

The Government of Aruba



## **Request For Information (RFI)**

### **RFI 2: Landfill Remediation and Sanitary Landfill**

**RFI 18-1107**

RFI Issue Date: February 8, 2018

RFI Closing Date: March 16, 2018

**Version 1.0**  
**February 8<sup>th</sup>, 2018.**



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## Acronyms

BLT	Build Lease Transfer
BOO	Build Own Operate
BOT	Build Operate Transfer
CW	Commercial Waste
EP	Engineering, Procurement (Construction by GoA)
EPC	Engineering, Procurement, Construction
GoA	Government of Aruba
HH	Household waste
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
PTS	Public Transfer Station
RDF	Refuse Derived Fuel
SWTF	Landfill Remediation and Sanitary Landfill
WTEF	Waste to Energy Facility



## 1 Disclaimer - Conditions

The Government of Aruba has prepared this Request for Information (RFI) document to obtain information on globally available technologies for the processing of solid waste and to identify entities capable of delivering and implementing such technologies. It is not the Government's objective to make any supplier selection on the basis of this RFI process. Moreover, this RFI document is expressly not intended as a public tender / Request for Proposal, or any part or phase thereof. Instead, this RFI process is intended by the Government of Aruba as an information gathering tool towards an envisaged tendering process / Request for Proposal for Landfill Remediation and Sanitary Landfill.

While the Government of Aruba has taken due care in the preparation and presentation of the information contained herein, neither the Government of Aruba, its representatives, officers, employees, advisors, subsidiary companies or any other stakeholder providing assistance to the Government of Aruba warrants or makes any representation, express or implied, as to the accuracy or completeness, for any purpose, of the information contained in this document and/or any information which may be provided in connection herewith by or on behalf of the Government, its representatives, officers, employees, advisors, subsidiary companies or any other stakeholder providing assistance to the Government of Aruba.

The information contained herein is not intended to be exhaustive. Interested local and/or international parties shall undertake their own research and enquiries, and should not rely solely on the information provided in this RFI document in participating in this RFI process and/or in preparing and submitting their responses. The Government of Aruba, its representatives, officers, employees, advisors, subsidiary companies or any other stakeholder providing assistance to the Government of Aruba are however not obliged to provide any additional information or access to information, other than the information



contained herein, to interested local and/or international parties during the undertaking of their own research and enquiries.

All information contained herein is provided on the condition that it is non-binding to the Government of Aruba, its representatives, officers, employees, advisors, subsidiary companies or any other stakeholder providing assistance to Government. Oral explanations or oral instructions from the Government, its representatives, officers, employees, advisors, subsidiary companies or any other stakeholder providing assistance to the Government shall not be considered binding.

The Government of Aruba reserves the right to, at its sole discretion, without incurring any liability and without the obligation to provide any reason:

- modify or withdraw this RFI document or any part of it at any time;
- modify or cancel the RFI process at any time;
- reject any and all responses to this RFI and to seek new responses;
- seek clarification or additional information from respondents, whether individually or collectively, as it deems necessary for the evaluation of the responses;
- evaluate the respondents' written and/or oral representations as to their veracity, substance and relevance to the subject of this RFI document, including seeking and evaluating independent information on any respondent;
- refrain from discussing the RFI process, any and all responses, the Landfill Remediation and Sanitary Landfill and or any tendering process aimed at the Landfill Remediation and Sanitary Landfill, with any other respondent;
- refrain from proceeding with a tendering process for a Landfill Remediation and Sanitary Landfill and/or from pursuing the Landfill Remediation and Sanitary Landfill itself.

Any and all costs or damage incurred by any respondent in relation to this RFI process and/or its response to the RFI, are the sole responsibility and are for the sole account of such respondent. The Government of Aruba, its representatives, officers, employees,



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advisors, subsidiary companies and any other stakeholder providing assistance to the Government shall not, directly or indirectly, have, assume or incur any responsibility or liability for these costs or for any damage or claim related to any and all aspects of the RFI process.

The respondents shall not offer any gratuities, favors, or anything of monetary value to any representative, officer, employee, advisor, subsidiary company of the Government of Aruba or any other stakeholder providing assistance to the Government for purposes of influencing evaluation of a response.

All documents, conversations, correspondence, multimedia, etc. between the Government of Aruba, its representatives, officers, advisors, subsidiary companies and any other stakeholder providing assistance to the Government and respondents are public information subject to local law and regulations, unless specifically identified otherwise.

The laws of Aruba shall be exclusively applicable to all acts under or related to this RFI. Any and all disputes arising out of or in connection with this RFI shall be submitted exclusively to the competent courts of Aruba and its appellate courts. By participating in this RFI process, all parties irrevocably accept the aforementioned disclaimer and conditions.



## 2 General

### 2.1 Information of population and expected growth

Aruba is an island and a constituent country of the Kingdom of the Netherlands in the southern Caribbean Sea, located about 1,600 kilometers (990 mi) west of the main part of the Lesser Antilles and 29 kilometers (18 mi) north of the coast of Venezuela. It measures 32 kilometers (20 mi) long from its northwestern to its southeastern end and 10 kilometers (6 mi) across at its widest point. Aruba has approx. 110.000 inhabitants and approximately 40.000 households. Aruba receives nearly 2 million stay-over visitors per year.

Aruba's basic characteristics and selected economic indicators are given in Table 2-1 and Table 2-2.

Table 2-1. Characteristics of Aruba

Official name	Aruba
Form of Government	Unitary parliamentary representative democracy under constitutional monarchy
Total area	Land: 179 km <sup>2</sup> (69.1 sq. mi); Water %: negligible
Climate	Hot semi-arid. Mean monthly temperature from 26.7 °C (80.1 °F) to 29.2 °C (84.6 °F), with constant trade winds from the Atlantic Ocean, coming from the north-east.
Total population	110300 (2016 estimate)
Population density	612 inh./km <sup>2</sup> (1,585 inh./sq. mi)
Population growth rate	0.5% (2010-2015 annual average)
Highest Peak	(188 m) (620 ft.) above Sea level (Jamanota)
Capital City	Oranjestad

Table 2-2 Economy of Aruba

Currency	Aruban florin (AWG). Pegged to the US dollar at 1.79 florins to 1 USD
Nominal GDP	2,668 (millions of U.S. dollars, 2016)
GDP per capita	24.1 (thousands of U.S. dollars, 2016)



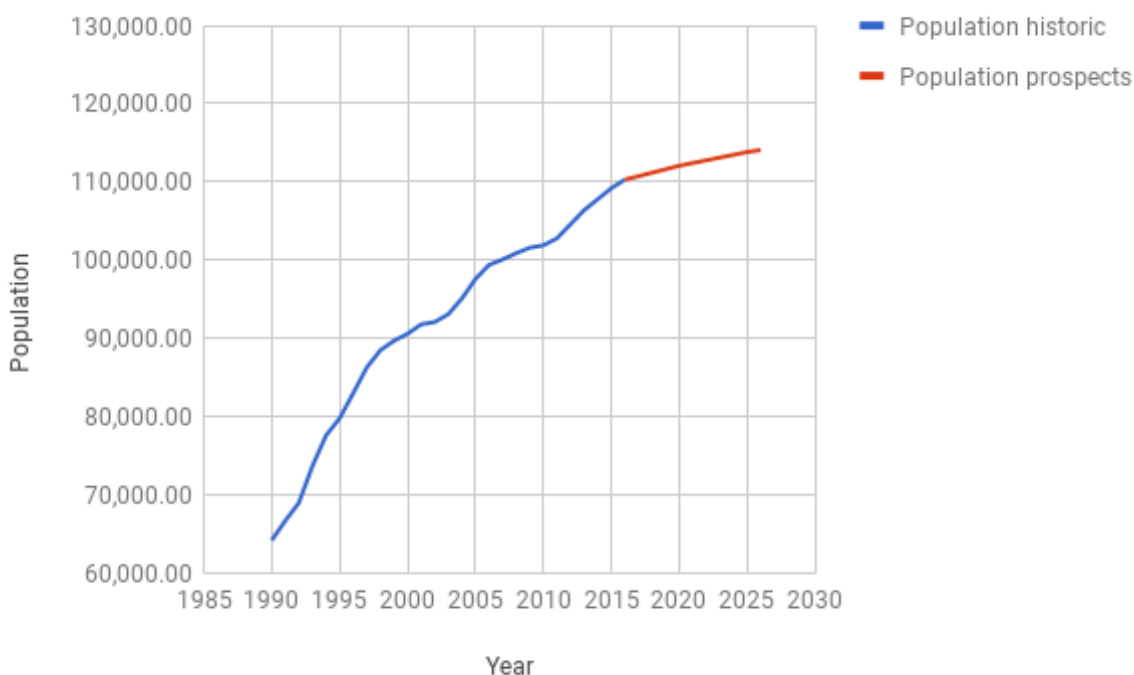


Figure 2-1. Population of Aruba. Source: Central Bank of Aruba and United Nations World Population Prospects.

Figure 2-1 presents a fact sheet of the current prognoses for the population of the Island of Aruba. The expected annual growth rates are based on the United Nations World Population Prospects (0.4% for 2015-2020, 0.3% for 2020-2025 and 0.23% for 2025-2030).

## 2.2 Current waste management situation

The amount of solid waste generated on Aruba is estimated at 130 to 150 kilotons per year. Appendix B presents a fact sheet of the waste streams and corresponding volumes in Aruba. Currently, the majority of the waste is deposited without pre-treatment at landfill Parkietenbos, located on the South side of the island. The landfill does not have facilities for the reduction of undesirable environmental impact. In addition, and aside from the social and environmental aspects, the landfill will reach its maximum capacity within a couple of years at the current growth rate.

In view of the protection of public health and conservation of the environment and in order to keep pace with evolving international standards and best practices, the Government of Aruba has established the objective to transition from its current solid waste management system to sustainable and sanitary waste management that entails a complete process from the waste sources to the recovery of valuable products and environmentally friendly treatment of the remaining waste. In connection herewith, the Government of Aruba is actively seeking for possible solutions to achieve a combination of sanitary landfilling

together with other waste management methods, which are more in line with a circular economy and international standards.

## 2.3 Desired situation and envisioned process

Solid waste management solutions cannot be addressed effectively without considering the value chain, ranging from waste collection in the first stages to product export or landfilling in the final stages. As an example, Figure 2-2 presents the basic model of a solid waste value chain. In this process, the collection of waste from households, businesses, hotels and industry needs to be improved through national awareness campaigns and the introduction of effective regulation and implementation of waste separation at source.

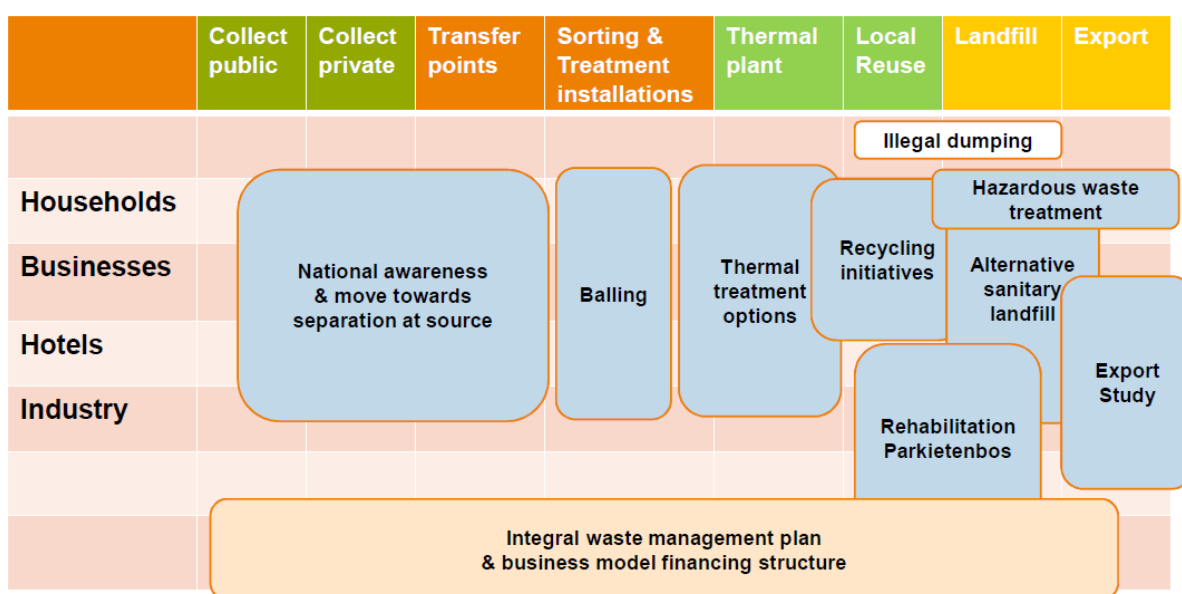


Figure 2-2. Example of a Solid waste value chain model

The collected waste is then transferred to materials recovery and energy recovery facilities, where further sorting and treatment are performed. Recovered recyclable materials can be locally re-used in a variety of ways (e.g. in local construction projects). Alternatively, these materials can also be exported. In addition to the recovery of recyclable materials, other materials with high calorific value can be separated and treated in a thermal facility in order to generate useful energy streams. Residual waste such as hazardous/toxic waste or waste with insignificant economic value will need to be treated and stored using environmentally responsible methods.

The entire process is to be governed by an effective integral waste management plan, thereby realizing an end-to-end value chain and business model that are beneficial from the economic, social and environmental perspectives.



### **Direction for a sustainable waste management solution for Aruba**

The Government of Aruba is working to identify pathways towards a long-term sustainable solution for Aruba's waste management. In order to do this, the government has identified a three-track approach:

1. A new solid waste thermal treatment facility for energy recovery;
2. Closure and remediation of the existent landfill at Parkietenbos; and
3. Creation of a sanitary landfill for residual waste and in case of debris from disasters

The Government of Aruba has prepared a market participation process seeking input from interested industry partners for either solutions on the individual tracks or integrated solutions. To this extent, the Government of Aruba intends to publish two RFI's:

- RFI 1 solid waste thermal treatment for energy recovery solution (Track 1)
- RFI 2 landfill remediation and sanitary landfill (Track 2 & 3)

This document (RFI 2) represents the work on the landfill remediation and sanitary landfill projects. The intention is to request and obtain detailed information/approach for landfill remediation and the execution of a new sanitary landfill according to the Best Available Technologies (BAT) for the Aruban situation.

### 3 RFI Scope

#### 3.1 Introduction

The Government of Aruba wants to make the transition to a more sustainable way of waste management on Aruba. At this moment almost all waste generated on Aruba is deposited at landfill Parkietenbos. The landfill currently lacks the facilities to minimize environmental impact. Besides the landfill operations are not up to international standards of best practices for sanitary landfilling. As a result there are many complaints of nuisance and concerns on environmental health and safety risks. The Government of Aruba wants to close the landfill urgently and make the transition to sanitary landfilling in combination with other waste management methods (i.e. WTE, recycling. etc.), which are more in line with a circular economy.

Furthermore, the strategy and hierarchy of the technical/economical solutions to be proposed by the respondent shall fulfill the following requirement;

1. Mitigation of health risks and safety at the site (e.g. employee safety);
2. Mitigation of nuisance and health- and environmental risks for surrounding area;
3. Ability to re-use the area for other purposes after remediation.

Respondents are to clearly mention in their bid, the methodology used for achieving these three (3) components.

#### 3.2 Description of the current Landfill

##### 3.2.1 History

The landfill at Parkietenbos has been in operation since the 1950's. At first the waste was deposited in an area not defined by walls the landfill grew like an amoeba. The landfill grew into the mangroves, lagoon and dry riverbed. Dikes were built around the landfill during 1992-1994. This project was not only to establish a clear boarder but also cap the landfill, where after a new modern solid waste management facility should have been established. However, the facility was never built.

In 2001 an emergency action plan was set up with the main objective to put out the wildfire on the landfill and come with an additional landfill cell with a capacity for 5 years. In this 5 year period a modern solid waste management facility should had been built and transferred. The new landfill cell had no synthetic liner, the Dutch environmental engineering considered the natural organic subservice as an adequate protection. Air emission pipes were installed to facilitate the escape of biogas. These pipes were discontinued sometime after 2010 due to budget cuts.

The old landfill contains primarily ash and is about 12 ha. The amount of waste (i.e. ash) on the old landfill is approximately 480,000 m<sup>3</sup>.

From 2003 onwards, the new landfill was used which contains primarily untreated solid waste and is about 4 ha. Waste is not intentionally burned anymore. The new landfill was designed, built, operated and transferred. Between 2003-2016 a total amount of 1.5-1.7 Million metric tons.



Figure 3-1. Google Earth image of Landfill Parkietenbos in 2002.



Figure 3-2. Google Earth image of Landfill Parkietenbos in 2016.

### **3.2.2 Current situation**

The current landfill at Parkietenbos is currently about 16 ha (see Figure 3-3). Waste brought to the landfill is weighted and deposited at the landfill by using an excavator and front-end loader (no bulldozer or compactor, see Figure 3-4). For daily cover of the deposited solid waste, fine fraction of excavated waste from the old part of the landfill is currently being re-used (see Figure 3-5) as cover material. As mentioned in the previous section, the landfill has no bottom liner, no water (leachate) management and no landfill gas management.

It should also be noted that sludge from three (3) wastewater treatment plants is being burned in 'open-air burners' on the landfill (see Figure 3-7). To minimize fuel cost, this fuel



for these air burners are being complemented with scrap wood and wooden pallets, collected separately at the landfill. This method being used to reduce waste and the unintentional superficial smoldering fires are presently causing a lot of nuisance to the surroundings (see Figure 3-6).

Appendix C includes topographic charts of the current landfill.



Figure 3-3 Maximum footprint area / countour of the Landfill (16 ha).



Figure 3-4 Active disposal area landfill Parkietenbos.



Figure 3-5 Excavation of old waste body for retrieving material for daily cover.



Figure 3-6 Smoldering area at the western slope.



Figure 3-7 Open-air burners for sludge burning at Parkietenbos.

### 3.3 Current solid waste volume and future estimations

#### 3.3.1 Baseline waste volume and composition

The most recent data indicates that the amount of waste landfilled at Parkietenbos recorded for 2016 is 112,174 metric tons. Table 3-1 and Figure 3-8 shows the waste composition by fraction<sup>1</sup>.

Based on a population of 110.300 in 2016, the 1,102,000 stay-over tourists have a share of around 15% in the total amount of solid waste produced in Aruba, whereas the 600,000 cruise passengers per year accounted for approximate 0.5% of the produced solid waste.

Table 3-1. Waste fractions 2014-2016 in metric tons

	Fractions	2014 [T]	2015 [T]	2016 [T]	2016 [%]
1	Paper and cardboard (incl. classified papers)	235	28	-	0
2	Metal	88	1444	6	0.01
3	Chemical and hazardous waste	46	270	174	0.16
4	(Bio) medical and infectious waste	134	125	215	0.19
5	Plant/Yard waste	13304	7802	1334	1.19
6	Sand	11169	13668	1719	1.53
7	Construction and demolition waste	-	-	5754	5.13
8	Sludge (sewage, kitchen, hotels)	7606	5276	4952	4.41
9	Tires	42	275	194	0.17
10	Household (HH), Commercial Waste (CW), Public Transfer Station (PTS) and residual waste	139436	104947	97822	87.21
	Total	172060	133835	112174	100

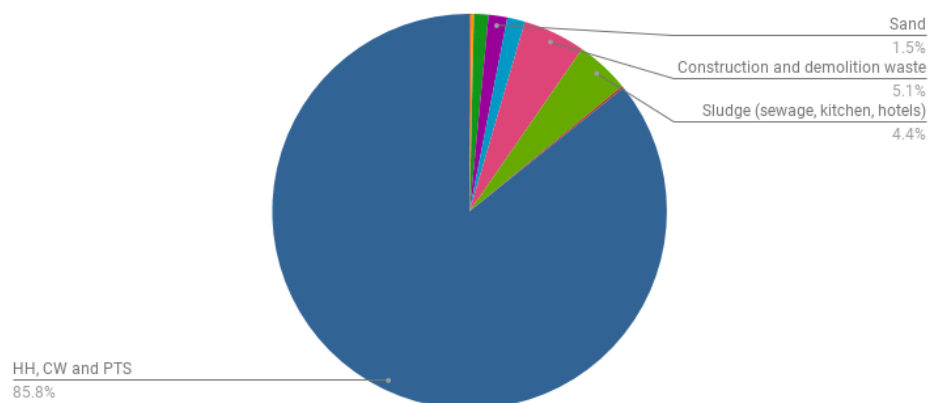


Figure 3-8. Distribution of waste fractions Aruba 2016

<sup>1</sup> The classification applied for the Aruban waste can be found in the international standards (e.g. USA-EPA standards, European- EC standards). The fractions represent the most abundant waste type for the context of Aruba and the Caribbean region.



### 3.3.2 Outlook

The population size of Aruba in 2016 was 110,300. The expected population size in 2026 is 114,085. The expected annual growth rates are based on the United Nations World Population Prospects (0.4% for 2015-2020, 0.3% for 2020-2025 and 0.23% for 2025-2030). Figure 3-9 below presents the total expected growth of the solid waste volume in Aruba based on the expected population and tourism growth. The waste amount in 2016 was 112,174 metric tons. The expected waste amount in 2026 is 117,295 metric tons.

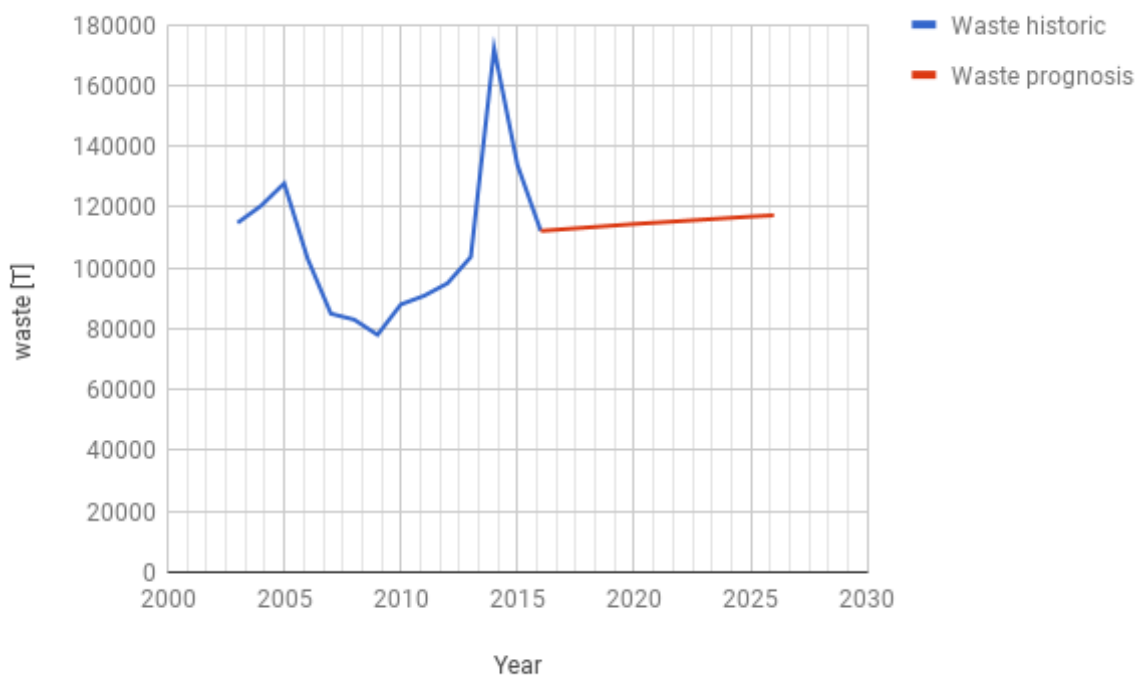


Figure 3-9. Expected waste volume development.

### 3.4 Minimum requirements of track 2 and 3 projects

Mitigation of the risks and concerns associated with the landfill remediation and the new sanitary landfill are crucial for the success of the projects. In the absence of regulations governing solid waste disposal and landfill mining, experiences (i.e. best practices) from other landfill reclamation projects should be used during remediation of the existing landfill and establishment of new sanitary landfill facilities.

As mentioned in section 3.1, respondents shall fulfill as a minimum the following requirements:

1. Mitigation of health risks and safety at the site (e.g. employee safety);
2. Mitigation of nuisance and health- and environmental risks for surrounding area;
3. Ability to re-use the area for other purposes after remediation.



Furthermore, respondents to give a proper technical solution for the following areas, viz.:

*Hazardous Waste and Special Waste*

- a. First, personnel involved in material excavation should have proper training to identify hazardous materials.
- b. Separate location should be allocated to store and manage hazardous material (batteries, chemicals, asbestos, etc.).
- c. Personnel should have proper protective clothing for handling hazardous materials when found.
- d. A detailed health and safety plan that includes specific provisions for hazardous materials should be issued.

*Storm Water and Leachate Management*

Mining of landfill facilities and processing of solid waste will result into generation of leachate. Storm water management and equipment washing facilities should be managed in such a way to minimize leachate. Generated contaminated water should be collected in special ponds and treated to acceptable level of contamination as not to hamper the environment.

*Gas Emissions and Odor*

Landfill gas and odor monitoring should be an integral component in the landfill reclamation and processing project and when necessary appropriate measures will be taken as to prevent calamities.

*Reclaimed Soil*

The reclaimed cover soil should constantly be monitored for contamination. If no contaminants are found in the cover soil, this soil will be used in the general construction industries. If contaminants are found, this soil will be stored separately.

*Vector Control*

The landfill should take control measurements to prevent insects, birds and other animals from causing a threat to public health and environment.

### **3.5 Track 2 Project: Remediation landfill Parkietenbos**

The remediation of the current landfill is referred to as 'Track 2 Project'. As part of this RFI the Government of Aruba would like to explore both options: mining and/or capping the current existing landfill. Respondents are therefore requested to provide their views on one or both options as per the questions in category 3 of the respondents form (Appendix A).

#### **3.5.1 Expected waste at the existing landfill**

According to the results of multiple site visits and some sampling of the landfill soil, the buried waste mainly consist of plastic, scrap metal, concrete, glass and tires. Due to a lack of



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proper waste management in the past, some hazardous materials could have been disposed at the dumpsite.

The waste streams of materials expected from the existing landfill will be very poor with respect to the caloric value. Considering the development of the waste volume/stream as given in Table 3-1 above, the following residual waste are expected, viz.:

Table 3-2. Expected average Residual Waste at excavation in percentage

	Fractions	2014 [T]	2015 [T]	2016 [T]	2014-2016 [%]	Expected residual waste at excavation [%]	Notes
1	Paper and cardboard (incl. classified papers)	235	28	0	0.06	30	In time some waste will disintegrate and the excavated volume will be less at the initial stage. In the left column, the expected residual waste at excavation, the expected percentage of disintegration is given as to obtain the expected total left over waste
2	Metal	88	1444	6	0.37	70	
3	Chemical and hazardous waste	46	270	174	0.12	20	
4	(Bio) medical and infectious waste	134	125	215	0.11	0	
5	Plant/Yard waste	13304	7802	1334	5.37	0	
6	Sand	11169	13668	1719	6.35	40	
7	Construction and demolition waste	0	0	5754	1.38	40	
8	Sludge (sewage, kitchen, hotels)	7606	5276	4952	4.27	0	
9	Tires	42	275	194	0.12	90	
10	Household (HH), Commercial Waste (CW), Public Transfer Station (PTS) and residual waste	139436	104947	97822	81.85	40	
	Total	172060	133835	112174	100.00		

Based on the present contour of the Landfill, the total expected volume to be excavated is 1,512,158 m<sup>3</sup> (waste before 2003 is excluded from this volume because that was burned).

Table 3-3 gives the expected total volume per fraction of waste.

Table 3-3. Expected average Residual Waste at excavation.

	Fractions	Expected volume to be excavated [m <sup>3</sup> ] per fraction	Expected waste residual at excavation [m <sup>3</sup> ]	Remarks
1	Paper and cardboard (incl. classified papers)	0.02	285.38	Combustable
2	Metal	0.26	3,894.07	Non-combustable
3	Chemical and hazardous waste	0.02	354.47	Non-combustable
4	(Bio) medical and infectious waste	0.00	0.00	Non-combustable
5	Plant/Yard waste	0.00	0.00	Combustable
6	Sand	2.54	38,421.28	Non-combustable
7	Construction and demolition waste	0.55	8,324.90	Non-combustable
8	Sludge (sewage, kitchen, hotels)	0.00	0.00	Non-combustable
9	Tires	0.11	1,663.46	Combustable
10	Household (HH), Commercial Waste (CW), Public Transfer Station (PTS) and residual waste	32.74	495,102.99	Combustable
11	Cover soil	63.76	964,111.45	Non-combustable



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	Total	100.00	1,512,158.00	
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From the above (Table 3-3) it can be concluded that the total expected non-combustible waste can be estimated at approx. 1.0 Million m<sup>3</sup>, whilst the expected combustible waste can be estimated at approx. 0.5 Million m<sup>3</sup>. The mentioned quantities are indicative.

### 3.6 Track 3 Project: Sanitary Landfill

The Government of Aruba would also like to explore the establishment of a new sanitary landfill taking into account the existence of a new SWTF plant as defined by RFI 1. This new SWTF plant will process all the daily solid waste produced and will recycle the burnable materials as to produce RDF for the energy side. The residual waste stream (i.e. non-burnable and non-recyclable waste) from the SWTF plant, will be sent to this new sanitary landfill. Furthermore, this new sanitary landfill has to cater for facilities for hazardous waste (e.g. asbestos, batteries/chemicals) and medical waste, etc. In the eventuality of a disaster, the new sanitary landfill should also be able to handle the possible debris.

The following three basic conditions should be considered in the design and operation of this new sanitary landfill:

1. Full or partial hydrogeological isolation: measures need to be taken to avoid or reduce leakage from the base of the site (leachate) and help reduce contamination of groundwater and surrounding soil.
2. Permanent control: trained staff should be based at the landfill to supervise site preparation and construction, the depositing of waste and the regular operation and maintenance.
3. Planned waste emplacement and covering: waste should be spread in layers and compacted. A small working area which is covered daily helps make the waste less accessible to pests and vermin.

Respondents are requested to comment on these aspects as per the questions in the respondents form (Appendix A).

### 3.7 Inter-relation between RFI 1 and RFI 2

The Government of Aruba has observed that the business case for a SWTF plant (RFI 1 - Track 1 Project) can be impacted significantly by integral solutions where mining of the current landfill (Track 2 Project) can feed into SWTF for producing RDF for the energy side. Respondents are hereby invited to evaluate an integral solution for RFI 1 and RFI 2.



## 4 Respondent Information

The Government of Aruba is requesting qualified and established Local and/or International companies and organizations that are interested to participate in this RFI, to submit the RFI Respondent Form (Appendix A) as specified below. Completion and submission of a RFI Respondent Form (Appendix A) is a requirement to participate in this non-committal RFI process.

Respondents should complete the form and return as an attachment via email to [rfi-lresl2018@arubarfi.com](mailto:rfi-lresl2018@arubarfi.com) as per section 4.3.

### Submission deadline and other instructions

The RFI Respondent Form (Appendix A) must be received no later than **March 16<sup>th</sup>, 2018 at 11:59 PM Eastern Time**.

- The Subject line of your email should be titled: "RFI 18-1107 - ***Company Name***"
- The Email address may be used for questions, queries and clarifications.
- Receipt of all submittals will be confirmed electronically.
- The respondent answers should be as concise as possible.

### 4.1 Respondent Approach

Respondent should clearly communicate their interest, subject to chapter 1 (Disclaimer and Conditions) and chapter 3 (RFI Scope).

### 4.2 Project Timing

Table 4-1. illustrates the anticipated milestones for this project

Table 4-1. - Anticipated milestones.

Activity	Completion
RFI published by the Government of Aruba	February 8, 2018
RFI Closing date	March 16, 2018
Initiate tendering process	3rd Quarter 2018*
Contract signing	4th Quarter 2018*

\* subject to change or cancellation without notice.



## **4.3 RFI format and Submission**

### ***4.3.1 RFI Submission***

- The respondent should complete the Appendix A **RFI Respondent Form** and submit this as an email attachment in both PDF and Word Format.
- It is recommended that attachments with file sizes exceeding 10MB be compressed (e.g. zipped) to ensure message delivery.
- RFI responses reaching later than the cut-off time and date specified above may, in the Government of Aruba's sole discretion, be rejected without further consideration.
- RFI responses may be submitted prior to the cut-off time and date specified above, however only complete RFI responses will receive attention.
- All costs if any incurred by a Respondent in connection with this Document and the preparation of its RFI responses shall be for the account of the Respondent.

### ***4.3.2 Language of the RFI Response***

The RFI response and all documents forming part of it shall be in English.

### ***4.3.3 Confirmation of the RFI Response***

The Government of Aruba reserves the right to seek additional information from the Respondent regarding its RFI response, and may require the respondent for clarification purposes to present supplementary information, in respect to the RFI response if so required by the Government of Aruba.

## **4.4 Additional Information**

- The conditions of contract for possible implementation will be determined in the subsequent feasibility study.
- The Government of Aruba deems it desirable that economic benefits are, where possible, retained locally in order to maximize the added value to the local economy. Respondents are therefore encouraged to maximize the use of local materials and/or labor.

Refer to Appendix B for information on demographics and current waste management



## **APPENDIX A - RFI Respondent Form**

The Respondent should complete and submit the Respondent Form (including all supporting documents), inserting additional pages as is necessary.

### **CATEGORY 1: The Project**

The outcome of the projects (Track 2 and 3) is to close the current landfill urgently and make the transition to sanitary landfilling in combination with other waste management methods (i.e. WTE, recycling, etc.), which are more in line with a circular economy.

Both projects shall be designed to incorporate all the above health and environment requirements.

#### **Information about Serlimar Sui Generis**

Serlimar Sui Generis (Serlimar) is the largest waste management company in Aruba, with the Aruban Government as the only shareholder. Serlimar provides refuse collection services to residential and commercial customers. Currently the waste collected by Serlimar is brought directly to the Parkietenbos Landfill & Containerpark, also operated by Serlimar. The facility has been Aruba's official public refuse dumping-site since the 1960s and is organized in two main deposit sections, the container park and the landfill. The container park is a residential Public Transfer Station (PTS) intended for waste materials separation with the purpose of materials recycling. Materials such as wood, tires, cardboard, paper, glass, green & yard waste, construction waste and metals can be brought to the container park. Hazardous or flammable materials such as car batteries, waste oil, asbestos containing materials, acid containing materials, and animal carcasses are not accepted with household waste; and need to be transported separately to the container park at Parkietenbos. The envisioned future of Serlimar is to achieve a modernized waste management solution that is sustainable from both an environmental and economic point of view.



## CATEGORY 2: Characterizing Respondent

1. Name and Contact Details of Respondent:
  - a. First Name
  - b. Last Name
  - c. Company Name
  - d. Business Address
  - e. Telephone Number
  - f. Email Address
2. Submit your company/ organization profile.
3. Specify the locations where you do most of your work.
4. Please provide the following information regarding your previously executed Landfill Remediation and Sanitary Landfill project(s) in Table A-1. You may provide information of up to three (3) representative projects.

Table A-1. *Past Projects*

Description	Project #1	Project #2	Project #3
a. Project name			
b. Project location			
c. Solid waste treated annually (ton)			
d. Project duration - months			
e. Project cost - USD/MT			
f. Facility cost estimate - USD/MT			
g. Facility cost - USD/MT			
h. Total area of landfill			
i. Total solid waste excavated			
j. Facility Life Cycle - years			
k. Facility Economic Life Cycle - years			
l. Type of contracting strategy			
m. Project financing strategy			





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Description	Project #1	Project #2	Project #3
n. Project owner			
o. Project reference person contact information			

### CATEGORY 3: Technical information

#### Input requirements

5. What are the utilities (i.e. water, electricity etc.) that need to be supplied to the Track 2 and 3 Projects?
6. What are the quantities of these required utilities?
7. What are the waste characterization information that you need for a design of the remediation of the current landfill and sanitary landfill projects?

#### Mining and material recovery option (Track 2 Project)

8. What are your options and typical steps in the mining process?
9. Based on the given solid waste profile, what is your estimated percentage (range) of the solid waste that could be recycled/recovered?
10. What is the percentage of the given solid waste profile that would be suitable for a WTF process?
11. Provide technical waste separation limitations (and efficiency reduction %) details as well as related operational conditions.
12. What are your experiences on the international markets of solid waste and recyclable materials import/export?
13. Which remediation measures or strategies do you propose for the landfill to mitigate health- and environmental risks in the mining option?
14. Do you foresee any possibility to export the waste of the current landfill out of Aruba?
15. Do you have any suggestions on what to do with the current waste if it is to remain in Aruba?
16. What safety measures would you introduce for landfill employees during the remediation process?



17. Describe the future purposes that the landfill site can be used for after remediation according to your proposal
18. Was your company/ organization involved in similar projects elsewhere ? – please provide references

### **Capping option current landfill (Track 2 Project)**

19. Which remediation measures or strategies do you propose for the landfill to mitigate health- and environmental risks in the capping option?
20. What capping system and material would you suggest for the Parkietenbos landfill
21. To what extent do you expect that you can source the capping material locally or abroad?
22. What safety measures would you introduce for landfill employees during the remediation process?
23. Describe the future purposes that the landfill site can be used for after remediation according to your proposal
24. Was your company/ organization involved in similar projects elsewhere ? – please provide references

### **Sanitary landfill (Track 3 Project)**

25. Where in your view could a sanitary landfill be established in Aruba? Please motivate your view.
26. Describe your approach to sanitary landfilling in terms of coverage system to avoid air contact and pollution.
27. What measures will you take to avoid leakage from the base of the site (leachate) and reduction of contamination of groundwater and surrounding soil?
28. What would be the key functions included in your sanitary landfill (e.g. level of waste separation, hazardous waste storage, etc.)
29. Which international standards for sanitary landfilling would you adhere to?
30. Give you approach with respect to:
  - Chemicals waste
  - (Bio-)medical waste
  - Asbestos



- Sludge
- Vector control
- Etc.

31. What safety measures would you introduce for landfill employees?

32. Was your company/ organization involved in similar projects elsewhere ? – Please provide references

33. What will be the lifetime and required space for the sanitary landfill?

Lifespan/capacity of landfill	Area required [m <sup>2</sup> ]
30 years	
40 years	
50 years	
60 years	

#### Other Facility characteristics

34. Provide a typical plot plan layout, configuration, location of cells and dangerous waste etc. for both tracks.

35. List what equipment is used for both tracks.

#### Environmental aspects

36. What are the environmental laws, regulations, conditions of operation and other compliances (e.g. vibration, odor, etc.) that are valid for your sanitary landfill? According to which environmental standards is your track 2 and track 3 projects designed?

37. Indicate possible environmental impacts.

#### Operation and maintenance

38. Provide details on the operating philosophy for your sanitary landfill.



39. Provide a typical Operation & Maintenance organization requirement to operate the facility.
40. What is the estimated number of personnel required to operate the sanitary landfill and/or the mining project?
41. What are the training and competence requirements for personnel to operate the facility? Please indicate how the required skills and competencies can be developed.
42. What are your guidelines and solutions regarding occupational health and safety for personnel working in the facilities? Please specify the applied international standards.

#### Economics related data

43. What is the estimated average capital cost per given solid waste available (USD/MT) for track 2 and Track 3?
44. What are the estimated amount, composition and potential economic value of the recyclable materials and residual waste resulting from the mining activities?

#### CATEGORY 4: Project Management & Contracting Strategy

45. What is the typical completion period for the project; from Engineering to completion of construction?
46. What are the typical bottlenecks and how can they be eliminated?
47. Does your company perform Hazard and Operability assessments of the sanitary landfill?
48. What are the guarantees, warranties that you offer for your projects?
49. What contracting strategy do you recommend?
50. Indicate the budgetary estimated cost per the following contracting strategies:
- Engineering, Procurement, Construction (EPC).
  - Engineering, Procurement, and Construction by the Government of Aruba (EP).
  - Build Own Operate (BOO).
  - Build Operate Transfer (BOT), with estimates to cover transfer period after 4, 8, 12 years.

Contracting Strategy	Transfer periods			
	4 years	8 years	12 years	
BOT				



- e. Build Lease Transfer (BLT); design & build the sanitary landfill and lease it to the Government of Aruba who will operate and maintain the facilities. At expiry of lease agreement, the facilities will be transferred to the Government of Aruba.

### **CATEGORY 5: Financial Aspect of Project**

- 51. The Government of Aruba is currently exploring multiple financing options and is therefore requesting respondents to clearly provide capital financing options your company can provide and proposals regarding financing possibilities. Financing options should include percentage of interest rate for each option.
- 52. Respondents to include a recommendation on a Lease to Purchase option whereby Respondent finances, designs & constructs the facilities and the Government of Aruba leases the facility from the respondent. The Government of Aruba will operate and maintain the facility.
- 53. Provide a general background on how you intend to finance this project if chosen for the finance option:
  - a. Company Profile, financial and management capacity to handle a project as described above.
  - b. What local government support do you anticipate being required to optimize the financing for the Project?

### **CATEGORY 6: Other Considerations**

- 54. Provide the economic benefits (e.g. value creation through energy, recyclable materials, carbon credits) of your proposed solutions.
- 55. Provide the economic and/or environmental challenges resulting from your proposed solutions.
- 56. Provide any novel or alternative technology that may benefit this project.
- 57. Propose an integral waste management plan that includes the end-to-end value chain for cost recovery.
- 58. How can your company support the development of a business model and financing structure that validates the proposed integral waste management plan and value chain?



59. How will your company provide a socio-economic, public health and environmental impact assessment?

**CATEGORY 7: Alternative proposal**

60. Please provide any comments on other creative project scope ideas, procurement options, technical considerations, etc. that have proven to be successful and that would be of interest to The Government of Aruba.

## APPENDIX B – Fact sheet waste management Aruba

### Demographics

The population size of Aruba in 2016 was 110,300. The expected population size in 2026 is 114,085. The expected annual growth rates are based on the United Nations World Population Prospects (0.4% for 2015-2020, 0.3% for 2020-2025 and 0.23% for 2025-2030).

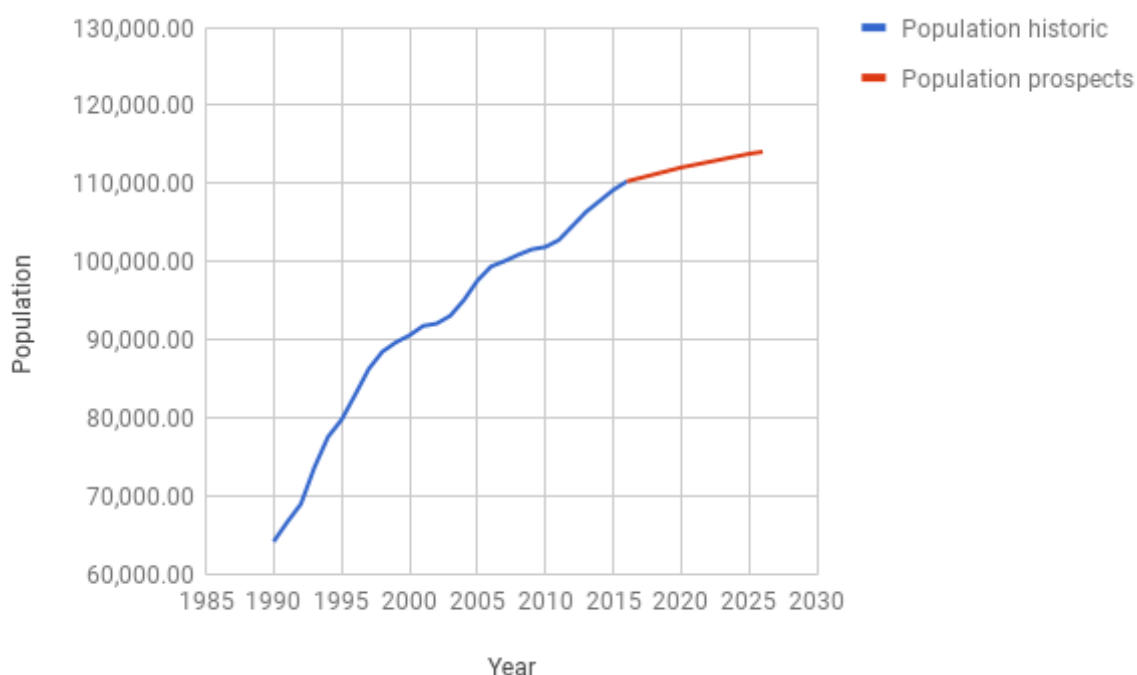


Figure B-1. Population of Aruba. Source: Central Bank of Aruba and United Nations World Population Prospects.

### Baseline solid waste volume and composition in Aruba

The most recent data indicates that the amount of waste landfilled at Parkietenbos recorded for 2016 is 112,174 metric ton. Table B-1 and Figure B-2 show the waste composition<sup>2</sup>. The specific fractions consist of waste that was received at the landfill in separate fractions. No separation was done at the landfill. Common fractions such as glass, plastic, and organic waste are not included in the table because either they were not registered or received in separate fraction.

<sup>2</sup> The classification applied for the Aruban waste can be found in the international standards (e.g. USA-EPA standards, European- EC standards).

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Table B-1. Waste fractions 2014-2016 in metric tons

	Fractions	2014 [T]	2015 [T]	2016 [T]	2016 [%]
1	Paper and cardboard (incl. classified papers)	235	28	-	0
2	Metal	88	1444	6	0.01
3	Chemical and hazardous waste	46	270	174	0.16
4	(Bio) medical and infectious waste	134	125	215	0.19
5	Plant/Yard waste	13304	7802	1334	1.19
6	Sand	11169	13668	1719	1.53
7	Construction and demolition waste	-	-	5754	5.13
8	Sludge (sewage, kitchen, hotels)	7606	5276	4952	4.41
9	Tires	42	275	194	0.17
10	Household (HH), Commercial Waste (CW), Public Transfer Station (PTS) and residual waste	139436	104947	97822	87.21
	Total	172060	133835	112174	100

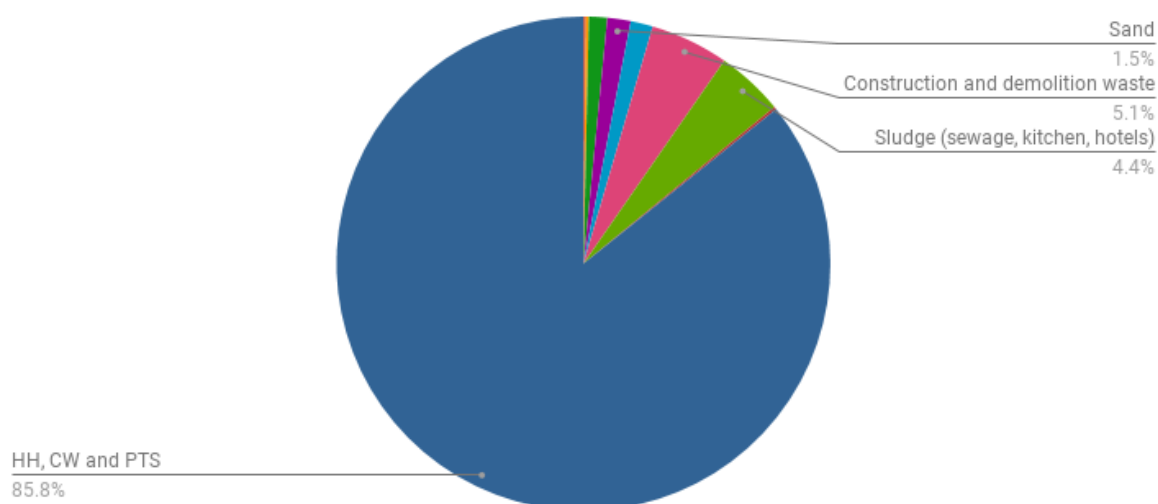


Figure B-2. Distribution of waste fractions in 2016. Source: Government of Aruba.

In 2016, the fraction of HH/CW/PTS counts for over 85% of the waste at Parkietenbos (Figure B-2). Although the fraction plastic was not registered, the plastic production by the tourism sector and by the local population is very high, which is also related to the fact that 90% of the consumables are imported. The amount of plant and yard waste is also relatively large as a result of the removal of vegetation due to the expansion of household area, maintenance of the roadsides and green areas.

### Historic trends



The waste landfilled at Parkietenbos from 2003 to 2016 in total was 1,507,544 metric ton. The amount of waste per year fluctuated over the years, with its lowest peak in 2009 of 84,964 metric ton and its highest peak on 2014 of 172,060 metric ton (Figure B-3). These fluctuations respond to the following historical events:

- 2005: Introduction of the tipping fee.
- 2009: Closure of the refinery, an important driver of the Aruban economy.
- 2005 - 2014: Collection of waste (recyclable fractions and non-recyclable) from commercial businesses and some households by private companies. After processing the waste, the remaining waste of the process, which corresponds to 80% of the collected waste, was landfilled at Parkietenbos (23,611 tons in 2013).
- In 2014, recycling activities carried out by private companies were ceased.

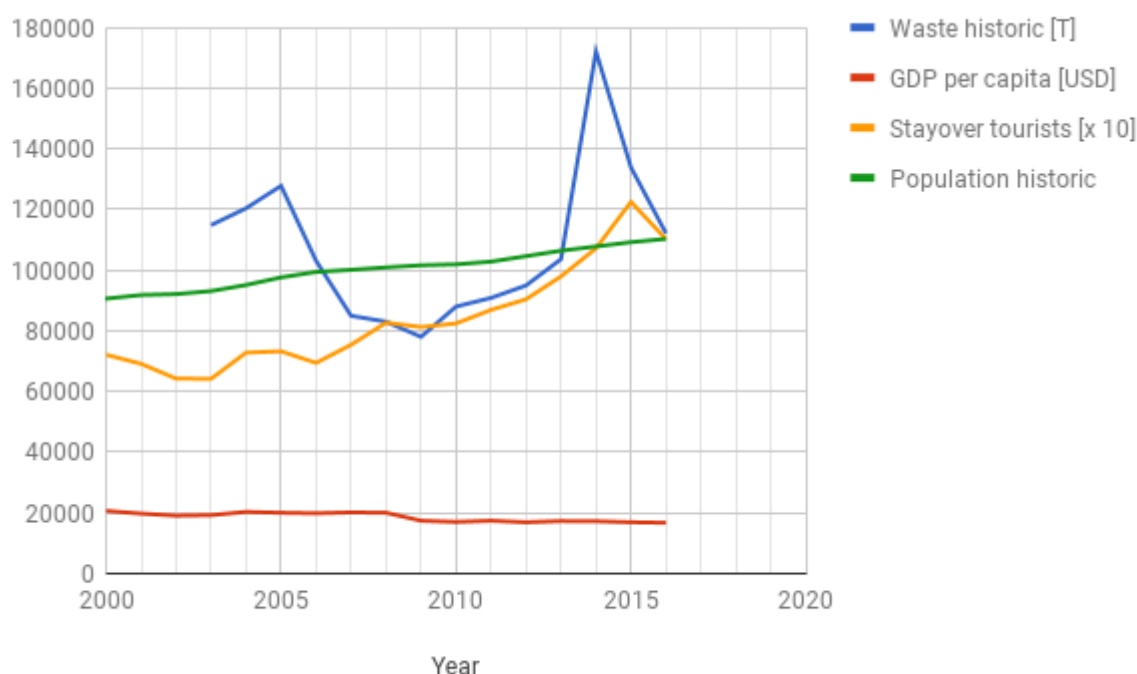


Figure B-3. Waste stream and economic indicators. Source: Government of Aruba, Central Bank of Aruba.

Based on a population of 110,300 in 2016, the 1,102,000 stay-over tourists have a share of around 15% in the total amount of waste produced on Aruba. The 656,000 cruise passengers account for only 0,5%. Furthermore, the direct impact of GDP will be between 2% and 4,5% on the total growth of the waste streams. On average Aruba citizens generate approximately 3 kg per person per day and tourists 2.5 kg per person per day. This may vary, since it is depending on the development of the GDP.

### Future trends

The waste production by 2026 cannot be exactly estimated due several uncertain factors. However, based on the annual growth rate of the United Nations World Population

Prospects (0.4% for 2015-2020, 0.3% for 2020-2025 and 0.23% for 2025-2030) and the potential annual increase in tourism of 1%, an estimation of the future waste stream is presented hereby. The assumption is made that tourists and citizens produce similar amounts of waste per day. However, tourists only stay for approximately one week.

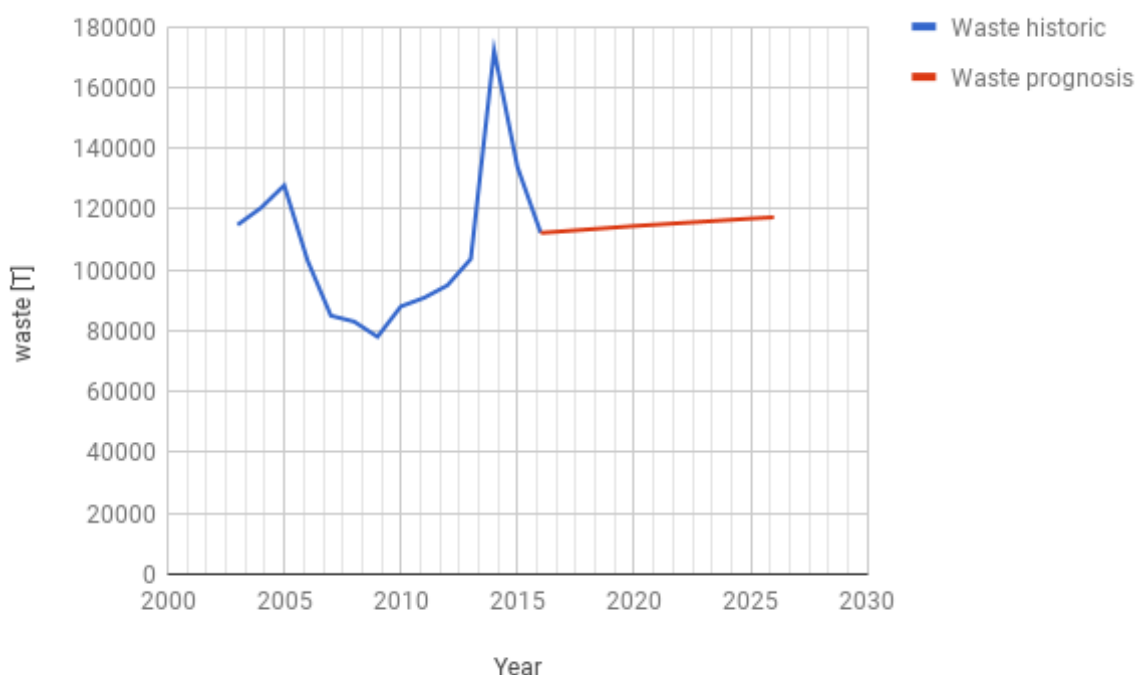


Figure B-4. Waste production prognosis for 2026. Source: Government of Aruba.

### Remarks and issues

The following issues were identified:

- Currently the Department of Nature and Environment ('Directie Natuur en Milieu') is working on a policy plan for waste and on legislation regarding waste management. Until now there is a limited regulatory framework that controls waste management on Aruba.
- The landfill at Parkietenbos is close to its maximum capacity. Only vertical extension is possible, but this involves risks. At the same time the landscape will be deteriorating further (visual pollution);
- The current landfill has no facilities for capturing and utilizing gas from the waste;
- Aside from the lack of extension possibilities, fires regularly occur on the landfill as a result from the physical and chemical processes in the waste;
- Between 2005-2010 an estimate of 30.000 to 40.000 metric ton per year was dumped at illegal dump sites;
- Until now there is no installation on Aruba for the incineration of (bio) medical and infectious waste. This waste is landfilled and burned;
- Chemical and hazardous substances are landfilled without any processing;



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- Aruba has no harbor waste collection facility<sup>3</sup>, the waste from ships is being disposed at Parkietenbos without further processing or separation into fractions.
- Serlimar has introduced a standard waste container called the 'clico' a few years ago. However, separated collection is not a common practice and there are no other dedicated containers in the city or neighborhoods.

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<sup>3</sup> Although the waste from ships is being collected in Aruba's harbour, it does not mean that there is a proper harbour waste collection facility. The waste from ships is dumped without any separation into open containers that are emptied on dumping ground Parkietenbos. A similar situation can be found on other islands where waste from ships is collected.



## APPENDIX C – Landfill Parkietenbos chart

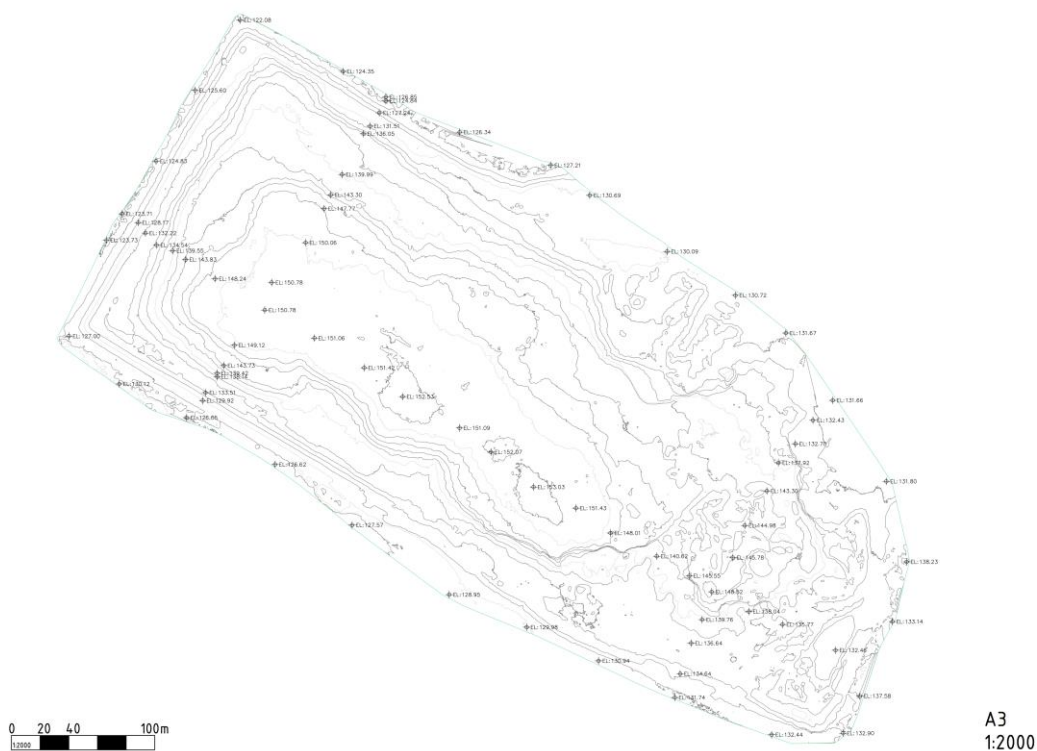


Figure C-1. Topography of landfill Parkietenbos measured in May 2017. Elevation in meters is relative (no datum defined).