for analysis.

4.11 Bulk Waste Visual Survey

The material categories in the MSW list are not appropriate for characterizing bulk wastes by visual inspection. Therefore, a bulk debris material list, including brief descriptions, was developed by GBB. There are fewer categories in the bulk waste stream that warrant detailed

sorting and characterization. Also, these categories are the ones predominantly found in bulk waste. The bulk waste materials list which was used for the visual inspections is provided in Table 9. As mentioned, the VIWMA utilizes drop-off sites, four on St. Croix and 26 on St. Thomas, with roll-off bins for waste collection. This results in these bins being used for waste from all sources. In addition, bulk roll-off bins from a variety of commercial sources were visually inspected.

Table 9 – Bulk Material Categories

Category	Material
PAPER	Corrugated Cardboard
BAGGED MSW	Residential
METAL	Appliances
	Other Metals
YARD WASTE	All
WOOD	Untreated Wood – Lumber/Pallets
	Treated/Painted/Processed Wood
INERT	Concrete/Block/Stone/Dirt/Sand/ Glass
CONSTRUCTION MATERIAL	Drywall/Roofing/Insulation/Carpet
OTHER WASTE	Tires
	Electronics
	Furniture, etc
	Mixed Bulk/Other Unclassified
	Plastic (All types, Any Items)
	Paint/Oil/Chemicals/HHW

Visual surveys of bulk waste were made near the landfill sort area at Bovoni and near the working face at Anguilla. Each selected load was dumped, as described previously, but in the dump area adjacent to the working face. Figure 10 shows a bulk load dumped at the Anguilla site. The landfill dozer operator waited while the Site Manager conducted the visual survey. Visual surveying of a load of bulk waste involved the following steps:

1. The volume of the incoming load was recorded prior to unloading and then the "percent full" of the vehicle was estimated using the Bulk Load Visual Survey Form (Exhibit B). Also, the source of the load and the truck identification were recorded after interviewing the driver.
2. The dumped load of bulk waste material was spread out using the loader so that it was possible to see dense materials such as block chips and sand that tend to sink to the bottom of the pile.

3. A walk around the spread-out load was made to note the major material categories present: cardboard, drywall, lumber, etc. An estimate was made of the volume percentage of the load for the major materials.
4. A second walk around the load was made to note the other minor categories using the Bulk Load Visual Survey Form, to estimate their percentage, and to take photos.
5. Quality control of the collected data included verification that the estimated percentages summed to 100 percent.

The residential and commercial waste that was included in the bulk waste loads was categorized as "bagged MSW" in the visual samples. These bulk-waste bags were assigned the "average composition of MSW" based on the detailed manual sort results. Samples of bulk waste loads are shown in Figure 10 and Figure 11.

Figure 10 – Bulk Waste Load Sample

Figure 11 – Bulk Waste Load Sample

5. Data Analysis

The waste characterization data analysis was done in two steps:

1. Development of material composition characterization in weight and percentages from the sample data; and
2. Extrapolation of the characterization to the total quantity of solid waste for each island.

This section of the study discusses the analysis methodology used in this study.

5.1 Composition

As mentioned above, the data were entered into the field data sheets as the individual samples were weighed. These field data sheets were entered into Microsoft Excel spread sheets: (1) MSW Waste Characterization and (2) Bulk Load Visual Survey. These spreadsheets calculated the arithmetic mean and standard deviation for each material category. Also, the 90 percent confidence interval, which is the industry accepted standard for variation, was calculated for each material category. The confidence interval reflects the homogeneity of the samples for the category: the smaller the confidence interval, the greater the consistency for the category.

The mean, confidence limits and percentage composition statistics were calculated for each island and generator type. Also, the statistics for the overall waste stream for each island were calculated.

5.2 Quantity Calculations

The daily scalehouse data sheets showing the categories of waste[8] for each island during the sort weeks were provided by VIWMA. This allowed the quantity of waste delivered by each truck to be summed by generator category for each island. For some deliveries, the data were recorded as weight in tons and some had no weights. For those with no weight, the truck volume in cubic yards, multiplied by the percent fullness of the truck, was used. These were later converted to weight, in tons, by GBB using standard industry factors.

These daily waste quantity totals for the sort week at the Anguilla Landfill on St. Croix and the Bovoni Landfill on St. Thomas have been converted to tons, as mentioned above, and are shown in Table 10 and Table 11, respectively. In addition, Table 10 and Table 11 show the daily truck count for each waste category at Anguilla Landfill and Bovoni Landfill, respectively. Note that Fill is not a waste but material used for daily cover. Also, not all weights were recorded during this week. The last row shows the number and percentage of trucks for which weights were recorded each day.

[8] The waste categories used are those from the VIWMA scalehouse data sheets.

Table 10 – Anguilla Landfill Sort Week Quantity, by Category (tons)

Waste Category	Monday 2/23/2009		Tuesday 2/24/2009		Wednesday 2/25/2009		Thursday 2/26/2009		Friday 2/27/2009		Total		
	Truck Count	Composite Weight	Truck Count	Composite Weight	Truck Count	Composite Weight	Truck Count	Composite Weight	Truck Count	Composite Weight	Truck Count	Composite Weight	Percent Weight
Residential	40	106.9	37	105.5	33	51.2	40	116.4	35	96.8	185	477	31%
Commercial	38	113.9	9	15.7	10	30.9	12	29.5	10	32.6	79	223	14%
Construction & Demolition	9	42.8	13	50.5	12	36.1	15	60.1	9	24.9	58	214	14%
Green Waste	7	26.7	8	11.9	6	12.8	8	14.6	5	24.6	34	91	6%
Metal	7	9.7	10	15.0	10	24.1	9	15.1	5	4.2	41	68	4%
Fill	7	109.8	0	0.0	1	33.0	5	102.6	7	107.3	20	353	23%
Other	3	4.5	4	27.0	5	25.9	5	21.3	5	7.3	22	86	6%
Blank (1)	12	12.9	2	0.0	0	0.0	3	1.1	12	14.1	29	28	2%
Total	123	427.2	83	225.5	77	214.1	97	360.7	88	311.9	468	1539	100%
Trucks with weights	54	44%	72	87%	72	94%	73	75%	70	80%	341	76%	
TOTAL WASTE	116	317	83	225	76	181	92	258	81	205	448	1,187	

(1) The waste category, "Blank," indicates that no data were supplied for the waste category for a particular truck on the scalehouse log form.

Table 11 – Bovoni Landfill Sort Week Quantity, by Category (tons)

Waste Category	Monday 3/2/2009		Tuesday 3/3/2009		Wednesday 3/4/2009		Thursday 3/5/2009		Friday 3/6/2009		Total		
	Truck Count	Scale Weight	Truck Count	Scale Weight	Truck Count	Scale Weight	Truck Count	Scale Weight	Truck Count	Scale Weight	Truck Count	Scale Weight	Percent Weight
Residential	91	226.7	88	191.5	95	228.0	64	111.2	80	154.5	418	912	35%
Commercial	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0%
Construction & Demolition	2	13.4	5	4.8	7	44.0	3	14.0	1	8.4	18	85	3%
Green Waste	1	2.5	6	2.4	5	7.5	1	0.9	1	0.4	14	14	1%
Metal	2	5.1	3	1.4	4	64.8	2	1.1	4	10.4	15	83	3%
Fill	47	1410.0	4	62.1	1	12.3	0	0.0	0	0.0	52	1484	56%
Other	0	0.0	1	7.1	2	6.7	1	2.3	5	26.5	9	43	2%
Blank (1)	0	0.0	0	0.0	1	14.7	0	0.0	1	0.7	2	15	1%
Total	143	1657.6	107	269.2	115	377.9	71	129.5	92	200.9	528	2635	100%
Trucks with Weights	93	65%	106	99%	114	99%	71	100%	92	100%	476	93%	
TOTAL WASTE	96	248	103	207	114	366	71	130	92	201	476	1,151	

(1) The waste category, "Blank," indicates that no data were supplied for the waste category for a particular truck on the scalehouse log form.

6. Findings

The objective of the 2009 Solid Waste Stream Characterization Study, as discussed above, was to obtain a snapshot of the current composition data on the solid waste being disposed at the landfills on St. Croix and St. Thomas. These composition data will be used to assist in the waste management system planning by VIWMA, including the planning of each proposed RDF facility and energy-generation facility. In the following sections, the data are presented for each of the two landfills and then for the entire Virgin Islands system. The quantities of waste are distributed among the generator source categories for the refuse trucks sorted in the weeks of waste characterization, February 23 through March 6, 2009. These quantity data were provided by the VIWMA, as discussed in Section 3.2, and are summarized in Table 12.

The system wide data were developed by combining the data from the two landfills as provided by the VIWMA. In each of these sections, the data are presented by generator type and aggregated. These quantities and the total quantity estimates discussed in Section 1 have been analyzed to arrive at an estimate of the total solid waste for each island and landfill in 2008. These estimates are shown in Table 12.

The annual quantity of each material that makes up the composition was determined by the analysis of the sort data. Multiplying the quantity for each category - Residential, Commercial, and Bulk Loads – produces the individual annual quantities provided in the following sections.

Table 12 – Estimated 12-Month 2008/2009 Waste Quantity by Generator and Landfill (tons)[(1)]

Generator Source Category	St. Croix (Anguilla)	St. Thomas (Bovoni)	St. John[(2)]	Total Bovoni	Total
Residential	30,355	12,686		12,686	43,042
Commercial (incl. Industrial and Institutional)	21,233	28,110		28,110	49,343
Residential and Commercial	51,588	40,797		40,797	92,384
Bulk Loads	29,971	16,080	8,638	24,718	54,689
Total Processable MSW	81,558	56,877	8,638	65,515	147,073
Total Waste[(3)]	104,402	67,748	8,638	76,386	180,788

[(1)] Months samples shown in Appendix 1 and Appendix 2.

[(2)] Solid waste from St. John is transferred to St. Thomas and disposed in the Bovoni Landfill. On St. John, residential and commercial waste is disposed in 28 bin sites distributed throughout the island. From the visual inspections of bulk loads performed in St. Thomas, about 36 percent of the incoming bulk loads was found to be bagged MSW. The remainder includes yard waste, wood waste and paper which account for 47 percent; C&D and others represent the final 17%.

[(3)] Total waste included processable MSW, green waste, C&D waste, scrap metal and other waste.

6.1 St. Croix, Anguilla Landfill

During the 2008/2009 12-month period, the Anguilla Landfill received an estimated total of 104,402 tons of solid waste, of which 81,558 was processable, as discussed before in Section 3.2. Approximately 29 percent of this waste was from residential generators, and 20 percent from commercial generators. The remainder, 22,844 tons or 22 percent of the waste, was made up of green waste, scrap metal, C&D waste, and other waste. The green waste was landfilled along with the MSW. Scrap metal was diverted after passing over the scale to the scrap processor for recycling. C&D waste was diverted if it was inert (dirt, rock, concrete, etc) and could be used for landfill road construction; otherwise, it was sent to the working face. Other waste was landfilled. Adding 11,399 tons of green waste to the processable waste results in an estimated 92,957 tons of MSW. This MSW is considered processable, making up an estimated 89 percent of the total landfilled waste.

In the following sections, the results of the waste sorts completed at the Anguilla Landfill are presented. The presentation of the composition percentages and the estimated quantity of each constituent is in the following order:

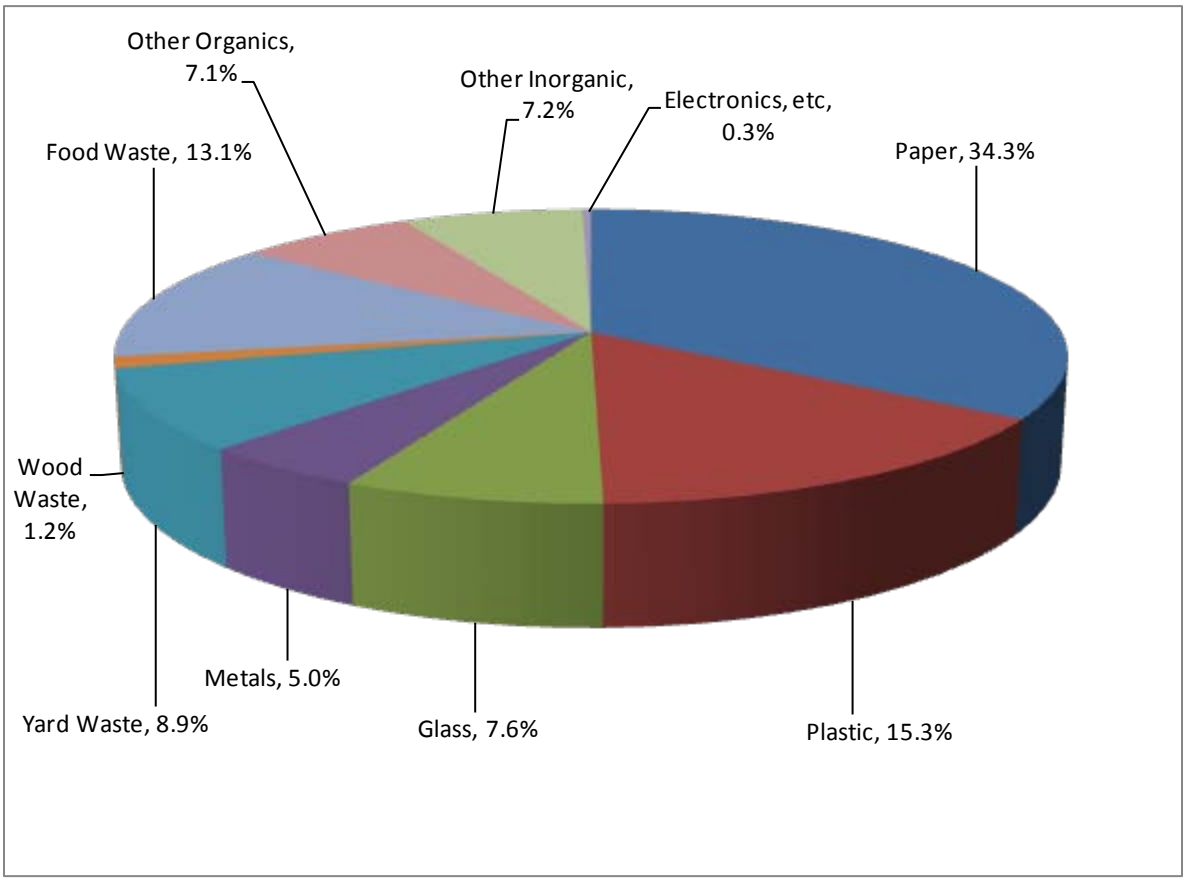
1. Residential waste;
2. Commercial waste;
3. Combined residential and commercial waste;
4. Bulk waste; and
5. Total waste for St. Croix.

6.1.1. Residential Waste

Figure 12 shows the composition of the residential solid waste being landfilled in the Anguilla Landfill based on the February 2009 sorts. The categories remain the same as described above, and it can be seen that the major components of the residential waste are the same as the overall MSW with some changes in the percentages. The major components, making up 77 percent of the residential waste, are:

- Paper – 34.3%
- Plastic – 15.3%
- Food Waste – 13.1%
- Yard Waste – 8.9%
- Glass – 7.6%

Figure 12 – St. Croix, Residential Waste



When the residential composition is compared to the U.S. EPA composition for MSW presented in Section 1, the pattern is similar. Paper is the largest constituent at more than 30 percent, and plastics, food waste and yard waste form the next three. Plastic in St. Croix residential waste is a little higher than U.S. EPA and food waste is about the same. Yard waste is higher in the U.S. EPA composition than for St. Croix residential waste.

The specific results of the characterization can be seen in Table 13, where the data for each material in each category are shown.

Table 13 – St. Croix, Residential Waste Composition

Category	Material	% of Total	90% Conf +/- %	Estimated Annual Tons	90% Conf +/- Tons	Category %
PAPER						34.3%
1	Newsprint	2.3%	1.2%	688	371	
2	Office Paper	2.6%	1.7%	786	502	
3	Magazines	6.5%	6.8%	1,983	2,059	
4	Corrugated Cardboard (OCC) & Kraft Paper	8.5%	1.9%	2,578	579	
5	Paper Board	3.5%	0.6%	1,076	174	
6	Other Paper - Dirty	10.9%	2.3%	3,315	686	
PLASTIC						15.3%
7	PET (#1) Containers	2.1%	0.4%	645	122	
8	HDPE (#2) Containers - Natural	1.2%	0.3%	370	93	
9	HDPE (#2) Containers - Colored	1.5%	0.3%	450	83	
10	Dirty Plastic	0.0%	0.0%	5	6	
11	Foam - Polystyrene (#6)	1.3%	0.4%	381	107	
12	Other Rigid Plastic	3.8%	2.6%	1,167	792	
13	LDPE - Film Plastic (bags, sheet, etc.)	5.4%	1.3%	1,628	404	
GLASS						7.6%
14	Glass - Clear	3.2%	0.9%	973	280	
15	Glass - Green	2.6%	1.0%	779	308	
16	Glass - Brown	1.8%	0.5%	544	152	
METALS		0.0%	0.0%	0	0	5.0%
17	Ferrous Metals	3.7%	0.8%	1,131	252	
18	Non-Ferrous Metals (Incl. Al Cans)	1.3%	0.3%	383	96	
ORGANICS						23.2%
19	Yard Waste	8.9%	4.7%	2,704	1,415	
20	Wood Waste	1.2%	0.5%	377	165	
21	Food Waste	13.1%	4.1%	3,964	1,250	
22	Miscellaneous Organics	0.0%	0.0%	0	0	
SPECIAL WASTES						14.6%
23	Rubber – Except tires	0.0%	0.0%	0	0	
24	Textiles	7.1%	2.1%	2,144	631	
25	Household Hazardous Waste (HHW)	0.0%	0.0%	0	0	
26	Tires	0.0%	0.0%	0	0	
27	Appliances and Electronics incl. Dry Cell Batteries	0.3%	0.2%	106	61	
28	Used Oil	0.0%	0.0%	0	0	
29	C&D	3.2%	2.9%	983	877	
30	Miscellaneous Inorganic	0.9%	0.6%	264	195	
31	Fines	3.1%	0.9%	933	273	
TOTAL	Estimated Annual Waste Quantity (tons)			30,355	11,933	100.0%

6.1.2. Commercial Waste

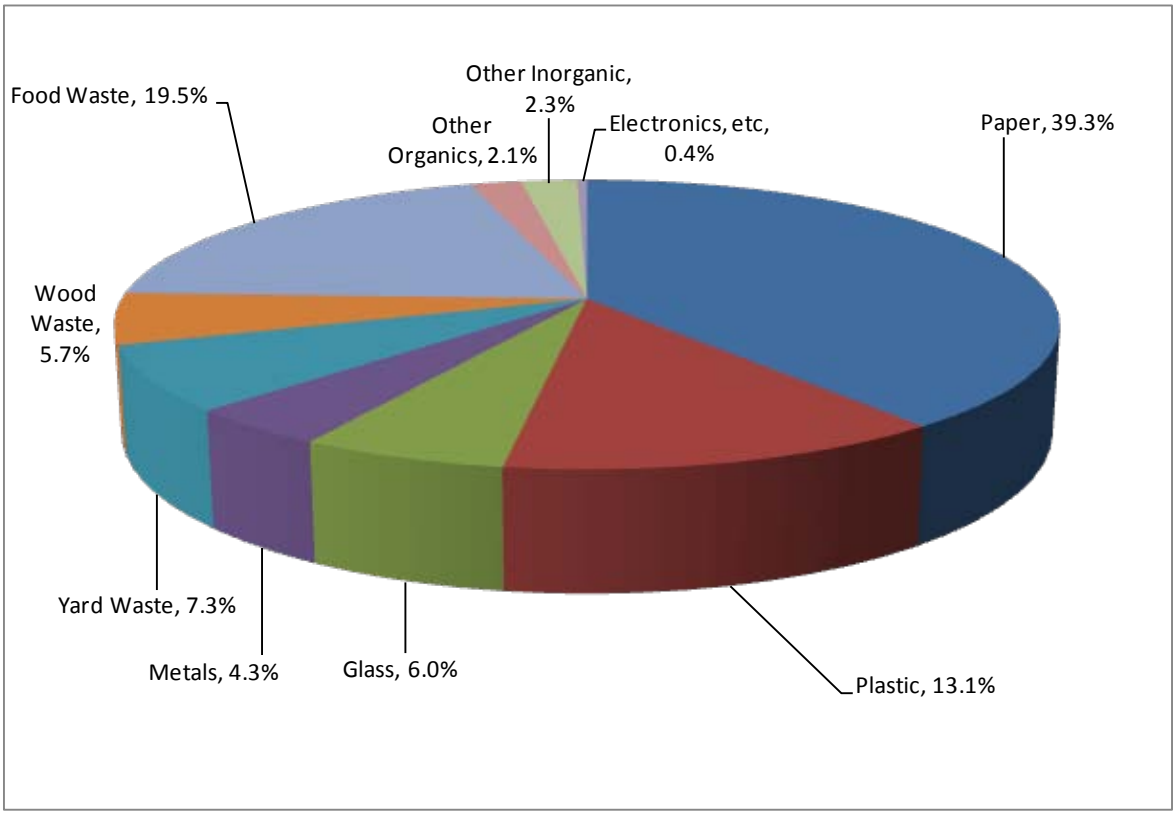
The composition of the commercial solid waste being landfilled in the Anguilla Landfill based on the February 2009 sorts is shown graphically in Figure 13. The categories remain the same as described in the overall MSW and the residential waste. It can be seen that the major components of the commercial waste are the same, with some changes in the percentages including increases in paper and food waste. The major components, making up 85 percent of the commercial waste are:

- Paper – 39.3%
- Food Waste – 19.5%

- Plastic – 13.1%
- Yard Waste – 7.3%
- Glass – 6.0%

When compared to the St. Croix residential composition, commercial waste shows some differences. These include a significantly higher percentage of paper and food waste, 39 vs. 34 percent and 20 vs. 13 percent, respectively. Wood waste increased significantly and plastics decreased.

Figure 13 – St. Croix, Commercial Waste



The specific results of the characterization can be seen in Table 14, where the data for each material in each category are shown.

Table 14 – St. Croix, Commercial Waste Composition

			90% Conf	Estimated	90% Conf	Category
Category	**Material**	**% of Total**	**+/- %**	**Annual Tons**	**+/- Tons**	**%**
PAPER						39.3%
1	Newsprint	0.2%	0.1%	41	30	
2	Office Paper	1.5%	1.6%	319	342	
3	Magazines	2.2%	2.3%	459	483	
4	Corrugated Cardboard (OCC) & Kraft Paper	23.1%	12.4%	4,907	2,625	
5	Paper Board	3.9%	1.7%	826	359	
6	Other Paper - Dirty	8.5%	3.1%	1,797	649	
PLASTIC						13.1%
7	PET (#1) Containers	1.9%	1.4%	407	289	
8	HDPE (#2) Containers - Natural	0.4%	0.2%	89	34	
9	HDPE (#2) Containers - Colored	0.9%	0.5%	195	101	
10	Dirty Plastic	0.9%	1.4%	185	304	
11	Foam - Polystyrene (#6)	2.5%	2.1%	525	440	
12	Other Rigid Plastic	1.0%	0.7%	215	139	
13	LDPE - Film Plastic (bags, sheet, etc.)	5.5%	1.8%	1,160	380	
GLASS						6.0%
14	Glass - Clear	2.7%	1.5%	573	308	
15	Glass - Green	1.5%	1.0%	326	221	
16	Glass - Brown	1.8%	1.1%	377	223	
METALS						4.3%
17	Ferrous Metals	3.8%	2.5%	806	536	
18	Non-Ferrous Metals (Incl. Al Cans)	0.5%	0.3%	100	71	
ORGANICS						32.6%
19	Yard Waste	7.3%	7.1%	1,543	1,508	
20	Wood Waste	5.7%	7.3%	1,219	1,546	
21	Food Waste	19.5%	8.7%	4,150	1,856	
22	Miscellaneous Organics	0.0%	0.0%	0	0	
SPECIAL WASTES						4.8%
23	Rubber – Except tires	0.0%	0.0%	0	0	
24	Textiles	2.1%	1.1%	447	236	
25	Household Hazardous Waste (HHW)	0.0%	0.0%	0	0	
26	Tires	0.0%	0.0%	0	0	
27	Appliances and Electronics incl. Dry Cell Batteries	0.4%	0.6%	86	128	
28	Used Oil	0.0%	0.0%	0	0	
29	C&D	0.2%	0.4%	50	82	
30	Miscellaneous Inorganic	1.1%	1.9%	241	396	
31	Fines	0.9%	0.8%	190	173	
TOTAL	Estimated Annual Waste Quantity (tons)			21,233	13,459	100.0%

6.1.3. Combined Residential and Commercial Waste

Figure 14 shows a summary of the combined residential and commercial waste composition that was derived from the data collected during the waste sort conducted the week of February 23, 2009, at the Anguilla Landfill. As noted in Table 6, a total of 26 samples of MSW were sorted to obtain the St. Croix data. The percentages for categories shown in Figure 14 are sums of the individual sort categories. For example, paper includes newspaper, cardboard, magazines, etc. Over 80 percent of the residential and commercial waste disposed at the Anguilla Landfill is comprised of the following five categories:

- Paper – 35.9%
- Food Waste – 15.1%
- Plastic – 14.6%
- Yard Waste – 8.4%
- Glass – 7.1%

Within paper, the largest single category, cardboard, made up 13 percent of that category. It should be noted that paper includes the dirty paper category which was heavily contaminated with food waste and other wet substances. Similarly, plastic includes the dirty plastic category which was also contaminated with food waste and other wet materials.

Figure 14 – St. Croix, Residential and Commercial Waste Composition Summary

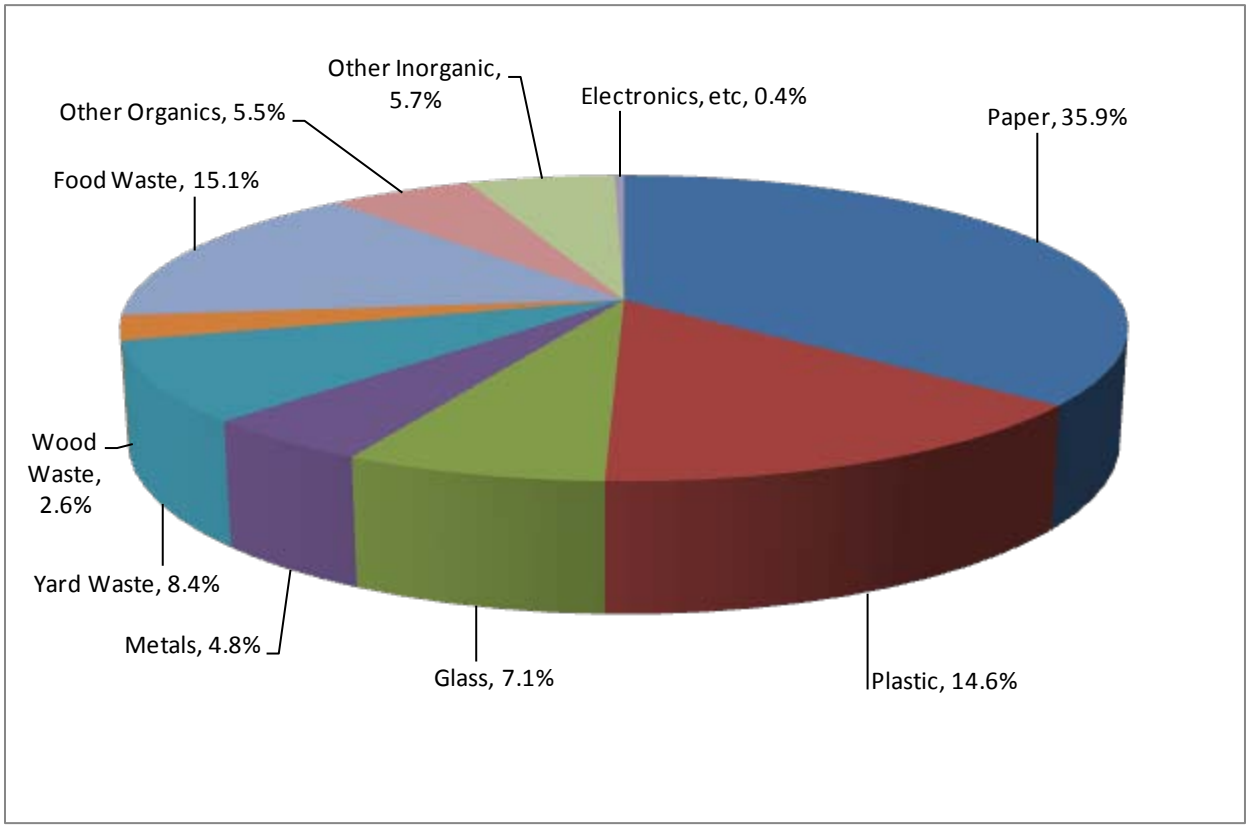


Table 15 presents the detailed waste characterization for the combined residential and commercial waste, based on the waste sort conducted at the Anguilla Landfill. It was computed by combining the samples of the waste from the residential and commercial sources. The percentage for each material category occurring in the MSW is represented by its arithmetic mean and its 90 percent confidence interval. By multiplying by the estimated MSW quantity measured during the February 2009 waste sort, the quantities of each material received at Anguilla Landfill in 2008 are estimated. Also, the 90 percent confidence level quantities are shown, which when added or subtracted from the expected quantity provides the range for that category.

Table 15 – St. Croix, Combined Residential and Commercial Waste Composition

			90% Conf	Estimated	90% Conf	Category
Category	**Material**	**% of Total**	**+/- %**	**Annual Tons**	**+/- Tons**	**%**
PAPER						35.9%
1	Newsprint	1.6%	0.9%	837	7	
2	Office Paper	2.3%	1.2%	1,161	14	
3	Magazines	5.2%	4.7%	2,669	126	
4	Corrugated Cardboard (OCC) & Kraft Paper	13.0%	4.7%	6,725	317	
5	Paper Board	3.7%	0.7%	1,884	12	
6	Other Paper - Dirty	10.2%	1.8%	5,239	94	
PLASTIC						14.6%
7	PET (#1) Containers	2.1%	0.5%	1,063	5	
8	HDPE (#2) Containers - Natural	1.0%	0.2%	501	1	
9	HDPE (#2) Containers - Colored	1.3%	0.2%	675	2	
10	Dirty Plastic	0.3%	0.4%	145	1	
11	Foam - Polystyrene (#6)	1.6%	0.7%	842	6	
12	Other Rigid Plastic	3.0%	1.8%	1,529	28	
13	LDPE - Film Plastic (bags, sheet, etc.)	5.4%	1.1%	2,783	30	
GLASS						7.1%
14	Glass - Clear	3.0%	0.8%	1,573	12	
15	Glass - Green	2.2%	0.8%	1,159	9	
16	Glass - Brown	1.8%	0.5%	922	4	
METALS						4.8%
17	Ferrous Metals	3.7%	0.9%	1,933	18	
18	Non-Ferrous Metals (Incl. Al Cans)	1.0%	0.3%	524	1	
ORGANICS						26.1%
19	Yard Waste	8.4%	3.8%	4,331	165	
20	Wood Waste	2.6%	2.3%	1,362	31	
21	Food Waste	15.1%	4.1%	7,777	318	
22	Miscellaneous Organics	0.0%	0.0%	0	0	
SPECIAL WASTES						11.5%
23	Rubber – Except tires	0.0%	0.0%	0	0	
24	Textiles	5.5%	1.6%	2,849	45	
25	Household Hazardous Waste (HHW)	0.0%	0.0%	0	0	
26	Tires	0.0%	0.0%	0	0	
27	Appliances and Electronics incl. Dry Cell Batteries	0.4%	0.2%	188	0	
28	Used Oil	0.0%	0.0%	0	0	
29	C&D	2.3%	2.0%	1,189	0	
30	Miscellaneous Inorganic	1.0%	0.7%	491	3	
31	Fines	2.4%	0.7%	1,236	9	
TOTAL	Estimated Annual Waste Quantity (tons)			51,588	1,261	100.0%

6.1.4. Bulk Waste

Figure 15 shows the St. Croix bulk waste composition that was derived from the data collected during the visual waste inspections conducted the week of February 23, 2009, at the Anguilla Landfill. A total of 32 samples of bulk waste were visually inspected to obtain these data. The percentages of categories shown in Figure 15 are summed from a number of the individual sort categories. For example, metals include appliances and other metals, C&D includes inert and construction materials, and the other bulk category includes everything within the category except plastic. The largest single constituent is bagged MSW, which is assumed to have the same composition as the combined residential and commercial waste. Three-quarters of the bulk waste disposed at the Anguilla Landfill, found in the top four categories, is comprised of:

- MSW – 30.7%
- Yard Waste – 21.3%
- Untreated Wood Waste 15.5%
- Paper – 11.2%

Figure 15 – St. Croix, Bulk Waste

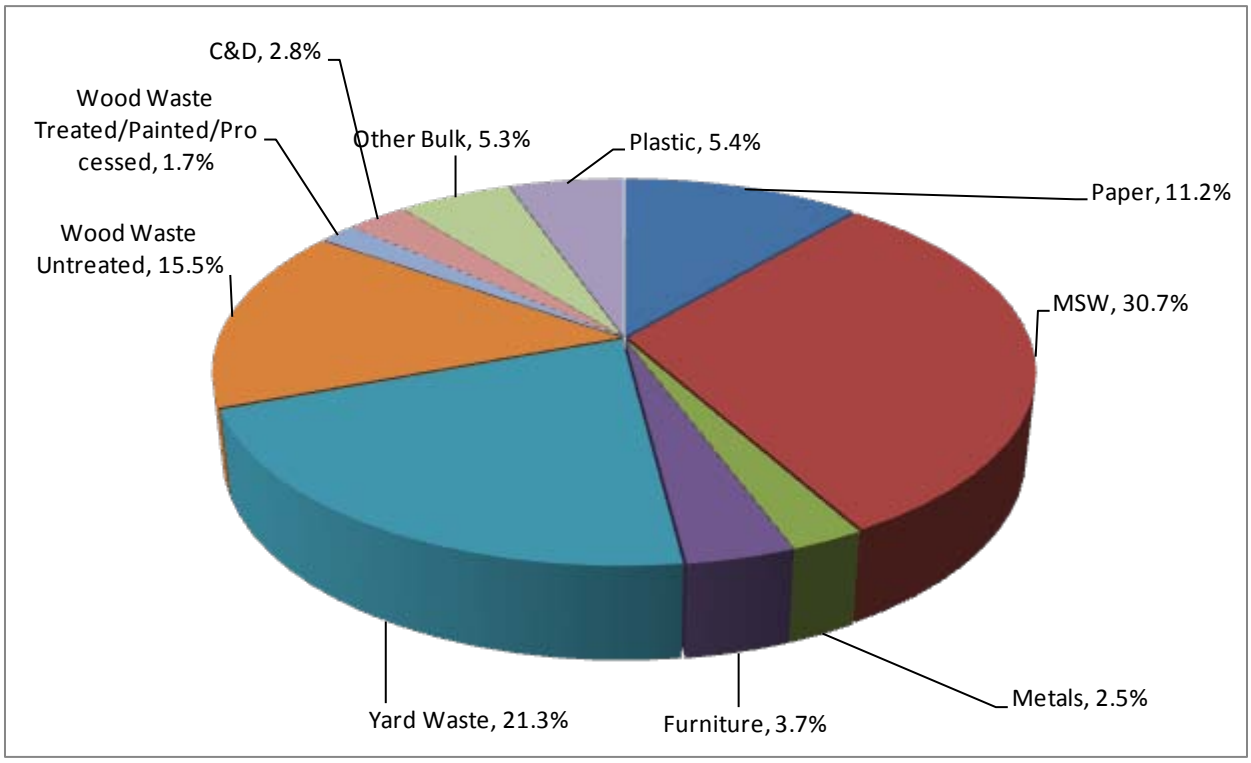


Table 16 presents the detailed waste characterization for the bulk waste visual inspection conducted at the Anguilla Landfill. It provides the summary of the bulk waste data. The table shows the percentage of each material with the arithmetic mean and the 90 percent confidence interval for each material category. These values were converted to a volume estimate based upon the recorded size of the roll-off container and the percentage fullness. These material volume estimates were then used to estimate the weight of each material by multiplying by the bulk density.

Table 16 – St. Croix, Bulk Waste

Category	Material	% OF TOTAL	90% conf. +/- %	Annual Tons	90% conf. +/- Tons	Category %
PAPER	Corrugated Cardboard	11.2%	5.7%	3,347	1,703	11.2%
BAG MSW	Residential Household Trash	30.7%	8.1%	9,191	2,427	30.7%
METAL						2.5%
	Appliances	0.3%	0.6%	100	178	
	Other Metals	2.2%	1.5%	644	462	
YARD WASTE	All Types, Any ITEM	21.3%	5.4%	6,369	1,631	21.3%
WOOD						17.2%
	Untreated Wood; Pallets, Lumber	15.5%	4.3%	4,645	1,286	
	Treated/Painted/Processed Wood	1.7%	1.5%	519	452	
INERT	Concrete/Block/Stone/Dirt/Sand/Glass	1.6%	2.9%	475	865	1.6%
CONSTRUCTION MATERIAL	Drywall/Roofing/Insulation/Carpet	1.3%	0.8%	375	226	1.3%
OTHER WASTE						14.4%
	Tires	0.1%	0.2%	25	75	
	Electronics	0.1%	0.2%	25	75	
	Furniture	3.7%	3.2%	1,099	957	
	Mixed Bulk/Other Unclassified	5.2%	2.8%	1,543	849	
	Plastic (All types, Any item)	5.4%	5.1%	1,613	1,525	
	Paint/Chemicals/Oil/HHW	0.0%	0.0%	0	0	
Total	All Waste Present in Load	100.00%		29,971	12,712	100.0%

6.1.5. St. Croix Total Waste

Table 17 shows an overall composition summary of the combined residential and commercial waste and the bulk wastes. The Summary was derived from the data collected during the waste sort conducted the week of February 23, 2009, at the Anguilla Landfill. This was generated by combining the estimated waste quantities, in tons, from Table 15 and Table 16. The categories shown in bulk waste are slightly different from those in the MSW. As mentioned above, the largest single constituent in bulk waste is bagged MSW, which is assumed to have the same composition as the combined residential and commercial waste. Over 76 percent of the overall waste disposed at the Anguilla Landfill is comprised of the following three categories:

- Organics – 32.4%
- Paper – 31.2%
- Plastic – 13.0%

Within paper, one of the two largest single categories, cardboard made up 45 percent of that category and represented 14 percent of the total. It should be noted that paper includes the dirty paper category which was heavily contaminated with food waste and other wet substances. Similarly, plastic includes the dirty plastic category which was also contaminated with food waste and other wet materials.

Table 17 – St. Croix, Overall Waste Composition

St. Croix, Anguilla Overall Composition					
		Estimated MSW	Estimated Bulk	Estimated	Percent
Category	Material	Annual Tons	Annual Tons	Total Waste	Composition
PAPER		***18,515***	***6,645***	***25,161***	***30.8%***
1	Newsprint	837	149	986	1.2%
2	Office Paper	1,161	207	1,368	1.7%
3	Magazines	2,669	475	3,144	3.9%
4	Corrugated Cardboard (OCC) & Kraft Paper	6,725	4,545	11,270	13.8%
5	Paper Board	1,884	336	2,219	2.7%
6	Other Paper - Dirty	5,239	933	6,173	7.6%
PLASTIC		***7,538***	***2,956***	***10,494***	***12.9%***
7	PET (#1) Containers	1,063	189	1,252	1.5%
8	HDPE (#2) Containers - Natural	501	89	590	0.7%
9	HDPE (#2) Containers - Colored	675	120	795	1.0%
10	Dirty Plastic	145	26	171	0.2%
11	Foam - Polystyrene (#6)	842	150	993	1.2%
12	Other Rigid Plastic	1,529	272	1,801	2.2%
13	LDPE - Film Plastic (bags, sheet, etc.)	2,783	496	3,279	4.0%
GLASS		***3,653***	***651***	***4,304***	***5.3%***
14	Glass - Clear	1,573	280	1,853	2.3%
15	Glass - Green	1,159	206	1,365	1.7%
16	Glass - Brown	922	164	1,086	1.3%
METALS		***2,457***	***1,082***	***3,540***	***4.3%***
17	Ferrous Metals	1,933	989	2,922	3.6%
18	Non-Ferrous Metals (Incl. Al Cans)	524	93	617	0.8%
ORGANICS		***13,471***	***13,414***	***26,886***	***33.0%***
19	Yard Waste	4,331	7,140	11,472	14.1%
20	Wood Waste	1,362	4,888	6,251	7.7%
21	Food Waste	7,777	1,386	9,163	11.2%
22	Miscellaneous Organics	0	0	0	0.0%
SPECIAL WASTES		***5,953***	***5,221***	***11,174***	***13.7%***
23	Rubber – Except tires	0	0	0	0.0%
24	Textiles	2,849	508	3,356	4.1%
25	Household Hazardous Waste (HHW)	0	0	0	0.0%
26	Tires	0	25	25	0.0%
27	Appliances & Electronics incl. Dry Cell Batteries	188	158	347	0.4%
28	Used Oil	0	0	0	0.0%
29	C&D	1,189	3,124	4,313	5.3%
30	Miscellaneous Inorganic	491	1,186	1,677	2.1%
31	Fines	1,236	220	1,456	1.8%
TOTAL	***Estimated Annual Waste Quantity (tons)***	***51,588***	***29,971***	***81,558***	***100.0%***

6.2 St. Thomas, Bovoni Landfill

During the 12-month 2008/2009 period, the Bovoni Landfill received an estimated total of 76,386 tons of solid waste. This includes 8,638 tons of waste from St. John, as discussed in Section 3.2. Approximately 17 percent of this waste was from residential generators, 37 percent was from commercial generators, and 32 percent in bulk loads. The remainder, 10,871

tons or 14 percent, of the waste is made up of green waste, scrap metal, C&D waste, and other waste.[9] The green waste is landfilled along with the MSW. Scrap metal is diverted after passing over the scale to the scrap processor for recycling. C&D waste is diverted if it is inert and can be used for landfill road construction or sent to the working face. Other waste is landfilled.

In the following sections, the results of the waste sorts completed at the Bovoni Landfill are presented. The presentation of the composition percentages and the estimated quantity of each constituent is in the following order:

1. Residential waste;
2. Commercial waste;
3. Combined residential and commercial waste;
4. Bulk waste; and
5. Total waste for St. Thomas.

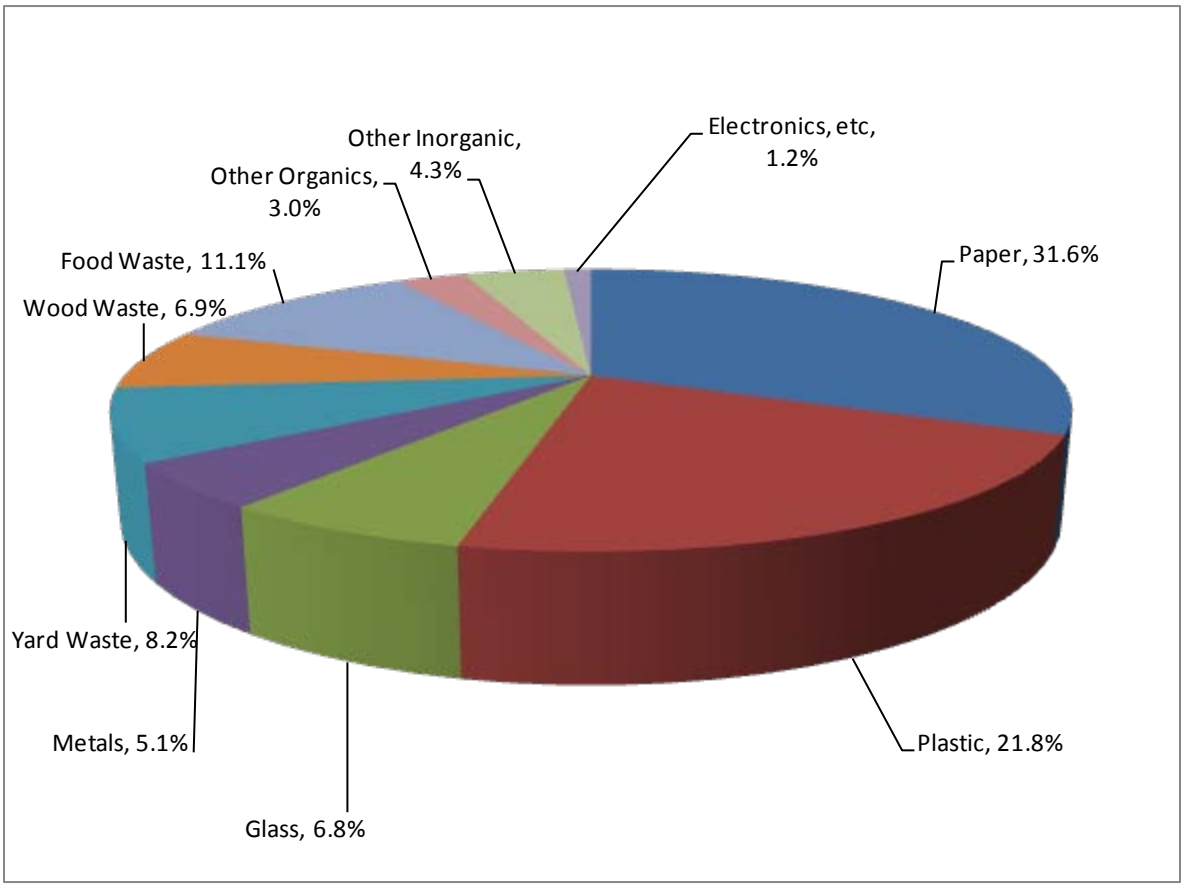
6.2.1. Residential Waste

Figure 16 shows the composition of the residential solid waste being landfilled in the Bovoni Landfill. The categories remain the same as described above, and it can be seen that the majority of the residential waste is comprised of:

- Paper – 31.6%
- Plastic – 21.8%
- Food Waste –11.1 %
- Yard Waste – 8.2%
- Wood Waste – 6.9%

[9] The percent composition of the waste landfilled in the Bovoni Landfill was calculated using the sampling procedure described in the Waste Characterization Protocol document and based on the data of the sources for the waste. St. John waste is also landfilled at Bovoni, but its composition (residential, commercial and bulk) is unknown, so the composition for the waste at St. John was assumed to be the same for St. Thomas and divided proportionally to add up to each of the three categories, resulting in the reported distribution.

Figure 16 – St. Thomas, Residential Waste



When the residential composition is compared to the U.S. EPA composition for MSW presented in Section 1 and to St. Croix residential waste, the pattern is similar. Paper is the largest constituent at more than 30 percent, and plastics, food waste and yard waste form the next three. Plastic in St. Thomas residential waste is much higher than in St. Croix and in U.S. EPA data, and food waste is slightly lower. Yard waste is higher in the U.S. EPA composition than for St. Thomas residential waste and about the same as St. Croix.

The specific results of the characterization can be seen in Table 18, where the data for each material in each category are shown.

Table 18 – St. Thomas, Residential Waste Composition

Category	Material	% of Total	90% Conf +/- %	Estimated Annual Tons	90% Conf +/- Tons	Material Category
PAPER						31.6%
1	Newsprint	2.0%	0.9%	260	116	
2	Office Paper	2.2%	1.4%	283	181	
3	Magazines	1.4%	0.9%	173	115	
4	Corrugated Cardboard (OCC) & Kraft Paper	13.3%	4.0%	1,692	503	
5	Paper Board	1.9%	0.4%	237	49	
6	Other Paper - Dirty	10.8%	3.5%	1,369	443	
PLASTIC						21.8%
7	PET (#1) Containers	2.2%	0.4%	274	54	
8	HDPE (#2) Containers - Natural	1.0%	0.2%	133	29	
9	HDPE (#2) Containers - Colored	1.2%	0.2%	149	31	
10	Dirty Plastic	8.1%	2.8%	1,026	361	
11	Foam - Polystyrene (#6)	1.0%	0.2%	131	26	
12	Other Rigid Plastic	4.6%	2.1%	580	265	
13	LDPE - Film Plastic (bags, sheet, etc.)	3.8%	1.1%	479	140	
GLASS						6.8%
14	Glass - Clear	2.7%	0.6%	336	71	
15	Glass - Green	2.3%	0.5%	296	64	
16	Glass - Brown	1.8%	0.5%	230	61	
METALS						5.1%
17	Ferrous Metals	3.1%	0.8%	389	99	
18	Non-Ferrous Metals (Incl. Al Cans)	2.0%	1.6%	253	203	
ORGANICS						26.3%
19	Yard Waste	8.2%	3.9%	1,043	491	
20	Wood Waste	6.9%	4.6%	877	588	
21	Food Waste	11.1%	3.4%	1,412	434	
22	Miscellaneous Organics	0.0%	0.0%	0	0	
SPECIAL WASTES						8.4%
23	Rubber – Except tires	0.0%	0.0%	0	0	
24	Textiles	3.0%	1.1%	375	139	
25	Household Hazardous Waste (HHW)	0.0%	0.0%	0	0	
26	Tires	0.0%	0.0%	0	0	
27	Appliances and Electronics incl. Dry Cell Batteries	1.2%	0.5%	149	60	
28	Used Oil	0.0%	0.0%	0	0	
29	C&D	0.0%	0.0%	0	0	
30	Miscellaneous Inorganic	1.5%	1.3%	186	171	
31	Fines	2.8%	1.5%	356	193	
TOTAL	Estimated Annual Waste Quantity (tons)			12,686	4,889	100.0%

6.2.2. Commercial Waste

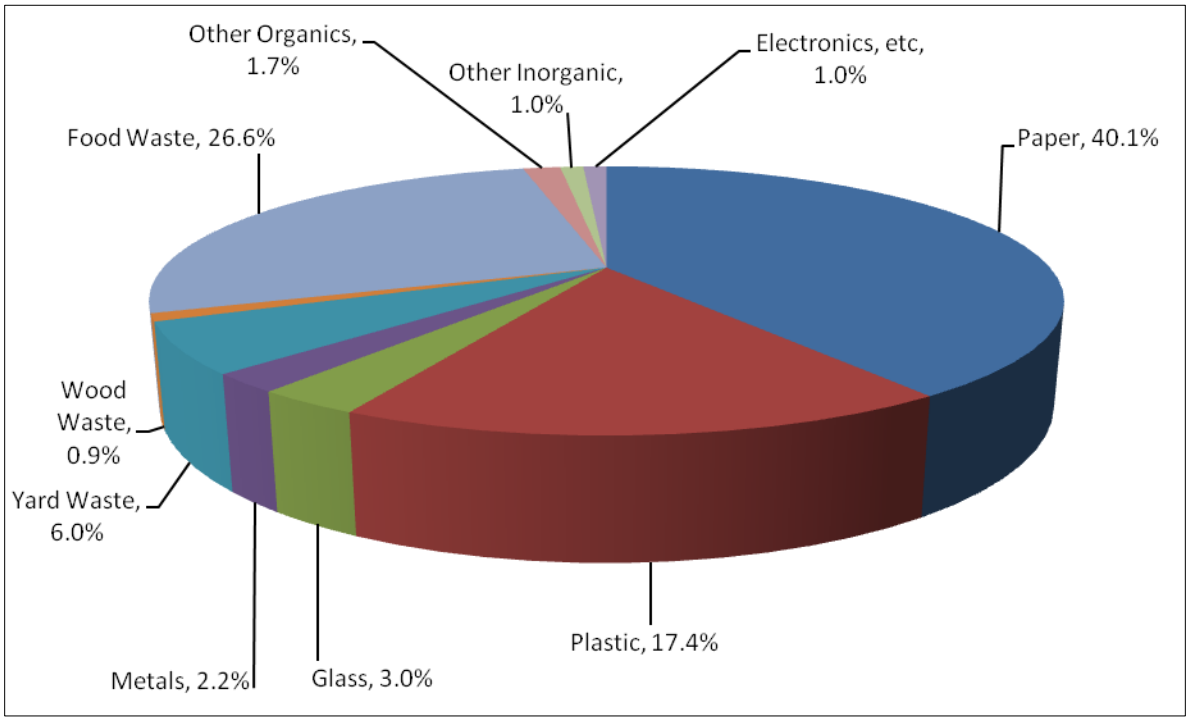
The results from the samples collected from commercial waste generators can be seen graphically in Figure 17. The commercial waste results show that the major components of the commercial waste are:

- Paper – 40.1%
- Food Waste – 26.6%

- Plastic – 17.4%
- Yard Waste – 6.0%
- Glass –3.0 %

When compared to the St. Croix commercial composition, St. Thomas commercial waste shows some differences. These include a significantly higher percentage of food waste and plastic: 27 vs. 20 percent and 17 vs. 13 percent, respectively. Paper and yard waste were approximately the same as for St. Croix commercial waste; however, glass decreased.

Figure 17 – St. Thomas, Commercial Waste



The specific results of the characterization can be seen in Table 19, where the data for each material in each category are shown.

Table 19 – St. Thomas, Commercial Waste Composition

Category	Material	% of Total	90% Conf +/- %	Estimated Annual Tons	90% Conf +/- Tons	Material Category
PAPER						40.1%
1	Newsprint	1.0%	0.8%	279	236	
2	Office Paper	1.4%	1.0%	405	280	
3	Magazines	1.3%	1.3%	359	356	
4	Corrugated Cardboard (OCC) & Kraft Paper	19.0%	9.7%	5,333	2,716	
5	Paper Board	3.2%	3.1%	900	871	
6	Other Paper - Dirty	14.2%	5.3%	3,998	1,499	
PLASTIC						17.4%
7	PET (#1) Containers	2.3%	1.9%	634	525	
8	HDPE (#2) Containers - Natural	0.8%	0.7%	221	208	
9	HDPE (#2) Containers - Colored	0.8%	0.5%	219	139	
10	Dirty Plastic	8.8%	3.1%	2,460	858	
11	Foam - Polystyrene (#6)	0.5%	0.4%	148	120	
12	Other Rigid Plastic	0.5%	0.4%	131	124	
13	LDPE - Film Plastic (bags, sheet, etc.)	3.8%	1.4%	1,066	388	
GLASS						3.0%
14	Glass - Clear	1.4%	0.9%	382	244	
15	Glass - Green	0.5%	0.5%	153	133	
16	Glass - Brown	1.1%	0.7%	319	187	
METALS						2.2%
17	Ferrous Metals	1.8%	1.7%	493	478	
18	Non-Ferrous Metals (Incl. Al Cans)	0.4%	0.2%	123	66	
ORGANICS						33.6%
19	Yard Waste	6.0%	6.1%	1,681	1,707	
20	Wood Waste	0.9%	0.9%	264	254	
21	Food Waste	26.6%	39.1%	7,487	10,990	
22	Miscellaneous Organics	0.0%	0.0%	0	0	
SPECIAL WASTES						3.8%
23	Rubber – Except tires	0.0%	0.0%	0	0	
24	Textiles	1.7%	1.6%	470	454	
25	Household Hazardous Waste (HHW)	0.0%	0.0%	0	0	
26	Tires	0.0%	0.0%	0	0	
27	Appliances and Electronics incl. Dry Cell Batteries	1.0%	0.9%	294	248	
28	Used Oil	0.0%	0.0%	0	0	
29	C&D	0.0%	0.0%	0	0	
30	Miscellaneous Inorganic	0.1%	0.2%	30	50	
31	Fines	0.9%	1.0%	261	283	
TOTAL	Estimated Annual Waste Quantity (tons)			28,110	23,416	100.0%

6.2.3. Combined Residential and Commercial Waste

Figure 18 shows a summary of the combined residential and commercial waste composition that was derived from the data collected during the waste sort conducted the week of March 2, 2009. As noted in Table 6, a total of 23 samples of MSW were sorted to obtain this data. The percentages of categories shown in Figure 18 are sums of the individual sort categories. For example, paper includes newspaper, cardboard, magazines, etc. The majority of the waste disposed at the Bovoni Landfill is comprised of:

- Paper – 32.8%
- Plastic – 20.6%
- Food Waste – 15.3%
- Yard Waste – 7.3%
- Glass – 6.8%

It should be noted that paper includes the dirty paper category which was heavily contaminated with food waste and other wet substances. Similarly, plastic includes the dirty plastic category which was also contaminated with food waste and other wet materials.

Figure 18 – St. Thomas, Residential and Commercial Waste Composition Summary

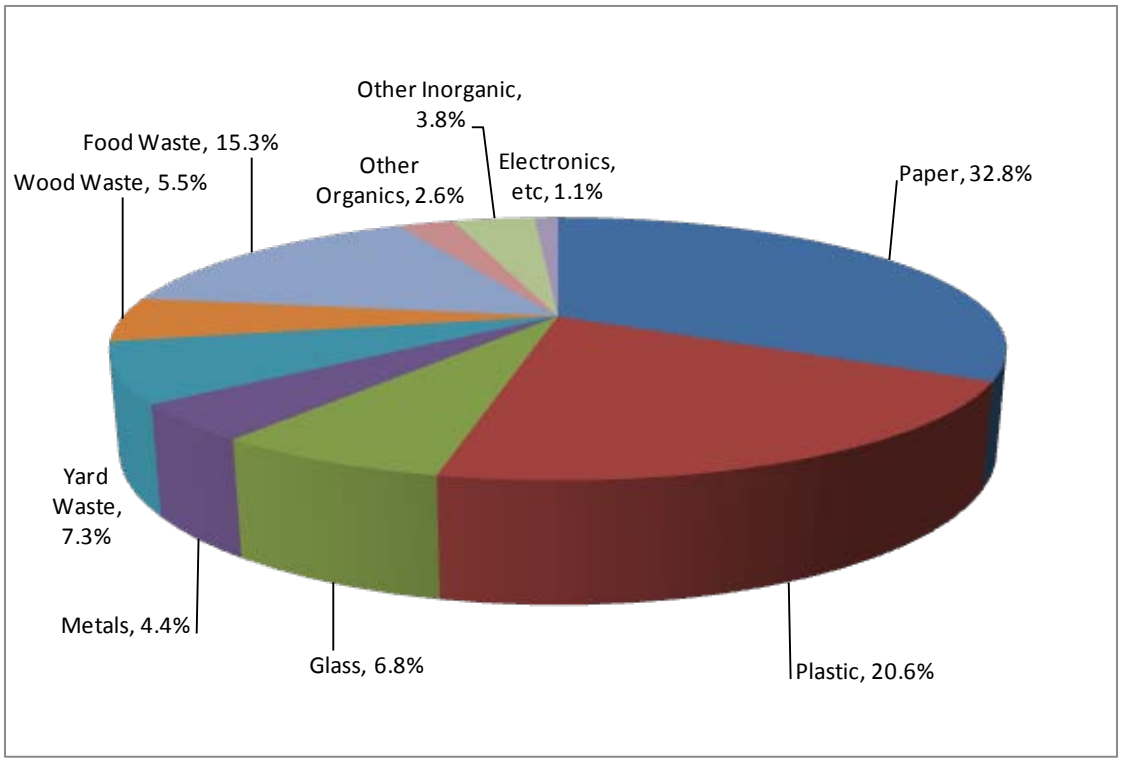


Table 20 presents the detailed waste characterization for the waste sort conducted at the Bovoni Landfill. It provides the summary of the combined residential and commercial waste. The table shows the arithmetic mean and the 90 percent confidence interval for each material category. In addition, the estimated distribution of the total waste received at the Bovoni Landfill during the 12-month 2008/2009 period is shown.

Table 20 – St. Thomas, Combined Residential and Commercial Waste Composition

			90% Conf	Estimated	90% Conf	Material
Category	Material	% of Total	+/- %	Annual Tons	+/- Tons	Category
PAPER						32.8%
1	Newsprint	1.8%	0.7%	743	284	
2	Office Paper	2.0%	1.1%	814	430	
3	Magazines	1.4%	0.7%	577	287	
4	Corrugated Cardboard (OCC) & Kraft Paper	14.5%	3.5%	5,916	1,421	
5	Paper Board	2.1%	0.6%	862	229	
6	Other Paper - Dirty	10.9%	2.8%	4,452	1,132	
PLASTIC						20.6%
7	PET (#1) Containers	2.1%	0.4%	857	168	
8	HDPE (#2) Containers - Natural	1.0%	0.2%	405	97	
9	HDPE (#2) Containers - Colored	1.1%	0.2%	433	100	
10	Dirty Plastic	8.1%	2.1%	3,309	875	
11	Foam - Polystyrene (#6)	0.9%	0.3%	365	109	
12	Other Rigid Plastic	3.6%	1.6%	1,471	658	
13	LDPE - Film Plastic (bags, sheet, etc.)	3.9%	0.9%	1,575	355	
GLASS						6.8%
14	Glass - Clear	2.6%	0.7%	1,077	268	
15	Glass - Green	2.1%	0.6%	867	225	
16	Glass - Brown	2.1%	0.8%	840	322	
METALS						4.4%
17	Ferrous Metals	2.7%	0.7%	1,118	275	
18	Non-Ferrous Metals (Incl. Al Cans)	1.7%	1.2%	674	498	
ORGANICS						28.0%
19	Yard Waste	7.3%	3.0%	2,973	1,224	
20	Wood Waste	5.5%	3.5%	2,225	1,414	
21	Food Waste	15.3%	7.0%	6,227	2,847	
22	Miscellaneous Organics	0.0%	0.0%	0	0	
SPECIAL WASTES						7.4%
23	Rubber – Except tires	0.0%	0.0%	0	0	
24	Textiles	2.6%	0.9%	1,043	386	
25	Household Hazardous Waste (HHW)	0.0%	0.0%	0	0	
26	Tires	0.0%	0.0%	0	0	
27	Appliances and Electronics incl. Dry Cell Batteries	1.1%	0.7%	437	279	
28	Used Oil	0.0%	0.0%	0	0	
29	C&D	0.0%	0.0%	0	0	
30	Miscellaneous Inorganic	1.4%	1.2%	574	499	
31	Fines	2.4%	1.3%	963	521	
TOTAL	Estimated Annual Waste Quantity (tons)			40,797	14,901	100.0%

6.2.4. Bulk Waste

Figure 19 shows a summary of the St. Thomas Bulk Waste composition that was derived from the data collected during the waste sort conducted the week of March 2, 2009, at the Bovoni Landfill. A total of eight samples of bulk waste were visually inspected to obtain these data. The percentages of categories shown in Figure 19 are sums of the individual sort categories. For example, the metals category includes appliances and other metals, C&D includes inert and

construction materials, and the other bulk category includes everything within the category except Plastic. The majority of the bulk waste disposed at the Bovoni Landfill is comprised of:

- MSW (bagged waste) – 36.3%
- Untreated Wood Waste 21%
- Paper – 10.0%
- Yard Waste – 10.0%

Figure 19 – St. Thomas, Bulk Waste

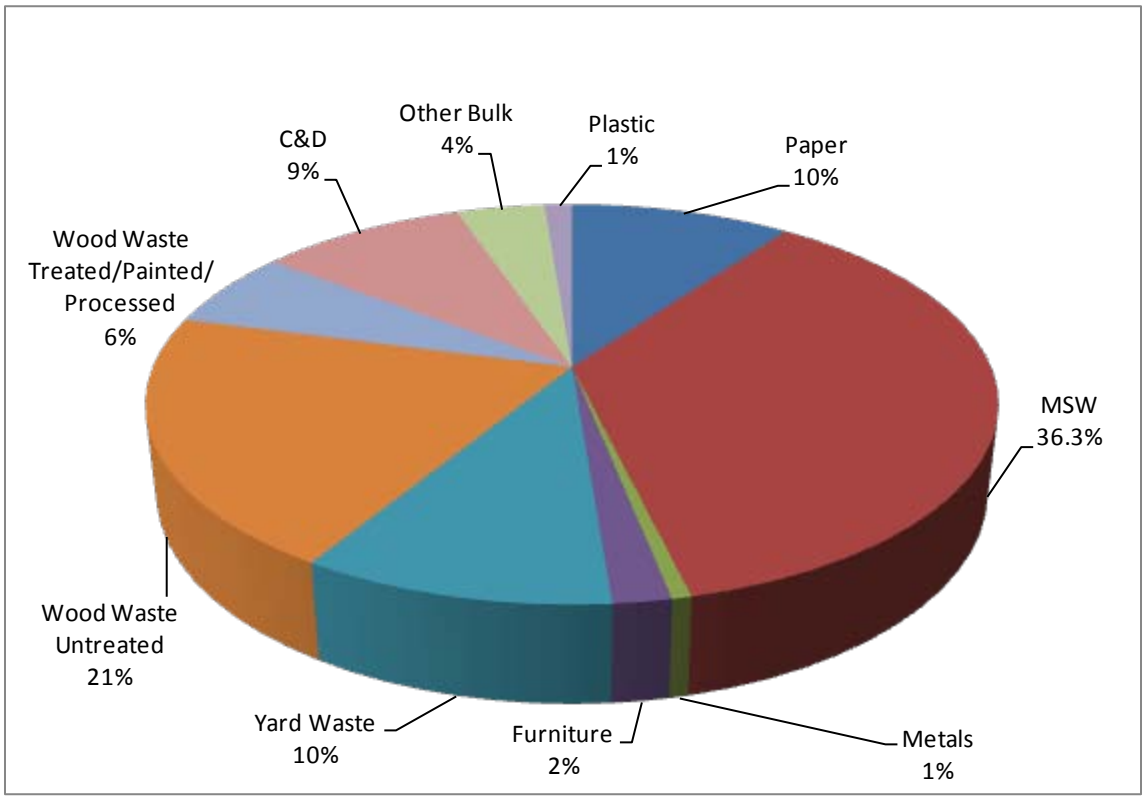


Table 21 – St. Thomas, Bulk Waste - presents the detailed waste characterization for the bulk waste visual inspection conducted at the Bovoni Landfill. It provides the summary of the bulk waste data. The table shows the arithmetic mean and the 90 percent confidence interval for each material category. In addition, the estimated distribution of the total bulk waste received at Bovoni Landfill during the 12-month 2008/2009 period is shown.

Table 21 – St. Thomas, Bulk Waste

		% OF	90% conf.	Annual	90% conf.	
Category	**Material**	**TOTAL**	**+/- %**	**Tons**	**+/- Tons**	
PAPER	Corrugated Cardboard	10.0%	6.0%	2,472	1,488	10.0%
BAG MSW	Residential Household Trash	36.3%	18.0%	8,960	4,460	36.3%
METAL						0.6%
	Appliances	0.0%	0.0%	0	0	
	Other Metals	0.6%	1.0%	154	254	
YARD WASTE	All Types, Any ITEM	10.0%	13.1%	2,472	3,237	10.0%
WOOD						26.6%
	Untreated Wood; Pallets, Lumber	20.4%	16.6%	5,036	4,098	
	Treated/Painted/Processed Wood	6.3%	10.3%	1,545	2,541	
INERT	Concrete/Block/Stone/Dirt/Sand/Glass	5.6%	5.3%	1,390	1,299	5.6%
CONSTRUCTION MATERIAL	Drywall/Roofing/Insulation/Carpet	3.8%	3.0%	927	744	3.8%
OTHER WASTE						7.1%
	Tires	0.0%	0.0%	0	0	
	Electronics	0.9%	1.1%	216	260	
	Furniture	1.9%	2.2%	463	535	
	Mixed Bulk/Other Unclassified	3.1%	4.1%	772	1,012	
	Plastic (All types, Any item)	1.3%	1.3%	309	333	
	Paint/Chemicals/Oil/HHW	0.0%	0.0%	0	0	
Total	All Waste Present in Load	100.00%		24,718	20,260	100.0%

6.2.5. St. Thomas Total Waste

The overall composition summary for St. Thomas is formed from the combined residential and commercial waste and the bulk waste, and is shown in Table 22. The Summary was derived from the data collected during the waste sort conducted the week of March 2, 2009, at the Bovoni Landfill. This was generated by combining the estimated waste quantities, in tons, from Table 20 and Table 21. The categories shown in bulk waste are slightly different from those in the MSW. As mentioned above, the largest single constituent in bulk waste is bagged MSW, which is assumed to have the same composition as the combined residential and commercial waste. Over 75 percent of the overall waste disposed at the Bovoni Landfill is comprised of the following three categories:

- Organics – 32.6%
- Paper – 28.8%
- Plastic – 16%

Within organics, the largest single category, yard waste and clean wood made up 64 percent of that category and represented 21 percent of the total. It should be noted that paper, which was the second largest category, includes the dirty paper category which was heavily contaminated with food waste and other wet substances. Similarly, plastic includes the dirty plastic category which was also contaminated with food waste and other wet materials. Table 22 provides the summary waste composition and the estimated annual waste quantity.

Table 22 – St. Thomas, Overall Waste Composition

Category	Material	Estimated MSW Annual Tons	Estimated Bulk Annual Tons	Estimated Total Waste	Percent Composition
PAPER		***13,364***	***5,407***	***18,771***	***28.7%***
1	Newsprint	743	163	906	1.4%
2	Office Paper	814	179	993	1.5%
3	Magazines	577	127	704	1.1%
4	Corrugated Cardboard (OCC) & Kraft Paper	5,916	3,771	9,688	14.8%
5	Paper Board	862	189	1,051	1.6%
6	Other Paper - Dirty	4,452	978	5,430	8.3%
PLASTIC		***8,416***	***2,157***	***10,574***	***16.1%***
7	PET (#1) Containers	857	188	1,046	1.6%
8	HDPE (#2) Containers - Natural	405	89	494	0.8%
9	HDPE (#2) Containers - Colored	433	95	528	0.8%
10	Dirty Plastic	3,309	727	4,036	6.2%
11	Foam - Polystyrene (#6)	365	80	446	0.7%
12	Other Rigid Plastic	1,471	323	1,794	2.7%
13	LDPE - Film Plastic (bags, sheet, etc.)	1,575	346	1,921	2.9%
GLASS		***2,784***	***611***	***3,395***	***5.2%***
14	Glass - Clear	1,077	236	1,313	2.0%
15	Glass - Green	867	190	1,057	1.6%
16	Glass - Brown	840	185	1,025	1.6%
METALS		***1,791***	***548***	**2,339**	***3.6%***
17	Ferrous Metals	1,118	400	1,518	2.3%
18	Non-Ferrous Metals (Incl. Al Cans)	674	148	822	1.3%
ORGANICS		***11,424***	***10,017***	***21,441***	***32.7%***
19	Yard Waste	2,973	3,125	6,098	9.3%
20	Wood Waste	2,225	5,525	7,750	11.8%
21	Food Waste	6,227	1,368	7,594	11.6%
22	Miscellaneous Organics	0	0	0	0.0%
SPECIAL WASTES		***3,017***	***5,977***	***8,994***	***13.7%***
23	Rubber – Except tires	0	0	0	0.0%
24	Textiles	1,043	229	1,272	1.9%
25	Household Hazardous Waste (HHW)	0	0	0	0.0%
26	Tires	0	0	0	0.0%
27	Appliances & Electronics incl. Dry Cell Batterie	437	312	750	1.1%
28	Used Oil	0	0	0	0.0%
29	C&D	0	4,635	4,635	7.1%
30	Miscellaneous Inorganic	574	589	1,163	1.8%
31	Fines	963	211	1,174	1.8%
TOTAL	***Estimated Annual Waste Quantity (tons)***	***40,797***	***24,718***	***65,515***	***100.0%***

6.3 U.S. Virgin Islands Overall Waste Composition

The overall waste composition summary for the U.S. Virgin Islands in Table 23 is the combination of the overall wastes summaries from Anguilla Landfill on St. Croix and Bovoni Landfill on St. Thomas. The Summary was derived from the data collected during the waste sort conducted the weeks of February 23, 2009 and March 2, 2009, at the landfills. This was generated by combining the estimated waste quantities, in tons, from Table 17 and Table 22. The categories shown in bulk waste are slightly different from those in the MSW. As mentioned above, the largest single constituent in bulk waste is bagged MSW, which is assumed to have

the same composition as the combined residential and commercial waste. Over 75 percent of the overall waste disposed at the combined landfills is comprised of the following three categories:

- Organics – 32.5%
- Paper – 31.0%
- Plastic – 14.5%

Within paper, the second largest single category, cardboard made up 47 percent of that category and represented 14 percent of the total waste. It should be noted that paper includes the dirty paper category, which was heavily contaminated with food waste and other wet substances. Similarly, plastic includes the dirty plastic category, which was also contaminated with food waste and other wet materials.

Table 23 – U.S. Virgin Islands Overall Waste Composition

		Estimated MSW	Percent
Category	Material	Annual Tons	Composition
PAPER		***43,932***	***29.9%***
1	Newsprint	1,892	1.3%
2	Office Paper	2,362	1.6%
3	Magazines	3,848	2.6%
4	Corrugated Cardboard (OCC) & Kraft Paper	20,958	14.3%
5	Paper Board	3,270	2.2%
6	Other Paper - Dirty	11,603	7.9%
PLASTIC		***21,068***	***14.3%***
7	PET (#1) Containers	2,298	1.6%
8	HDPE (#2) Containers - Natural	1,084	0.7%
9	HDPE (#2) Containers - Colored	1,323	0.9%
10	Dirty Plastic	4,207	2.9%
11	Foam - Polystyrene (#6)	1,438	1.0%
12	Other Rigid Plastic	3,596	2.4%
13	LDPE - Film Plastic (bags, sheet, etc.)	5,200	3.5%
GLASS		***7,699***	***5.2%***
14	Glass - Clear	3,166	2.2%
15	Glass - Green	2,422	1.6%
16	Glass - Brown	2,111	1.4%
METALS		**5,879**	***4.0%***
17	Ferrous Metals	4,440	3.0%
18	Non-Ferrous Metals (Incl. Al Cans)	1,439	1.0%
ORGANICS		***48,327***	***32.9%***
19	Yard Waste	17,570	11.9%
20	Wood Waste	14,000	9.5%
21	Food Waste	16,757	11.4%
22	Miscellaneous Organics	0	0.0%
SPECIAL WASTES		***20,168***	***13.7%***
23	Rubber – Except tires	0	0.0%
24	Textiles	4,629	3.1%
25	Household Hazardous Waste (HHW)	0	0.0%
26	Tires	25	0.0%
27	Appliances & Electronics incl. Dry Cell Batteries	1,097	0.7%
28	Used Oil	0	0.0%
29	C&D	8,947	6.1%
30	Miscellaneous Inorganic	2,841	1.9%
31	Fines	2,630	1.8%
TOTAL	***Estimated Annual Waste Quantity (tons)***	***147,073***	***100.0%***

6.4 Energy Value of U.S. Virgin Islands Waste

Estimates of the energy value of the processable waste disposed at the Anguilla Landfill on St. Croix and the Bovoni Landfill on St. Thomas were made by assigning higher heating values (HHV) in British Thermal Units (Btus) per pound to each of the 31 material components used in the waste sorts. These HHVs were primarily drawn from the recognized literature resulting from tests of as-received waste. In a minority of cases, the HHV was estimated by GBB based upon its experience in the solid waste industry and observations of the waste of the U.S. Virgin Islands during the waste sorts. The source of each HHV is footnoted in the following tables.

The individual HHVs were multiplied by the quantity of material in each material for each landfill. These individual heating values for each material were summed by general material category, such as Paper, and for the waste stream as a whole. The aggregate HHV for each general material was calculated and is shown in the tables, as is the overall HHV for the estimated waste at each landfill. Finally, a similar table which estimates the heating values for the aggregate waste for the U.S. Virgin Islands was developed.

6.4.1. St. Croix, Anguilla Landfill

Table 24 shows the aggregated processable waste quantities by material category for the Anguilla Landfill. As mentioned above, the HHV for each category has been assigned and an estimate of the annual available energy, in millions of Btus, was made. These estimates of available energy are summed by general material category and for the total processable waste. The overall estimated HHV for the waste at the Anguilla Landfill was calculated at 5,062 Btus per pound. This is generally consistent with the heating values found in the as-received processable waste streams at waste-to-energy facilities in several communities in the U.S. It appears that the high moisture content in the waste is offset by the higher than expected level of plastics.

6.4.2. St. Thomas, Bovoni Landfill

Table 25 shows the aggregated processable waste quantities by material category for the Bovoni Landfill. As mentioned above, the HHV for each category has been assigned and an estimate of the annual available energy, in millions of Btus, was made. These estimates of available energy are summed by general material category and for the total processable waste. The overall estimated HHV for the waste at the Bovoni Landfill was calculated at 5,306 Btus per pound, which is higher than for waste received at the Anguilla Landfill. This overall HHV, although somewhat higher than that calculated for the St. Croix, Anguilla Landfill waste stream, is also generally consistent with the heating values found in the as-received processable waste streams at waste-to-energy facilities in several communities in the U.S. It appears that the high moisture content in the waste is offset by the higher than expected level of plastics.

Table 24 – St. Croix, Anguilla Estimated Processable Waste Higher Heating Value as Received

		Estimated MSW	Heating Value	Estimated	HHV
Category	Material	Annual Tons	Btus Per Lb.	Million Annual Btus	Reference
PAPER		***25,161***	***5,779***	***290,831***	***N.A.***
1	Newsprint	986	7,974	15,722	(1)
2	Office Paper	1,368	6,088	16,662	(1)
3	Magazines	3,144	5,254	33,039	(1)
4	Corrugated Cardboard (OCC) & Kraft Paper	11,270	7,043	158,754	(1)
5	Paper Board	2,219	5,282	23,445	(3)
6	Other Paper - Dirty	6,173	3,500	43,209	(3)
PLASTIC		***10,494***	***12,290***	***257,943***	***N.A.***
7	PET (#1) Containers	1,252	15,900	39,815	(1)
8	HDPE (#2) Containers - Natural	590	15,900	18,759	(1)
9	HDPE (#2) Containers - Colored	795	15,900	25,289	(1)
10	Dirty Plastic	171	7,950	2,722	(3)
11	Foam - Polystyrene (#6)	993	15,900	31,563	(1)
12	Other Rigid Plastic	1,801	15,900	57,285	(1)
13	LDPE - Film Plastic (bags, sheet, etc.)	3,279	12,583	82,510	(1)
GLASS		***4,304***	***0***	***0***	***N.A.***
14	Glass - Clear	1,853	0	0	N.A.
15	Glass - Green	1,365	0	0	N.A.
16	Glass - Brown	1,086	0	0	N.A.
METALS		***3,540***	***0***	***0***	***N.A.***
17	Ferrous Metals	2,278	0	0	N.A.
18	Non-Ferrous Metals (Incl. Aluminum Cans)	617	0	0	N.A.
ORGANICS		***26,886***	***3,781***	***203,297***	***N.A.***
19	Yard Waste	11,472	3,554	81,543	(3)
20	Wood Waste	6,251	7,108	88,859	(1)
21	Food Waste	9,163	1,795	32,895	(1)
22	Miscellaneous Organics	Minimal	1,795	0	(3)
SPECIAL WASTES		***11,174***	***3,295***	***73,641***	***N.A.***
23	Rubber – Except tires	Minimal	10,900	0	(1)
24	Textiles	3,356	7,403	49,692	(1)
25	Household Hazardous Waste (HHW)	Minimal	12,060	0	(3)
26	Tires	25	13,792	689	(1)
27	Appliances & Electronics incl. Dry Cell Batteries	347	3,975	2,758	(3)
28	Used Oil	Minimal	18,000	0	(2)
29	C&D	4,313	1,777	15,327	(3)
30	Miscellaneous Inorganic	1,677	0	0	N.A.
31	Fines	1,456	1,777	5,175	(3)
TOTAL	***Estimated Annual Processable Waste Quantity (tons***	***81,558***			***N.A.***
	Heating Value		***5,062***	***825,712***	***N.A.***

Source References:

(1) Refuse Derived Fuel Processing, Floyd Hasselriis, Ann Arbor Press, 1984.
(2) Thermal Conversion Factor Source Documentation, U.S. Energy Information Administration, 2009.
(3) Estimated by GBB from various waste industry sources.

Table 25 – St. Thomas, Bovoni Estimated Processable Waste Higher Heating Value as Received

Category	Material	Estimated MSW Annual Tons	Heating Value Btus Per Lb.	Estimated Million Annual Btus	HHV Reference
PAPER		***18,771***	***5,847***	***219,510***	N.A.
1	Newsprint	906	7,974	14,453	(1)
2	Office Paper	993	6,088	12,094	(1)
3	Magazines	704	5,254	7,392	(1)
4	Corrugated Cardboard (OCC) & Kraft Paper	9,688	7,043	136,462	(1)
5	Paper Board	1,051	5,282	11,100	(3)
6	Other Paper - Dirty	5,430	3,500	38,009	(3)
PLASTIC		***10,574***	***11,798***	***249,505***	N.A.
7	PET (#1) Containers	1,046	15,900	33,255	(1)
8	HDPE (#2) Containers - Natural	494	15,900	15,708	(1)
9	HDPE (#2) Containers - Colored	528	15,900	16,791	(1)
10	Dirty Plastic	4,036	7,950	64,168	(3)
11	Foam - Polystyrene (#6)	446	15,900	14,169	(1)
12	Other Rigid Plastic	1,794	15,900	57,060	(1)
13	LDPE - Film Plastic (bags, sheet, etc.)	1,921	12,583	48,354	(1)
GLASS		***3,395***	***0***	***0***	N.A.
14	Glass - Clear	1,313	0	0	N.A.
15	Glass - Green	1,057	0	0	N.A.
16	Glass - Brown	1,025	0	0	N.A.
METALS		***2,339***	***0***	***0***	N.A.
17	Ferrous Metals	1,363	0	0	N.A.
18	Non-Ferrous Metals (Incl. Aluminum Cans)	822	0	0	N.A.
ORGANICS		***21,441***	***4,216***	***180,776***	N.A.
19	Yard Waste	6,098	3,554	43,341	(3)
20	Wood Waste	7,750	7,108	110,171	(1)
21	Food Waste	7,594	1,795	27,263	(1)
22	Miscellaneous Organics	Minimal	1,795	0	(3)
SPECIAL WASTES		***8,994***	***2,526***	***45,442***	N.A.
23	Rubber – Except tires	Minimal	10,900	0	(1)
24	Textiles	1,272	7,403	18,839	(1)
25	Household Hazardous Waste (HHW)	Minimal	12,060	0	(3)
26	Tires	Minimal	13,792	0	(1)
27	Appliances & Electronics incl. Dry Cell Batteries	750	3,975	5,959	(3)
28	Used Oil	Minimal	18,000	0	(2)
29	C&D	4,635	1,777	16,472	(3)
30	Miscellaneous Inorganic	1,163	0	0	N.A.
31	Fines	1,174	1,777	4,173	(3)
TOTAL	***Estimated Annual Processable Waste Quantity (tons***	***65,515***			N.A.
	Heating Value		***5,306***	***695,233***	N.A.

Source References:

(1) Refuse Derived Fuel Processing, Floyd Hasselriis, Ann Arbor Press, 1984.
(2) Thermal Conversion Factor Source Documentation, U.S. Energy Information Administration, 2009.
(3) Estimated by GBB from various waste industry sources.

6.4.3. U.S. Virgin Islands Aggregated Processable Waste

Table 26 shows the aggregated processable waste quantities by material category for the aggregated processable waste from the Anguilla and Bovoni Landfills. As mentioned above, the HHV for each category has been assigned and an estimate of the annual available energy, in millions of Btus, was made. These estimates of available energy are summed by general material category and for the total processable waste. The overall HHV for the processable waste for the aggregated landfills was calculated at 5,171 Btus per pound. As noted for the estimated HHVs for the processable waste received at each landfill, this is generally consistent with the heating values found in the as-received processable waste streams at waste-to-energy facilities in several communities in the U.S. It appears that the high moisture content in the waste is offset by the higher than expected level of plastics.

Table 26 – U.S. Virgin Islands Estimated Processable Waste Higher Heating Value as Received

		Estimated MSW	Heating Value	Estimated
Category	Material	Annual Tons	Btus Per Lb.	Million Annual Btus
PAPER		***43,932***	***5,808***	***510,341***
1	Newsprint	1,892	7,974	30,175
2	Office Paper	2,362	6,088	28,756
3	Magazines	3,848	5,254	40,432
4	Corrugated Cardboard (OCC) & Kraft Paper	20,958	7,043	295,216
5	Paper Board	3,270	5,282	34,545
6	Other Paper - Dirty	11,603	3,500	81,218
PLASTIC		***21,068***	***12,043***	***507,448***
7	PET (#1) Containers	2,298	15,900	73,070
8	HDPE (#2) Containers - Natural	1,084	15,900	34,467
9	HDPE (#2) Containers - Colored	1,323	15,900	42,079
10	Dirty Plastic	4,207	7,950	66,891
11	Foam - Polystyrene (#6)	1,438	15,900	45,732
12	Other Rigid Plastic	3,596	15,900	114,345
13	LDPE - Film Plastic (bags, sheet, etc.)	5,200	12,583	130,864
GLASS		***7,699***	***0***	***0***
14	Glass - Clear	3,166	0	0
15	Glass - Green	2,422	0	0
16	Glass - Brown	2,111	0	0
METALS		***5,879***	***0***	***0***
17	Ferrous Metals	3,641	0	0
18	Non-Ferrous Metals (Incl. Aluminum Cans)	1,439	0	0
ORGANICS		***48,327***	***3,974***	***384,072***
19	Yard Waste	17,570	3,554	124,884
20	Wood Waste	14,000	7,108	199,030
21	Food Waste	16,757	1,795	60,158
22	Miscellaneous Organics	Minimal	1,795	0
SPECIAL WASTES		***20,168***	***2,952***	***119,083***
23	Rubber – Except tires	Minimal	10,900	0
24	Textiles	4,629	7,403	68,531
25	Household Hazardous Waste (HHW)	Minimal	12,060	0
26	Tires	25	13,792	689
27	Appliances & Electronics incl. Dry Cell Batteries	1,097	3,975	8,717
28	Used Oil	Minimal	18,000	0
29	C&D	8,947	1,777	31,799
30	Miscellaneous Inorganic	2,841	0	0
31	Fines	2,630	1,777	9,347
TOTAL	***Estimated Annual Processable Waste Quantity (tons)***	***147,073***		
	Heating Value		***5,171***	***1,520,945***

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EXHIBITS

Exhibit A – MSW Characterization Form

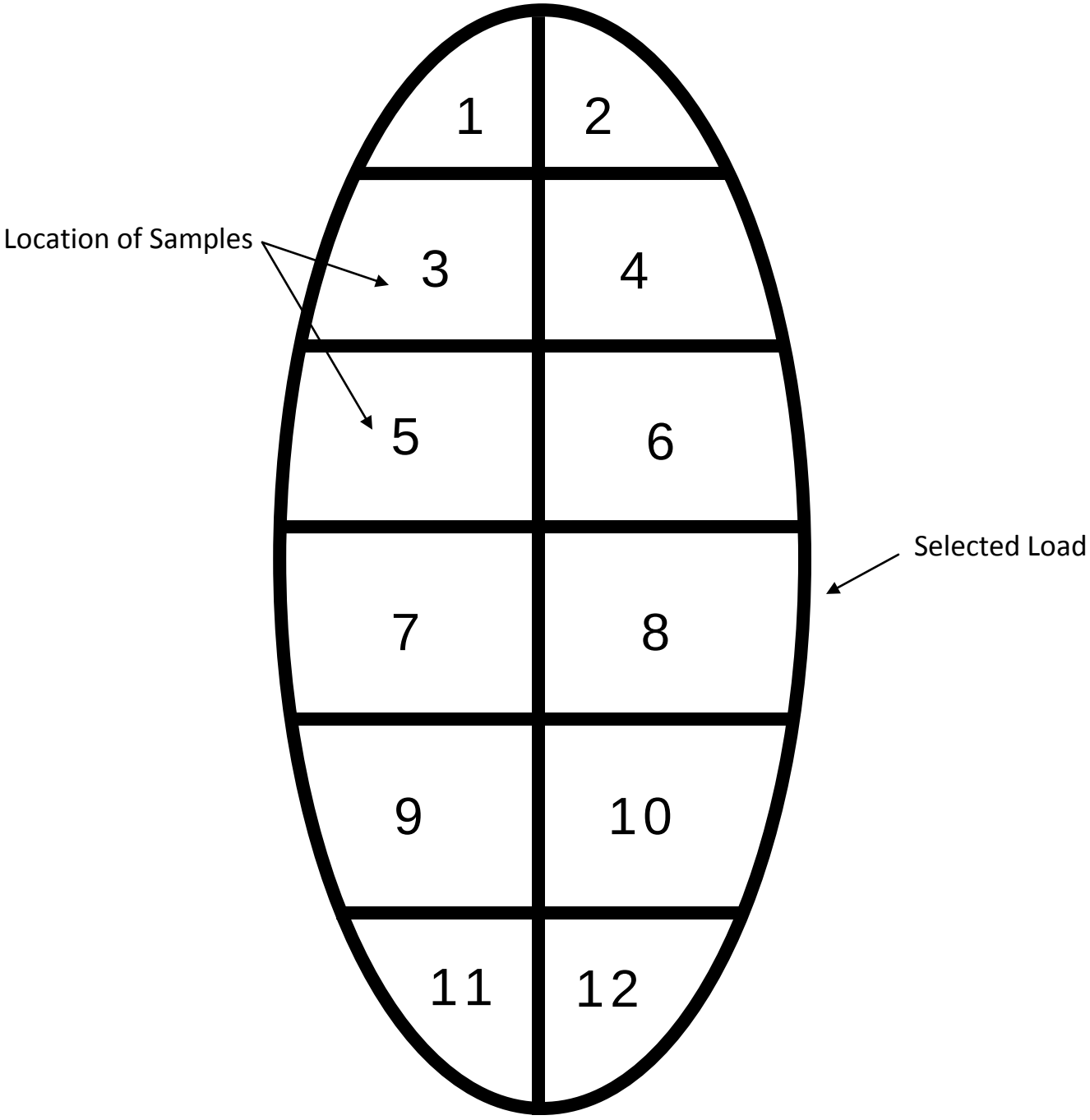
Date:	**ASSIGNED UNIQUE SORT VEHICLE ID #**
Day of Week (circle): M T W Th F	
Landfill (circle): Anguilla / Bovoni	**Surveyor:**
Sample Location (circle): 1 2 3 4 5 6 7 8 9 10 11 12	Sheet of

Category	Material	Gross Weight	Container Tare Weight	Net Weight
PAPER	Newsprint			
	Office Paper			
	Magazines			
	Corrugated Cardboard (OCC)			
	Paper Board			
	Kraft Paper			
	Other Paper			
	ALL PAPER TOTAL			***0***
PLASTIC	PET Containers (#1)			
	HDPE Containers - Natural (#2)			
	HDPE Containers - Colored (#2)			
	Poly Vinyl Chloride (#3)			
	Polystyrene (#6)			
	Other Rigid Plastic (#4, #6, #7 or no number)			
	LDPE - Film Plastic (bags, sheet, etc.)			
	ALL PLASTIC TOTAL			***0***
GLASS	Glass-Clear			
	Glass-Green			
	Glass- Brown			
	Non-container Glass			
	ALL GLASS TOTAL			***0***
METAL	Ferrous Cans			
	Other Ferrous Metal			
	Aluminum Cans			
	Other Aluminum			
	Other Non-Ferrous Metal			
	ALL METAL TOTAL			***0***
ORGANIC	Yard Waste			
	Wood Waste			
	Food Waste			
	Miscellaneous Organics			
	ALL ORGANIC TOTAL			***0***
SPECIAL WASTES	Rubber – Except tires			
	Textiles			
	Batteries – Auto and dry cell			
	Diapers			
	Household Hazardous Waste (HHW)			
	Tires			
	Appliances/Electronics			
	Used Oil			
	Used Paint			
	Miscellaneous Inorganic			
	Fines			
	ALL SPECIAL WASTE TOTAL			***0***

Exhibit B – Bulk Load Visual Survey Form

Bulk Load Visual Survey Form			
Date: **Day of Week (circle): M T W Th F** **Landfill (circle):** Anguilla / Bovoni **Surveyor:**		**ASSIGNED UNIQUE SORT VEHICLE ID #** Sheet _____ of	
Category	**Material**	**Present in Load?**	**Estimated %**
PAPER	Corrugated Cardboard		
BAG MSW	Residential Household Trash		
METAL	Appliances		
	Other Metals		
YARD WASTE	All Types, Any Item		
WOOD	Untreated Wood; Pallets, Lumber		
	Treated/Painted/Processed Wood		
INERT	Concrete/Block/ Stone/Dirt/Sand/Glass		
CONSTRUCTION MATERIAL	Drywall/Roofing/Insulation/Carpet		
OTHER WASTE	Tires		
	Electronics		
	Furniture, etc		
	Mixed Bulk/Other Unclassified		
	Plastic (All types, Any item)		
	Paint/Chemicals/Oil/HHW		
Total	**All Waste Present In Load**	**(Should = 100%)**	

Exhibit C – Sample Selection Grid



APPENDICES

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APPENDIX 1
ST. CROIX - ANGUILLA LANDFILL ANNUAL WASTE QUANTITY ESTIMATE (tons)

	1			2			3			4			5			6			7			8			9			10			11		
	September 2008			**October 2008**			**November 2008**			**December 2008**			**January 2009**			**February 2009**			**March 2009**			**April 2009**			**May 2009**			**June 2009**			**July 2009**		
Days Reporting Each Month	**30**			**15**			**19**			**8**			**7**			**12**			**31**			**27**			**31**			**30**			**31**		
	Totals	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**	**Totals**	**Ave. Daily**	**Percent**
	(tons)	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**		**(tons)**	**(tons)**	
Total VIWMA In House & Contracted Rear Packers (1)	1,375	45.8	25%	1,732	115.5	36%	2,081	109.5	43%	328	41.0	14%	480	68.6	27%	825	68.7	35%	2,868	92.5	47%	2,635	97.6	47%	2,023	65.3	24%	3,151	105.0	33%	2,602	83.9	27%
Total VIWMA 20yd Contracted Bins (1),(2)	2,991	99.7	54%	1,393	92.9	29%	1,527	80.4	31%	354	44.2	15%	399	57.0	23%	-	0.0	0%	-	0.0	0%	-	0.0	0%	2,897	93.4	34%	2,599	86.6	27%	2,798	90.3	30%
Total Green Waste	117	3.9	2%	212	14.1	4%	108	5.7	2%	118	14.7	5%	132	18.8	8%	292	24.3	12%	890	28.7	15%	1,083	40.1	19%	1,726	55.7	20%	1,742	58.1	18%	1,609	51.9	17%
Total Scrap Metal (2)	78	2.6	1%	76	5.1	2%	89	4.7	2%	94	11.8	4%	106	15.2	6%	157	13.1	7%	-	0.0	0%	-	0.0	0%	334	10.8	4%	387	12.9	4%	410	13.2	4%
Total C&D	219	7.3	4%	305	20.3	6%	236	12.4	5%	209	26.2	9%	206	29.4	12%	686	57.1	29%	978	31.5	16%	444	16.5	8%	214	6.9	2%	188	6.3	2%	460	14.8	5%
Total Special Waste	-	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%	-	0.0	0%	-	0.0	0%
Total Commercial Waste (1)	750	25.0	14%	1,067	71.1	22%	845	44.5	17%	1,228	153.5	53%	433	61.9	25%	430	35.8	18%	1,311	42.3	22%	1,423	52.7	25%	1,400	45.2	16%	1,568	52.3	16%	1,603	51.7	17%
TOTAL ALL CATEGORIES	5,530	184.3	100%	4,785	319.0	100%	4,886	257.2	100%	2,331	291.4	100%	1,756	250.9	100%	2,389	199.1	100%	6,047	195.1	100%	5,585	206.9	100%	8,594	277.2	100%	9,635	321.2	100%	9,482	305.9	100%
TOTAL PROCESSABLE (1)	5,116	170.5	93%	4,192	279.5	88%	4,453	234.4	91%	1,910	238.7	82%	1,313	187.5	75%	1,255	104.6	53%	4,175	134.8	69%	4,057	150.3	73%	6,320	203.9	74%	7,318	243.5	76%	7,003	225.9	74%

(1) Processable waste includes In-House & Contracted Rear Packers, Contracted Bins, including bulk bins and Commercial Waste.

(2) Total tons for VIWMA 20 yd Contracted bins for Jun 2008, Feb 09, Mar 09 and Apr 09 was not provided. The total tons for Scrap Metal for the months of Mar 09, Apr 09 was not provided either. The estimated annual tons for these materials were calculated on the available months of data, and modifications to calculations were made accordingly.

	Twelve-Month Data				**Ave. Daily Data Statistics**		**Current Estimated Annual**		
						90%	Based on 365 days per year.		
	Totals (1)	**Months**	**Ave. Daily**	**Percent**	**Standard**	**Confidence**	**Minimum**	**Expected**	**Maximum**
	(tons)	**of Data**	**(tons)**		**Deviation**	**+/-**	**(tons)**	**(tons)**	**(tons)**
Total VIWMA In House & Contracted Rear Packers (1)	23,338	12	83.2	32%	25.0	11.9	26,023	30,355	34,688
Total VIWMA 20yd Contracted Bins (1),(2)	17,887	9	82.1	30%	40.5	22.2	21,868	29,971	38,073
Total Green Waste	9,848	12	31.2	12%	20.8	9.9	7,797	11,399	15,000
Total Scrap Metal (2)	2,261	10	10.6	4%	6.0	3.1	2,735	3,881	5,026
Total C&D	4,761	12	20.7	9%	14.3	6.8	5,085	7,564	10,043
Total Special Waste	0	0	0.0	0%	0.0	0.0	0	0	0
Total Commercial Waste (1)	13,984	12	58.2	22%	32.5	15.4	15,605	21,233	26,861
TOTAL ALL CATEGORIES	72,078	N.A	286.0		N.A	69.3	79,112	104,402	129,691
TOTAL PROCESSABLE (1)	55,209	N.A	223.4	70%	N.A	49.5	63,496	81,558	99,621
	-								
	0								
	-								
	0								

Data for Figures 6 and 7			
Waste Composition			
	Total Waste	**Process. Waste**	**Processable as a % of Total**
Residential	29.1%	37.2%	78.1%
Commercial	20.3%	26.0%	
Bulk	50.6%	36.7%	
Total	100.0%	100.0%	

Note: Bulk includes Bulk Waste, Scrap Metal, C&D, and Special Waste.

Table 1 – Estimated Annual Anguilla Landfill Quantity

	Estimated Annual		
Waste Source Category	**Minimum**	**Expected**	**Maximum**
	(tons)	**(tons)**	**(tons)**
Total VIWMA In House & Contracted Rear Packers (1)	26,023	30,355	34,688
Total VIWMA 20yd Contracted Bins (1),(2)	21,868	29,971	38,073
Total Green Waste	7,797	11,399	15,000
Total Scrap Metal (2)	2,735	3,881	5,026
Total C&D	5,085	7,564	10,043
Total Special Waste	0	0	0
Total Commercial Waste (1)	15,605	21,233	26,861
TOTAL ALL CATEGORIES	79,112	104,402	129,691
TOTAL PROCESSABLE (1)	63,496	81,558	99,621

Notes:

(1) Processable waste includes In-House & Contracted Rear Packers, Contracted Bins, including bulk bins and Commercial Waste.

(2) Total tons for VIVIWMA 20 yd Contracted bins for Jun 2008, Feb 09, Mar 09 and Apr 09 was not provided. The total tons for Scrap Metal for the months of Mar 09, Apr 09 was not provided either. The estimated annual tons for these materials were calculated on the available months of data, and modifications to calculations were made accordingly.

Figure 6 – St. Croix, Anguilla Total Waste Composition

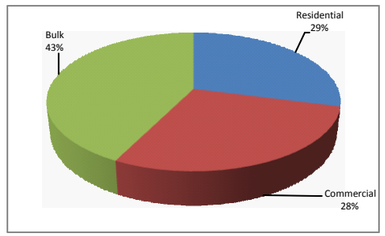
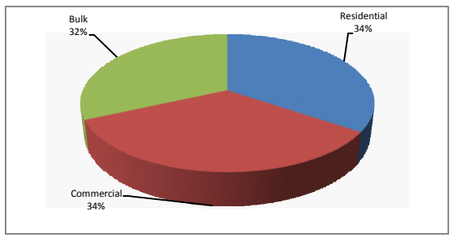


Figure 7 – St. Croix, Anguilla Processable Waste Composition



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APPENDIX 2
ST. THOMAS - BOVONI LANDFILL ANNUAL WASTE QUANTITY ESTIMATE (tons)

	1			2			3			4			5			6			7			8			9			10			11			12		
Days Reporting Each Month	February 2008 10			August 2008 14			September 2008 16			October 2008 29			January 2009 31			February 2009 26			March 2009 16			April 2009 30			May 2009 31			June 2009 28			July2009 31			August 2009 26		
	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent	Totals (tons)	Ave. Daily (tons)	Percent
Total VIWMA In House & Contracted Rear Packers (1)	299	29.9	11%	545	38.9	15%	900	56.3	16%	1,011	34.9	16%	929	30.0	16%	752	28.9	17%	459	28.7	19%	875	29.17	17%	1,031	33.24	21%	969	34.61	20%	1,015	32.74	20%	1,034	39.77	17%
Total VIWMA 20yd Contracted Bins (1)	449	44.9	16%	635	45.4	18%	1,007	62.9	18%	1,292	44.6	20%	1,182	38.1	21%	1,041	40.0	23%	624	39.0	25%	1,234	41.12	24%	1,255	40.50	25%	1,158	41.36	24%	1,264	40.76	25%	1,300	50.02	21%
Total St. John Waste Compactor and Bins (1)	318	31.8	11%	389	27.8	11%	675	42.2	12%	737	25.4	11%	333	10.7	6%	585	22.5	13%	248	15.5	10%	471	15.71	9%	442	14.27	9%	583	20.84	12%	707	22.80	14%	896	34.46	14%
Total Green Waste	133	13.3	5%	138	9.9	4%	163	10.2	3%	251	8.7	4%	241	7.8	4%	124	4.8	3%	43	2.7	2%	143	4.77	3%	117	3.78	2%	185	6.61	4%	174	5.62	3%	148	5.69	2%
Total Scrap Metal	159	15.9	6%	159	11.4	4%	181	11.3	3%	214	7.4	3%	203	6.5	4%	113	4.4	3%	34	2.1	1%	53	1.76	1%	49	1.57	1%	52	1.85	1%	70	2.24	1%	82	3.17	1%
Total C&D	166	16.6	6%	143	10.2	4%	231	14.4	4%	321	11.1	5%	211	6.8	4%	212	8.1	5%	79	4.9	3%	312	10.40	6%	178	5.73	4%	98	3.51	2%	102	3.28	2%	178	6.84	3%
Total Special Waste	28	2.8	1%	34	2.4	1%	40	2.5	1%	82	2.8	1%	44	1.4	1%	31	1.2	1%	15	0.9	1%	108	3.59	2%	113	3.64	2%	97	3.45	2%	-	-	0%	32	1.24	1%
Total Commercial Waste (1)	1,025	102.5	37%	1,399	99.9	39%	2,131	133.2	39%	2,372	81.8	36%	2,165	69.8	38%	1,591	61.2	35%	917	57.3	37%	1,826	60.87	36%	1,711	55.20	35%	1,545	55.17	32%	1,608	51.88	32%	2,477	95.27	40%
Total Mixed Waste	194	19.4	7%	125	8.9	4%	174	10.9	3%	237	8.2	4%	330	10.7	6%	82	3.2	2%	53	3.3	2%	63	0.0	0%	60	1.94	1%	85	3.04	2%	79	2.56	2%	108	4.14	2%
TOTAL ALL CATEGORIES	2,770	277.1	100%	3,567	254.8	100%	5,502	343.9	100%	6,517	224.7	100%	5,637	181.8	100%	4,532	174.3	100%	2,471	154.4	100%	5,085	169.50	100%	4,956	159.87	100%	4,773	170.45	100%	5,019	161.90	100%	6,255	240.59	100%
TOTAL PROCESSABLE (1)	2,091	209	75%	2,968	212	83%	1,907	295	86%	5,412	187	83%	4,609	149	82%	3,969	153	88%	2,248	141	91%	4,406	146.88	87%	4,440	143.21	90%	4,256	151.99	89%	4,594	148.19	92%	5,707	219.51	91%

	Totals (2) (tons)	Months of Data	Ave. Daily (tons)	Percent
Total VIWMA In House & Contracted Rear Packers (1)	9,819	12	34.8	17%
Total VIWMA 20yd Contracted Bins (1)	12,441	12	44.1	22%
Total St. John Waste Compactor and Bins (1)	6,385	12	23.7	11%
Total Green Waste	1,860	12	7.0	3%
Total Scrap Metal	1,368	12	5.8	3%
Total C&D	2,230	12	8.5	4%
Total Special Waste	623	12	2.2	1%
Total Commercial Waste (1)	20,768	12	77.0	36%
Total Mixed Waste	1,591	12	6.4	3%
TOTAL ALL CATEGORIES	57,084	N.A.	209.4	100%
TOTAL PROCESSABLE (1)	46,607	N.A.	179.5	86%

	Ave. Daily Data Statistics	
		90%
	Standard Deviation	Confidence +/-
Total VIWMA In House & Contracted Rear Packers (1)	7.7	3.7
Total VIWMA 20yd Contracted Bins (1)	6.8	3.2
Total St. John Waste Compactor and Bins (1)	9.3	4.4
Total Green Waste	3.1	1.5
Total Scrap Metal	4.8	2.3
Total C&D	4.2	2.0
Total Special Waste	1.2	0.6
Total Commercial Waste (1)	25.6	12.2
Total Mixed Waste	5.5	2.6
TOTAL ALL CATEGORIES	N.A.	25.4
TOTAL PROCESSABLE (1)	N.A.	8.4

	Current Estimated Annual Waste		
	Minimum (tons)	Expected (tons)	Maximum (tons)
Total VIWMA In House & Contracted Rear Packers (1)	11,345	12,686	14,028
Total VIWMA 20yd Contracted Bins (1)	14,899	16,080	17,261
Total St. John Waste Compactor and Bins (1)	7,035	8,638	10,242
Total Green Waste	2,012	2,545	3,079
Total Scrap Metal	1,287	2,116	2,944
Total C&D	2,376	3,101	3,826
Total Special Waste	585	791	997
Total Commercial Waste (1)	23,670	28,110	32,550
Total Mixed Waste	1,372	2,318	3,265
TOTAL ALL CATEGORIES	64,581	76,386	88,192
TOTAL PROCESSABLE (1)	56,948	65,515	74,082

Data for Figures 9 and 10			
Waste Composition			
	Total Waste	Process. Waste	Processable as a % of Total
Residential	16.6%	19.4%	85.8%
Commercial	36.8%	42.9%	
Bulk	46.6%	37.7%	
Total	100%	100%	

Note: Bulk includes Bulk Waste from St. Thomas and St. John. Green Waste, Scrap Metal, C&D, and Special Waste.

Notes:

(1) Processable waste includes VIWMA & Contracted Rear Packers, Contracted Bins, St. John Compactor and Bins, Bulk Waste Bins and Commercial Waste.

(2) The number of reporting days in the months vary, and reported data are incomplete for certain months.

Figure 9 – St. Thomas, Bovoni Total Waste Composition

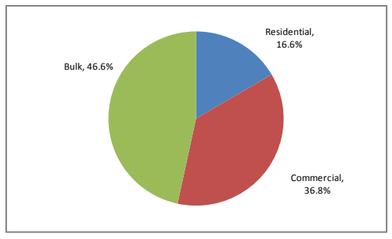

Figure 10 – St. Thomas, Bovoni Processable Waste Composition