St Helena Government

Waste Management and Recycling Options Assessment

Document: ERM-2015-009

Environmental Management Division

St. Helena Government

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EMD
"Our Island. Our Environment. Our Responsibility."

St Helena Government

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Contents

Executive Summary

St Helena Government (SHG) is faced with an opportunity and a threat. Volumes of waste needing to be landfilled on island are increasing and the available landfill space is rapidly reducing. This has significance for SHG as the need to replace and restore Horse Point Landfill Site (HPLS) will need to take place within a reduced timeframe.

There is an opportunity to delay the replacement of this asset through introducing a recycling programme to the island, reducing volumes of waste being landfilled and increasing the life of the landfill closer to its design life. This would bring the following benefits:

- reduce short-medium term capital expenditure by increasing the life of the landfill;
- provide cost efficiencies to SHG and private sector through substitution of recycled wastes for imported new raw materials; and
- enable the waste management service to be more financially self-supporting.

Recycling contributes towards achievement of National Goal 3: Effective Management of the Environment and that the Strategic Objectives for Environment and Climate Change are mainstreamed throughout SHG. These objectives are currently reported through the Sustainable Development Plan Key Performance Indicator as a 5% year on year reduction of waste to landfill, during a time when the quantities of waste generated are likely to increase.

Landfill Facilities and Needs

HPLS has seen a £1.5million investment in the last three years in order to bring it up to required airport safeguarding standards. With ingenuity this has created a step change in the way waste is managed on island. Due to the small size of the island, investment would be required for any new landfill on island to ensure it operated within airport safeguarding parameters. An estimate of capital investment for a new landfill is estimated as £2.7 million based on at current costs. This excludes additional HPLS restoration costs (estimated to be £300,000).

With the creation of domestic netted cells it has become clear that the quantity of waste generated has risen and the lifespan of the waste cells has fallen from 20 years to 12 years. This design life will drop further as waste generation rises with the development of the tourist industry, improved quality of life and the anticipated rise in returning St Helenians. Current estimates suggest that the design life of HPLS could be reduced to only 8 years without active intervention.

Waste Wheel

The weights of different waste streams are estimated so plans can be made to support effective decision making. The last complete ‘waste wheel’ was performed in 2013 and represents the waste streams found in the domestic cell. It was estimated that 630 tonnes of waste were deposited in 2013. It identified the three heaviest waste fractions as: glass (135 tonnes); compostable kitchen wastes (130 tonnes); and ferrous metals (130 tonnes).

Other waste streams that provide significant contributions to volume, but contribute smaller fractions of the waste wheel, due to their lighter weight, include: paper &

cardboard, rigid plastics, garden waste, textiles, polystyrene. Bulky waste is an additional waste stream and although unmeasured includes appreciable quantities of wood, electrical and electronic equipment and end of life vehicles.

The waste wheel is being updated between 2015 and 2016 to evaluate changes in waste volumes disposed at HPLS.

Risk Assessment

A generic risk assessment has identified that to do nothing and continue business as usual would not be advantageous under any of the assessment parameters. Doing nothing would carry a range of substantial negative impacts:

- a SDP KPI would not be achieved;
- new product opportunities missed;
- a major SHG capital expenditure (new landfill development) brought unnecessarily forward;
- increased imports of goods;
- loss of land multi-functionality;
- a range of negative social impacts including depreciation of house values; and
- an appreciable reputational impact on the new eco-tourism offering.

Recycling, although requiring some initial capital investment, will allow all these negative impacts to be mitigated or removed.

Waste Fractions

Options for recycling include on-island sorting and processing so materials can either be turned into on-island commodities or exported as raw material for sale in Africa for recycling.

Items suitable for export include paper, cardboard, steel tins, aluminium cans and rigid plastic. Smaller, very valuable, fractions, such as copper, may also be collected. This would require staff costs to sort waste, capital expenditure for plant to process and package the material and in the short term, annual operational costs to freight material overseas. The following paragraphs summaries opportunities for recycling (all costs are provided at equipment cost and exclude import and shipping costs).

Glass

As a waste fraction glass is:

- relatively simple to collect;
- would be simple for the public to engage with; and
- there is an opportunity to demonstrate Government efficiency and joined up thinking by using the crushed glass product by the SHG roads team.

Glass recycling on island would require investment in a glass imploder in the region of **£30K-£40K**. Collecting and sorting could, at least in the first instance, be absorbed into current waste management operational activities. Recycled glass is valued at **£3,500** per annum and would increase with the volume of glass recycled, which would depend on the degree of resource put into publicity, education and collection. Crushed glass could be incorporated into a road sub-base or block-work for house construction.

Cans and tins

Cans and tins do not have an on-island market. However, if sorted into steel and aluminium before being compacted and baled, these have export value. Steel currently generates £83 per bale (UK rates), whilst aluminium generates £557 per bale. Currently very little aluminium is imported to St Helena, but, this fraction is likely to rise considerably in the next two years as the major African packer, Nampak, migrates from steel to aluminium cans. Almost all drinks cans imported into St Helena are supplied by Nampak.

In order to export cans and tins an investment of **£8K-£10K** would be necessary to purchase a compactor/ baler to process tins and cans. Based on current shipping costs, current aluminium value and in anticipation of 50% of current steel tins becoming aluminium, an estimated **£15K** might be generated per annum (after processing and shipping costs).

Kitchen waste

A total of 130 tonnes of kitchen waste was disposed at the landfill in 2013 (based on 2013 waste wheel data). If composted, this organic waste could be converted into a useful, relatively low value, product for use on island. Using suitable composting methods it would remove edible food from the landfill that currently attracts pigeons and is a risk factor for birdstrike risk at the airport. Early assessment reports identified the removal of this waste stream as a primary means of managing birdstrike risk, although exclusion netting was finally settled upon. Biodegradable kitchen waste is the main source of landfill gas generation and given the HPLS geological and rural setting little gas control is required. This may not be so if the landfill were to be relocated and therefore attracting increased landfill development and management costs. Removal from the waste stream would be a great practical advantage.

There is a substantial market for both mulch and compost by the Landscape Ecological Mitigation Plan (LEMP). Secondary markets include landfill restoration, EMD conservation and SH National Trust as well as public and agricultural consumers. LEMP has a need for **£11K** (import cost) of compost and mulch in the next five years. The LEMP alone would easily consume all the organic waste currently generated on island if it were composted and mulched. A suitable bio-digester would cost in the region of **£14K** plus shipping and import costs. The practicalities of kitchen waste collection and digestion requires further investigation, but as a waste stream it does not lend itself to being one of the first to be separated and recycled, as there is not a composting culture on the island.

Paper and cardboard

Estimations suggest 70 tonnes of paper and cardboard waste is generated per year, however the quantity is greater as the figures do not include direct commercial disposal. There is a very limited market on island, through the paper and cardboard recycling SHAPE process to create artisan craft products. It is estimated that SHAPE can presently consume 3% of the waste paper and cardboard. Even with raised capacity it is unlikely that SHAPE can use more than 10%. Therefore 90 to 97% of paper and card end up in the landfill.

It is possible to blend processed paper and cardboard with kitchen waste, making the process more effective as well as generating more compost. This would require a chipper (see green waste) and a bio-digester (see kitchen waste) and staff resources to separate and treat the material prior to composting.

To export paper and cardboard for recycling, a separate compactor and baler would be required. Costs for this equipment are between **£8K-£10K**, excluding shipping and duty. In addition, the income from exporting paper and cardboard would be less than cost of shipping based on current rates and values (£14K per annum). However, the value would be in the volume of landfill saved as a result of this light but bulky fraction being removed. An alternative treatment may be available in the short term if card were to be shredded and incinerated. Further consideration of this option is necessary as it may help the incineration of a range of hazardous waste by providing a relatively harmless incineration medium for blending. However, the volumes involved would require man hours to process the material that may not be absorbable into current activities.

Plastic

Rigid plastic in the form of PET (the majority of rigid plastic waste) and HDPE both have economic value if separated, compacted and baled. In order to achieve this, a compactor and baler valued at £20K-£30K excluding shipping and duty would be required.

An alternative approach is to chip plastics prior to landfilling. This has the benefit of reducing the volume to landfill but, it would not encourage recycling. It may in fact actively discourage recycling if poorly communicated, as has been demonstrated in the UK where the recycled waste stream has later been found to be landfilled. A chipper would cost between **£15K-£20K.** SHAPE is looking to divest its chipper which would remove the need for import or shipping costs.

Textiles

Approximately 25 tonnes of textiles are disposed of annually. Volumes may be greater, as textiles are also found disposed in the landfills bulky waste trench. No investment would be required to process this waste stream, as a significant proportion of this material can be used as either vintage clothing, incorporation into SHAPE products or for sale as rags. It is proposed that textiles will be collected at the Public Recycling Facility and SHAPE will collect, sort and direct materials down the respective outlets. Not all textiles will be suitable for use but a good proportion can be removed. Monitoring in conjunction with SHAPE will be able to determine its efficacy.

Garden or green waste

Garden or green waste forms a very small proportion of domestic waste collected by SHG, but is created in quantity by the SHG Roads Department and disposed in quantity by the private sector and the general public and stockpiled at the bulky waste trench. With the aid of a chipper (**£15K-£20K**) this material can be converted into mulch or compost. Currently mulch cannot be imported because of its biosecurity risk and is not produced on island in quantity. Compost is imported. Composted green waste could be sold for use by the airport LEMP project, private sector and general public to off-set the costs of the operation.

Polystyrene

Much of the packaging on island is currently polystyrene. This is a reputational disaster for the green tourist. It also has damaging environmental implications. The first steps have been taken by SHG to leverage a change to more environmentally acceptable products by levying a tax on such containers. This is beginning to impact importers decisions; however, to support them in this choice a demonstration range of suitable products has been imported to demonstrate what is available. If the response to change by the private sector is poor, more active methods to encourage take-up,

such as increasing the levy or banning polystyrene may be the only remaining options.

Hazardous waste

Other wastes not collected by the Refuse Collection Vehicles (RCVs) include waste oil, waste fuel (aviation, diesel, petrol), vehicle batteries, waste electronic and electrical equipment (WEEE). These waste streams will be deposited at the Public Recycling Facility (PRF) and stored with the intention to export them for recycling. Recycling can only be achieved when St Helena has brokered a Basel Convention agreement with a nation willing to accept this waste as raw material for recycling. The Basel Convention requires nations wishing to export hazardous waste to have a formal agreement with the importing party; St Helena does not have such an agreement. This will require additional administrative time than is currently available. In the meantime burial in the hazardous waste cell is the best available option.

St Helena government needs to reach an agreement with either the UK, Namibia or South Africa for the acceptance of hazardous wastes as raw material for recycling under the Basal Agreement. This will require both political support at the highest level and technical support within EMD.

It is essential that a solution is identified as soon as possible, as the option for exporting waste oil from the power station is no longer available. Connect only have 3 months waste oil storage left. SHG needs to identify a budget for exporting waste fuel for recycling under the shipping contract or airport BFI contract.

End of life vehicles

End of life vehicles are currently compacted as well as buried. Further value may be extracted from them were a private sector scrap yard was to be established at the landfill. This may attract some planning input, but could also become a commercially viable business if operated by the private sector.

Recycling collection options

A number of potential locations for waste collection hubs have been identified. These are places, where a large number of people come regularly and include workplaces, supermarkets, schools and bars and restaurants. It is likely that these would work particularly well for dry recyclables and specifically glass and cans & tins. Glass has been collected in this way historically.

Funding recycling

Export value of some waste streams will provide revenue to cover all costs associated with the waste stream, whilst other waste stream recycling costs will need to be off-set by some form of a subsidy. In the UK a landfill tax has been imposed which provides public and financial focus on the creation and disposal of waste. As a result the recycling industry in the UK in its current form is sustained. SHG needs to consider options for payments for waste management, which can be used to maintain the waste collection service and support recycling.

Private sector

It is worth noting that although the private sector has expressed interest in developing various waste stream recycling options with ESH, this interest has not been converted into a private sector service for the island. Discussions are ongoing.

Waste reception building at HPLS

Several options for recycling have been identified. As the recycling private sector is still in its infancy, it is proposed that the waste reception building at HPLS is upgraded for use as a recycling center to process waste for re-use on St Helena or export as a raw material for sale. This will require additional capital to upgrade the building for the change of use. A planning application for change of use of the building would also be required.

The opportunity would be to centralize the processing of recyclables on St Helena and allow the private sector to operate within the confines of HPLS and recycle various waste streams when a mature business model has been developed. This will enable Government to kick start the recycling sector, but hand over responsibilities to the private sector where economic over time.

A fully costed upgrade for the waste reception building needs to be completed.

Proposed Programme

Immediate actions and year 1

In the first instance simple ‘clean’ waste streams that the public can actively engage with would initiate a culture of recycling on St Helena. These waste streams would also provide a raw material for re-use on island. It is recommended that the following waste streams are recycled as soon as possible:

- Glass;
- Garden waste; and
- Textiles.

Additionally:

- Paper and cardboard if a suitable compactor and baler is available from Basil Read, or capital resources are otherwise obtainable; and
- Polystyrene: continue to use economic and educational measures to direct use to less environmentally damaging packaging.

Two of these streams need to be addressed immediately as suitable equipment maybe available at reduced cost if purchased now. Specifically, SHAPE is divesting a chipper and Basil Read is divesting a compactor and baler. These opportunities to make significant capital savings are tightly time limited.

Initiation of negotiations for a Basel Convention agreement for the export of hazardous wastes, particularly those that can be recycled is required. Waste streams this is likely to include are vehicle batteries, waste oils, waste electrical and electronic equipment (WEEE). This will enable the export of a range of materials that currently contribute to the bulky waste fill and or will be directed to the very limited hazardous waste cell.

Other tasks include the costing of an upgrade to the waste reception building at HPLS, identification of overseas recycling partners and continuation of waste wheel programme.

Medium term actions (years 2 to 4)

Recycling of further waste streams can be instituted in year's two to four. This has the benefit of staggering the resources needed to start them up. Also before they can be clearly addressed the following will be required in order to allow better decision making:

- additional research;
- top down education and cultural change; and
- establishing the scale of the Nampak migration from steel to aluminium packaging on the waste streams on St Helena.

The second tier of waste streams to be recycled are:

- Kitchen waste;
- Cans and tins; and
- Rigid plastics.

Long term actions (from year 5)

Implementation of a full Material Recycling Facility (MRF) to enable the maximum value to be achieved by waste streams.

Third tier of waste streams to be recycled:

- WEEE and hazardous wastes not recycled in years 1 to 4.

Alternatively, depending upon the implementation of other recycling measures, it may be necessary to initiate the start of options appraisal to select the next landfill site and identify sources of capital for its construction.

1 Introduction

1.1 Background

Over the last three years there has been significant investment in the island's waste management facilities to ensure certification and safe operation of the airport. Staff exposure training in the UK and South Africa has built capability within the waste management service. These investments in infrastructure and staff skills have changed the island's waste management response from merely dumping mixed waste into an un-engineered waste cell at Horse Point Landfill into a credible, environmentally responsible waste management service where waste can be separated into hazardous and non-hazardous waste streams. The waste can then be disposed in a responsible manner to reduce potential risks of contamination to the land, air and groundwater underlying the landfill site.

This report outlines options for the next step in the island's waste management capability - reducing waste disposal through recycling.

Opportunities for recycling will:

- ***reduce medium term capital expenditure by increasing the life of the landfill;***
- ***provide cost efficiencies to SHG through the use of recycled material available on island in place of imported material; and***
- ***enable the waste management service to be more financially self-supporting.***

This document provides a review of options that would deliver these objectives. It is based on real island data collected from the waste wheel surveys combined with the best practice approach to waste management as outlined by a concept called 'the waste hierarchy'.

Currently, many of the materials we produce in quantity and think of as 'waste' could be reused in other situations as a useful material. This document outlines how St Helena could benefit from making waste products something with economic benefits.

This process has the benefit of supporting the achievement of the DFID Memorandum of Understanding goals for government reform (responsible environmental management) and National Environment Management Plan targets. Recycling contributes towards achievement of National Goal 3: Effective Management of the Environment and that the Strategic Objectives for Environment and Climate Change are mainstreamed throughout SHG. These objectives are currently reported through the Sustainable Development Plan Key Performance Indicator as a 5% year on year reduction of waste to landfill during a time when the quantities of waste generated are likely to increase. Recycling also contributes to general economic sustainability by returning money into the local economy.

1.2 Limitations of the Report

This report has been written by the Environmental Management Division (EMD) for the sole purpose of supporting the St Helena Government's (SHG) decision making

process for the developing an economically sustainable and environmentally friendly waste management service. No liability shall be taken for the report being used in other contexts or by third parties unless authorised in writing by the EMD.

2 Waste Management Services

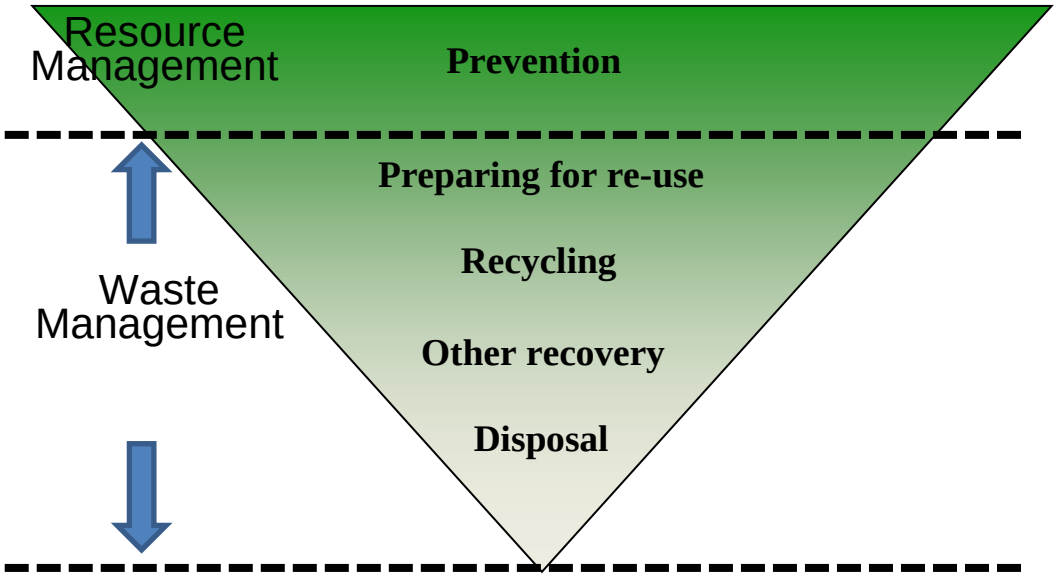
The focus of this report is for activities controlled by Saint Helena Government's Waste Management Service, managed by the Environmental Management Division.

Ideally, waste is best avoided. This is not simple and is beyond the scope of this report, however SHG has started to take steps in this direction through the introduction of a plastic bag tax. Informal communications suggest that one retailer has sold 2000 fewer single use plastic bags in the past 12 months.

2.1 Waste Management Hierarchy

The waste management hierarchy is presented in Figure 2.1. The most satisfactory response to waste is to re-use it in its intended form with increasingly less satisfactory options further down the waste hierarchy list. This is because generally there is less work required, and therefore less cost associated with processes further down the list. This assessment is designed of make the best use the island's waste and where possible to turn it into an economic asset. Currently a significant proportion of the asset value is being wasted. We are burying money.

Figure 2.1: Waste Hierarchy showing the decreasing preferences of management or disposal



2.1.1 Preparing for re-use

In this instance, wastes are taken unaltered for re-use. This occurs to some extent already where the general public will take waste materials taken from the landfill for reuse e.g. car parts, furniture, electronics. Waste tyres from airport construction vehicles have been used in an unaltered stage to construct retaining walls within the

public recycling facility at the landfill. With this kind of low cost re-use, the only form of treatment may be to clean the waste before re-use.

2.1.2 Recycling

This is where waste assets are taken, processed and reformed into a different usable form. This happens to a very limited extent on island. With care, materials can be recycled to make new raw materials at less cost than virgin materials, therefore extending their economically useful life. These materials could be used on island or they can be exported for sale (providing they are not internationally classified as hazardous waste). As St Helena does not have a bilateral agreement with a signatory of the Basal Convention, we are unable to export hazardous waste, including recyclable hazardous waste (e.g. vehicle batteries). It is urgent that St Helena starts discussions with either the UK, Namibia or South Africa to determine the potential for an agreement so that hazardous waste (including waste fuel) can be exported for disposal or recycling.

2.1.3 Other recovery

This could be turning waste into power or heat. This option requires a large capital outlay, in the order of £1million, for the plant and because of the relatively small quantities of waste St Helena produces this avenue is not currently financially viable.

2.1.4 Disposal

This is where the waste is no longer economically viable and is deposited for final disposal in the landfill. This is expensive in terms of land asset, particularly on a very small and remote island where space is at a premium.

3 Waste Management Facilities

3.1 Horse Point Landfill Site

3.1.1 Life span of the landfill

In August 2014 the new domestic waste area was brought into use at Horse Point Landfill Site (HPLS) with 20 cells planned within this area of landfill. Each cell had a predicted design life of approximately 12 months, equating to 20 years of remaining landfill life.

In April 2015 the first domestic waste cell was nearing full capacity, just eight months after being brought into use. This dramatic rise in rate of filling cuts the estimated life of the landfill from 20 years to only 13 years (when combined with the loss of two cells to accommodate the two hazardous waste cells). At the present rate of waste disposal, the landfill has a life of approximately 12 years remaining before it will be full.

An increase in transient population (expected through operation of the airport), along with an improved quality of life is expected to cause a rise in the quantities of waste being generated for disposal on St Helena. A waste management strategy written by Jacob-Gibbs for St Helena Government in 2003 estimated that waste generated by tourism would equate to the equivalent of 50 additional full-time residents. Based on current rates of fill of the domestic waste cells and potential increase in waste generated through tourism and returning Saints, it would be possible to assume that the landfill life span could drop to only 8 years. Adopting waste reuse and recycling options as soon as possible will extend the length of the landfill life, with the capital and resource efficiency that will result from this action.

3.1.2 Current capital costs

Each cell has a capital construction cost of £4,500 as well as additional operational costs. Only capital costs have been included in the following assessment, although there will be additional depreciation benefits as a reduction in wear and tear on equipment. Each cell is a volume of 2,304m^3 (24mx12mx8m). This gives a capital cost of £1.95 per m^3. The second cell was excavated to 24x12x10m giving a volume of 2,880m^3.

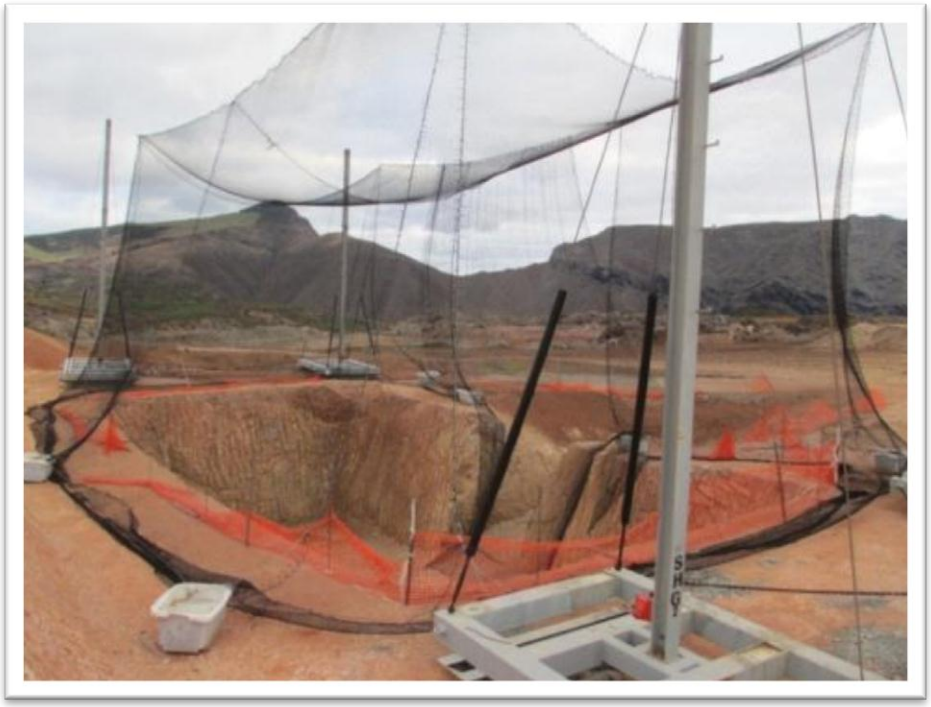
Table 3.1: Landfill capacity void space capital cost implications

Scenario	Duration of HPLS life	Capital cost per year	Volume per year (m^3)
Initial estimates	20 years	**£4,500**	2,300
Based on current evidence	12 years	**£7,500**	3,830
Projected estimate with increased	8 years	**£11,250**	5,800

waste generation.			

Figure 3 shows the first new general waste cell cut at the re-developed HPLS with new bird netting.

Figure 3.1: First waste cell cut at HPLS prior to filling August 2014



3.1.3 Other considerations

The scope to extend the HPLS more widely is limited due to previous burial of waste on the site limiting the available space. It is not possible to extend the site beyond current boundaries because it is surrounded by National Conservation Areas. Once the capacity of the site has been reached, a new landfill site at an alternative location will need to be found and developed.

3.2 Future Facilities

3.2.1 New landfill development

Alternative options for a landfill site were considered in June 2012 when considerations of airport safeguarding were reviewed. See an extract of ExCo minutes below:

'*The 'ideal' situation for ASSI would be to relocate landfilling operations to a site at least 13km from the airport development site. However, no such alternative site exists on the Island and therefore any alternative landfill site would be subject to the same additional operational requirements as would be required in any case at Horse Point. Relocating the landfill would incur significant capital costs, and would take a*

considerable period of time in agreeing the site location, securing planning permission, developing the site and then implementing operations. The need to improve and satisfactorily restore Horse Point would remain and therefore this option was discounted.'

All parts of the island are within 13km of the airport, therefore the same degree of infrastructure would be required as currently provided at HPLS to manage the risk of bird strike at the airport (by reducing the attractiveness of the landfill to feral pigeons). Therefore in building up indicative costing's for the construction of a new landfill all current facilities will require duplication, or where possible re-location.

On the basis that historically Donkey Plain, below the quarry, was identified as a potential site for the relocation of HPLS, it has been used as a model on which to build indicative costs for a new landfill site. It should be noted that this document is not intended to identify Donkey Plain as a new landfill site. A full options appraisal for an alternative landfill site will be required at the relevant time.

Any site identified is likely to pose a range of social and technical risks not currently found at HPLS. For example, the Donkey Plain site has more technical difficulties associated with it than HPLS, including the need to construct a new highway to avoid access via the quarry. In addition, the ground is rock so all groundwork's will be more costly and restoration more challenging.

3.2.2 Indicative Costs of Landfill Development

Indicative costs are presented in Appendix A, based on the replacement or transfer of all facilities to a new 10Ha site in Donkey Plain and using recent actual figures for the upgrade of HPLS. These costs provide for an options appraisal, construction and commissioning of a new landfill suitable for airport safeguarding. The indicative costs show that a replacement landfill site could cost in the region of **£2.7million** when all airport safeguarding infrastructure has been considered. These costs do not provide for HPLS landfill restoration costs which are in the region of £300,000.

4 What Could and Should St Helena Recycle?

4.1 Introduction

To manage waste it must be monitored. This is done by taking a sample of waste and dividing it into different types of waste (called waste fractions or waste streams). To identify the materials that could be recycled three approaches should be taken. The first is identifying the largest waste fractions and assessing how we can minimise the quantities generated and dumped. The second approach is to stop a waste fraction being waste by recycling or reusing it as a commodity. The third is to stop the waste being generated in the first place by banning, taxing or promoting alternatives. This report is based on these approaches and has drawn on the team's direct experience of working in the recycled products market and the expertise gained from the recent UK exposure visit.

4.2 The Waste Wheel

The waste wheel used throughout this document provides the baseline data for waste types received at the Horse Point Landfill Site. The data were collected in 2013. The data set provides a picture of the percentages of waste (by weight) being disposed at the landfill. The waste wheel is produced from Refuse Collection Vehicle (RCV) waste data only, calculated to represent 70% of the total waste being disposed of at HPLS and the vast majority delivered to the netted, domestic waste cells. The remaining 30% of waste is received as bulky waste.

RCV's collect both commercial and domestic waste and has a very different composition to materials that are bought either by commercial, government or private disposers to the bulky waste trench.

4.3 Method of data collection

The waste wheel is a mean average of four samples taken quarterly to allow some consideration of seasonality to be included. For example, more cardboard and paper is generated at Christmas, or just after a ship from Cape Town. Each sample includes selecting five bags per day, for five days, from an RCV delivery. The bags are split and the waste sorted into its component fractions. These are then individually weighed. A weekly average is calculated and then an average for the year. Results are presented in the wheel below.

Annual weights of waste were derived by averaging axel weights before and after waste deposit and multiplying by the regular schedule of RCV deliveries per year.

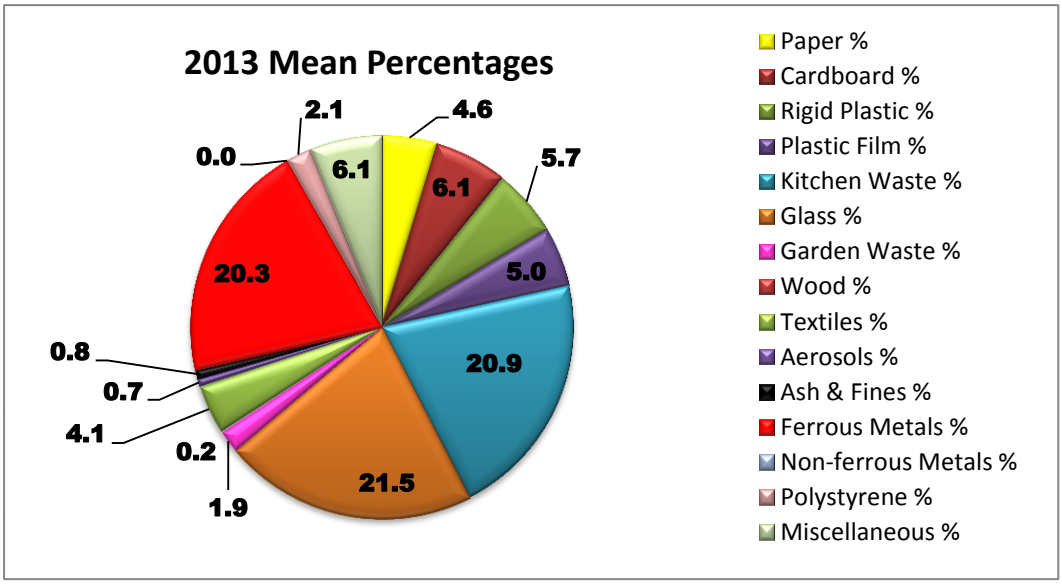
All waste assessment methods have problems. It should be noted that there is a degree of bias in this methodology as it only includes materials collected in black bags. Therefore, there is a tendency to exclude larger items collected by RCVs, such as bundled cardboard. As a result this is likely to be appreciably underestimated within the waste wheel. It also does not make provision for the types of waste that could be recycled within the bulky waste trench which attracts cardboard, wood, textiles and scrap metal in significant quantities.

However, as a cost effective indication of waste flows this is as good a method as is available. Where statistical or customs data have been made available to us we have used this to double check the data.

4.4 Results

In 2013 630 tonnes of waste were deposited in the domestic cells at HPLS, an average of 12 tonnes per week. This was generated from a population of 4675 people, so each person made a weight of 135kg of waste per year. Figure 4.1 shows results of the 2013 waste wheel.

Figure 4.1: Waste wheel fractions by weight, 2013



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The waste wheel shows that the three main fractions, or waste streams, of domestic waste that make up almost half the total waste stream by volume. These are:

- Glass, mostly in the form of bottles (135 tonnes);
- Kitchen (compostable) wastes (130 tonnes); and
- Ferrous (iron rich) metals, in the form of partially compacted cans and tins (130 tonnes[1]).

Note that these are the biggest contributors by weight to the waste stream. However, other, lighter, waste fractions will take up sizable void volume. For example, rigid plastic bottles are light and the 4.1% weight does not make clear the large void volume they take up, particularly as they do not compact well and will take up both plastic and associated air space. Therefore, although making up a smaller proportion by weight the following waste fractions have been estimated as volumes and are also worth investigation as they contribute a substantial volume of island waste.

- Paper and Cardboard (70 tonnes,– likely to be an appreciable underestimate see Section 4.3);
- Rigid plastic (35 tonnes);
- Garden waste (12 tonnes);

[1] Ideally, these tonnages would be converted to volumes, however no reliable bulk densities were found that would reliably reflect the actual monthly volumes of waste experienced at HPLS.

- Textiles (25 tonnes); and
- Polystyrene (13 tonnes);

These weights do not account for the additional waste that is added to the bulky waste trench. It is expected that major volume contributors to the bulky waste trench are:

- End of life vehicles;
- Wood;
- Cardboard; and
- Waste Electrical and Electronic Equipment (WEEE).

4.5 Value of exported recycled materials

A review of current waste fractions and practical methods of extracting value from exporting overseas as a raw material are detailed in Table 4.1 below. It is worth noting that the commercial value column is a sale value (UK rates). However, better methods of extracting value are possible by using materials on island either by substituting processed waste for raw materials or transforming them into new product lines.

Table 4.1: Processing option for sale or recycling

Material		Use on island	Commercial value	Preparation method
Paper		Partly via SHAPE	YES	COMPACT / BALE
Card		Partly via SHAPE	YES	COMPACT / BALE
Plastics	PET	NO	YES	COMPACT / BALE
	HDPE	NO	YES	COMPACT / BALE
	Film	NO	YES	COMPACT / BALE
Metals	Aluminium	NO	YES	COMPACT / BALE
	Steel	NO	YES	COMPACTABLE
	Cars/Car parts	YES OPPORTUNITY	YES	SHRED DISASSEMBLE
	Copper	NO	YES	BALE
Glass		YES	MINIMAL	CRUSH
Organic		YES OPPORTUNITY	YES ON ISLAND	COMPOST
Rubber		YES	MINIMAL	SHRED
Wood		YES	MINIMAL	CHIP
WEEE		NO	NO	STRIP DOWN
Hazardous		NO	NO	INCINERATE

Saint Helena generally accepts 20ft containers for shipping goods on and off the island. The value of recycled material is presented in Table 4.2, based upon exporting in a standard 20ft shipping container. Note: these figures are for guidance and would fluctuate by market forces, however these costing's have been taken using a mean average over a period of 3 years. Source www.letsrecycle.com

Table 4.2 Value of Separated Recycled Waste

Recycled Material	Bale Size (m^3)	Bale Weight (kg)	No of Bales per container	Value per tonne (£)	Value per bale (£)
Paper	1	600	16	105	65
Card	1	400	16	110	41
Plastic HDPE	1	600	16	390	234
Plastic PET	1	680	16	145	100
Mixed HDPE-PET	1	650	16	100	69
Aluminium Cans	1	650	16	810	557
Steel Cans	1	750	16	110	83
Copper	n/a	n/a	n/a	2,900	n/a

Looking at these tables it would appear export of some recyclable waste streams are viable, whilst others are not. However working with a recycler in South Africa or Namibia, likely to be defined by the agreed shipping contract, could provide an economic means of shipping recyclable waste off island. This might be achieved by mixing compacted and baled streams in a container as higher valued streams can offset the lesser value streams.

Tables 4.3 and 4.4 overleaf show the potential value of recyclable material on St Helena. From the tables it can be seen that there is an inherent vulnerability in relying on aluminium to carry such a substantial part of the cost and it is highly possible that the private or third sector will start to collect at least part of this waste stream as a fund raising exercise, reducing the potential for exporting aluminium to off-set the costs of shipping wastes for recycling.

Smaller high cost wastes, such as copper, could be collected, although these are currently produced in very small volumes and therefore producing a $1m^3$ bale would be infrequent and make budgeting unpredictable. It has therefore not been included in these calculations.

Material	2013 percentage	Annual tonnage	Recycled tonnage****	Bale weight (tonnes)	Void space per tonne	Annual no of bales	Value per bale (£)	Annual bale value (£)	Void space saved (m^3)	Value of void space (£)***
Paper	4.6	30	18	0.6	0.43	30	65	1,950	42	82
Cardboard	6.1	40	24	0.4	0.43	60	41	2,460	56	109
Steel	20.3	130	78	0.75	0.063	104	83	8,632	1,238	2,414
Rigid Plastic (HDPE & PET)	5.7	35	21	0.6	0.047	35	69	2,415	447	871
Total annual bales						229	Total annual export value (£)	**£15,457**	Cost of void space saved	3,476
Total containers**						14.3125	annual export cost (£)**	£42,866		
							Difference	-£27,409	Total Surplus / Deficit	-£23,933

*****containers hold 16 m^3 bales of whatever material.
****** based on RMS current prices of £2,995 per 20ft container.
******* void space valued at £1.95/m^3
**** assumes 60% recycling rate

Table 4.3 Projected waste streams based on 2013 waste wheel data, exporting all materials suitable for resale.

It is understood that a major player in the South African can market (Nampak) is migrating from steel to aluminium over the next 2 years. If a notional 50% of the tins and cans are drinks cans and become aluminium, based on 2013 numbers the table would change to this:

Material	2013 (%)	Annual tonnage	Recycled tonnage****	Bale weight (tonnes)	Void space per tonne	Annual no of bales	Value per bale (£)	Annual bale value (£)	Void space saved (m^3)	Value of void space (£)***
Paper	4.6	30	18	0.6	0.43	30	65	1,950	42	82
Cardboard	6.1	40	24	0.4	0.43	60	41	2,460	56	109
Steel	10.15	65	39	0.75	0.063	52	83	4,316	619	1,207
Aluminium	10.15	65	39	0.65	0.063	60	557	33,420	619	1,207
Rigid Plastic (HDPE & PET)	5.7	35	21	0.6	0.047	35	69	2,415	447	871
Total annual bales						177	Total annual export value (£)	£44,561	Cost of void space saved	£3,476
Total containers*						11.06	annual export cost (£)**	£33,132		
							Difference	**+£11,429**	Total Surplus/ Deficit	**+£14,905**

***containers hold 16 m^3 bales of whatever material.
**** based on RMS current prices of £2,995 per 20ft container.
***** void space valued at £1.95/m^3
****** assumes 60% recycling rate

Table 4.4 Projected waste streams based on 2013 waste wheel data but where an assumed 50% of tins and cans are aluminium (i.e. the majority of drinks cans are aluminium), exporting all materials suitable for resale.

4.6 Assumptions

The figures provided in Table 4.3 and 4.4 are based on a number of assumptions. The recycling rate is based on a literature review of recycling rates achieved in other island states and will vary on St Helena, depending upon the emphasis placed on the separation of wastes at source and the cultural acceptance of recycling.

The market values are based on UK values (South African and Namibian rates may vary). These markets are highly volatile, with UK markets rising 20% between January and May 2015. This variation is influenced by international markets and regional capacity to recycle, but could be an advantage if recyclable materials can be stored and sold to market when rates are acceptable.

Freight values are based on RMS rates, although a new freight contract is being negotiated and rates are likely to change.

Bale weights can be highly variable depending upon the plant used. The estimates here are based on a high degree of compaction. Some balers produce a far lower bulk density that would result in more bales for export with the commensurate change in shipping costs.

Bulk densities of landfilled/compacted material are very inconsistent, therefore extrapolation of landfill saved by removing waste streams have been provided but should not be wholly relied on.

Figures should be viewed as generally indicative only.

5 Waste Fractions Options Appraisal

5.1 Introduction

In the following sections of this report, the major waste streams identified within the 2013 waste wheel are considered individually. Each waste has a narrative describing its source, the potential markets with values (where available) and the operational and capital investment that would be required to release asset value of the waste. This is drawn together with an Options assessment looking at the specific issues relating to that option.

For ease and reduced repetition, there follows a general Options Appraisal that will apply to all options presented in a general way and underpin the need to increase recycling on island as soon as is possible.

5.2 Options Appraisal

5.2.1 Option 1: Do Nothing – Business As Usual

Table 5.1: Risk profile 'Do Nothing'

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

Economic Considerations: This option fails to support the economic development of the island by not facilitating the development of new products or income streams. Despite efforts to encourage the private sector over a period of at least three years it has singularly failed to develop. Given the prevailing conditions; be they lack of commercial reward, expertise, staffing or finance it is unlikely that this will change sufficiently fast to meet SHGs needs.

Environmental Considerations: A range of considerations apply. The three year SDP key performance indicators require a 5% reduction on landfilled waste year on year, during a period where the total volume of waste, unless mitigating measures are implemented, are likely to rise. In addition, the loss of land to landfilling on a highly land constrained island is not sustainable and goes against most NEMP targets. It prematurely removes usable assets from their lifecycle with consequent rise in imports, carbon footprint and generation of more waste than necessary (unnecessary purchasing and packaging). Where the option to produce usable materials to offset the consumption of virgin or imported materials is neglected a further loss is made through more carbon emissions and more habitat or resource loss. This is all exacerbated on a land constrained and resource poor island.

From a different perspective, Horse Point is well located, being sufficiently far away from large populations and all waste facilities are located together. When this landfill is complete it will be hard to find a location on island with the same diminished environmental presence. For example, it is an ideal site for the incinerator being on a high exposed ridge, but with relatively limited air quality impacts. To separate the waste operations would see a rise in operational and environmental costs through

additional handling and haulage with the additional visual, infrastructure, noise and carbon footprint that would entail.

Financial Considerations: By not removing significant volumes from the landfill immediately, the time when a new landfill will be required is bought forward. Current projection suggests that this could be as close as 8 years. The current landfill redevelopment cost £1.5 million. Due to the airport safeguarding issues as a result of an operational airport, a new landfill would have to replicate HPLS's facilities. A replacement landfill could cost in the order of **£2.7million**, including land purchase, fencing, services and infrastructure and relocation of mobile plant. It is also worth considering that there are long term financial implications. With rapid filling of HPLS, capital investment for the next site will need to be bought forward, acting as frequent and regular drain on the island's financial resources. This is not a driving factor that is experienced by the private sector and so the best interests of the island are served if SHG is to take a lead in reducing the quantities of waste at the earliest opportunity.

Social Considerations: Currently, the location of HPLS is culturally acceptable. When HPLS is full, it is likely that the new landfill will be located in a more populated, and quite probably less acceptable, area. This is because of the range of negative impacts, be they nuisance from noise, vehicle and plant movement, dust, odour, vermin etc. a landfill brings. An alternative landfill site could also impact on local house values.

Reputational Considerations: No *visible* recycling will cause adverse publicity amongst visiting tourists with particular sensitivities to 'green lifestyle'. It would therefore have a damaging impact on the island's green tourist reputation. Some issues are more emotive than others, and this is worth taking into account. However, as no recycling of note occurs on island at present this is unlikely to be viewed well.

In none of the waste streams does this option deliver any positive benefit. In fact it fails to offer any sort of resolution at all. It actually acts as a significant erosion of SHG waste management resources and highlights a large and regular drain on central capital and removes land from multifunctional use.

5.2.2 Option 2: Adoption of Recycling

These options mostly offer all the benefits that "Do Nothing" prevents. There are also some other factors worth considering.

Economic Considerations: This option supports the economic development of the island by facilitating the development of new products or income streams. It is important that development is immediate as the sooner waste is diverted into useful products and away from landfill the better. The economic forces on SHG to deliver this are far greater than those on private sector because of the capital costs involved with frequently creating new landfill sites. This reinforces the case that it is SHG that should lead a recycling programme.

Environmental Considerations: A range of considerations apply. Once land is lost to landfilling it ceases to be a multifunctional piece of land and becomes unsuitable for a large range of other purposes. On a significantly land constrained island it is important that where-ever possible multi-functionality is maintained, as without it a sustainable economy and environment is impossible. Recycling very strongly supports multi-functionality.

From a waste perspective, by diverting waste into more constructive uses it could reduce imports and consequently the large carbon footprint that is associated with shipping. It also would reduce the additional packaging waste that comes inevitably with the new imports. Also, if recyclables can be used in place of virgin material typically they are less carbon expensive as well as preserving the multi-functionality of the land where the virgin materials were extracted.

As noted above, HPLS is environmentally well located. Avoiding its completion will prevent the need to impact on a more environmentally sensitive site.

Financial Considerations: By removing various waste streams from landfill there will be a delayed need to find capital expenditure to restore HPLS and to develop a new landfill elsewhere. This would save, through postponement, £2.7million needed to develop a suitable new site.

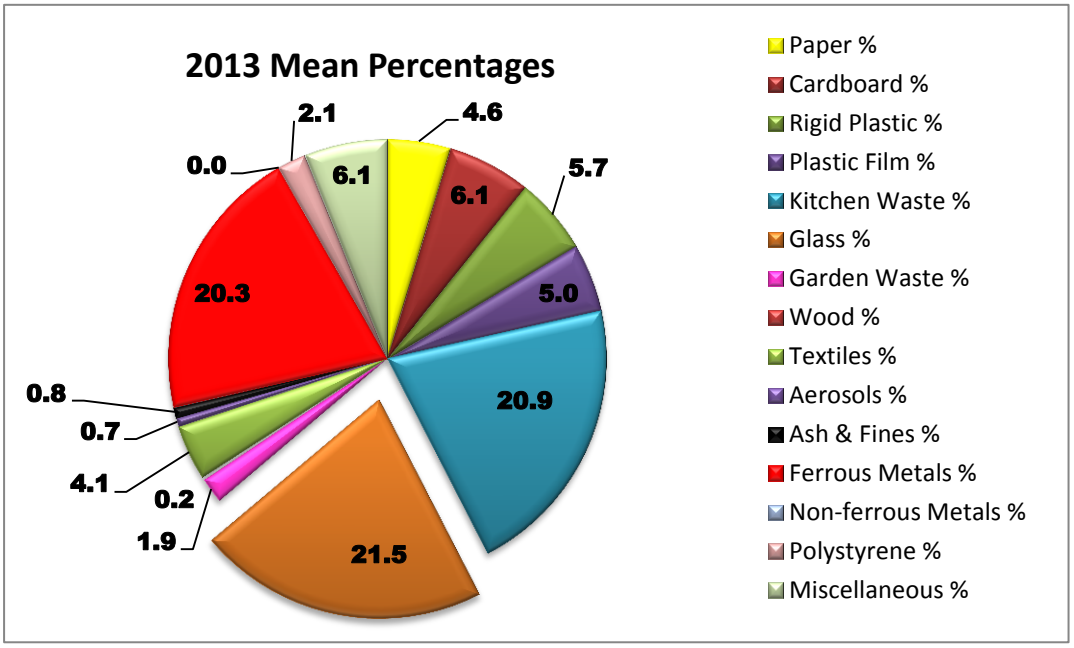
Social Considerations: By prolonging the life of HPLS there is a delay in the negative social impacts of nuisance from noise, lorry movement, dust, odour, vermin etc. experienced by a less isolated site. It would also postpone the impact on local house values.

Reputational Considerations: It is the only way to deliver the waste reduction KPIs that form part of the SDP and give island credibility in the eyes of the UK Government. It will also underpin the green tourist product that the island will need to develop as a tourist destination.

There are many benefits to investing in recycling on island, although this needs to be applied in a considered and phased manner starting at the soonest opportunity. This is detailed in the following sections.

6 Waste Fraction Options Appraisal: Glass

Figure 6.1: Waste wheel highlighting glass fraction



6.1 Sources of glass

The vast majority of glass waste is from bottles. 110 tonnes of bottles were estimated to have been deposited at HPLS in 2013, Typically one cubic meter of glass bottles weighs approximately 0.35-0.4tonnes, indicating that in 2013, 320m^3 waste glass was buried at HPLS.

Confirmation of these volumes were sought from Customs and Excise and their indicative figures suggest an import of approximately 125 tonnes of beer, wine and spirit bottles for 2013-14.

6.2 Markets for recycled glass

6.2.1 Products

Glass can be crushed into two product streams, both of which have on island uses. Cullet is a larger gravel sized material. Sand (known locally as dust) is a finer more adaptable product. Table 6.1 provides a conversion table between forms and weights of glass.

Table 6.1: Conversion table between forms and weights of glass

Glass	Weight per m^3	Total weight/ volume per year 2013
Whole bottles	0.35-0.4 tonnes	320m^3/ year
Cullet (15mm)	1.1-1.3 tonnes	90m^3/year
Sand (<3mm)	1.5-1.8 tonnes	70m^3/year

6.2.2 Potential markets

The price for glass on the open recycling market is negligible and over a period of three years has been negative (Source www.letsrecycle.com). To make glass crushing productive an island market will be necessary. There has already been successful use of glass recycling by a private company on island, using crushed glass in building blocks and furniture although this has now ceased and the plant is likely to be inoperable.

Glass, when roughly crushed, reduces in volume from between 3-5 to 1, therefore simply separating glass at source from domestic and commercial waste streams and then crushing it before disposal would significantly reduce landfill volume. Given the number of bottles involved the opportunity to run a returns scheme is not likely to be viable at the present time. Due to the shipping carbon footprint it is also likely to be environmentally damaging. However, glass has value when crushed and used as an aggregate substitute. Glass can be crushed to two grades; cullet and sand (or dust). These have different markets.

6.2.2.1 Cullet

Cullet can be created through a variety of techniques. The product is either sharp or smooth profile. To be usable the right technologies are necessary.

Glass crushed into cullet can be utilized by the SHG Roads Section and mixed with other aggregates (at 25%) for use as base course during roads resurfacing. This is already common practice in Europe. In the UK 'La Farge Tarmac' currently produce an eco-blend using up to 30% crushed glass. This would replace the need to extract virgin on-island aggregate.

Roads division require cullet to be 10mm 'down product', meaning 10mm is the maximum grain size, with a smooth profile.

Glass crushed into cullet used within the road base has the following advantages:

- increased the environmental sustainability of on-island aggregates and loss of islands natural assets;
- currently, SHG roads anticipate that in year 2015-16 £1200 could be saved by substituting glass cullet for virgin aggregate per km of road resurfaced;
- Assuming the island can generate 90m^3 cullet per year, based on 2013 volumes, this is a cost saving of **£3,060** (at £34/m^3);

- This would remove 320m^3 of waste from the landfill per year. This volume of landfill is equivalent to **£624** per year (void space at £1.95/m^3);
- Further savings maybe made by improving the proportion of glass waste collected. There is scope to accept significantly larger volumes of glass into this market;
- ***Total savings per annum of £3,684.***

6.2.2.2 Dirt / sand

Glass can be crushed into sand, finer than cullet, and can be utilized by both Government and Private Sector construction industry. The Roads Department alone has a demand of 500m^3 of sand per year at a cost of approximately £20,500 (£41/m^3). Sand has the added advantage of being more widely usable within the private construction sector.

The advantage of substituting glass sand for virgin aggregate are as follows:

- increase the environmental sustainability of on-island aggregates and loss of islands natural assets and reduce the need to extract marine sands. Marine sand extraction is the only source of island sand and is very detrimental to the marine tourist product;
- glass in building blocks is a benefit as it reduces the need for using dredged marine sand in block construction. The saltpeter normally damages wall plaster overtime;
- currently, SHG roads forecast a cost of £41/m^3 of sand used within the section;
- Assuming the island can generate 70m^3 sand per year this is a cost saving of **£2,870**;
- This would remove 320m^3 of waste from the landfill per year. This volume of landfill is equivalent to **£624** per year (void space at £1.95/m^3);
- Further savings maybe made by improving the proportion of glass waste collected. There is scope to accept significantly larger volumes of glass into this market;
- *Total savings per annum of* ***£3,494.***

6.3 Capital and Operational Investment

Crusher options are as follows:

To be an economic substitute crushed glass needs to be rounded. Equipment should be able to crush the volume of glass currently produced with scope to increase as projections suggest a growth in quantity in line with growth in the tourist industry.

- Purchase new glass crusher for rounded cullet/ sand;
- Purchase on island glass crusher for cullet.

After inspection the vendor was unable to demonstrate that the on island crusher had been maintained, serviced or worked. This, therefore, has been discounted as an option.

Three suppliers were approached with details of current production and an indication of future needs. Only two suppliers provided information. The results are provided in Table 6.2.

Table 6.2: Glass crusher options

Item	Glassbusters	Krystaline
10 down (gravel) product	Yes	8-10mm
3 down (sand) product	Yes	4-6mm
Equipment	GB1000 plus trommel	GB200-C-SC
Capacity	1 ton per hour	3 tonnes per hour
Consumables	Blades every 150 tons processed. £800 per set Motors £150 each Conveyor belt every 5years £600-£1000	
Servicing		
Ease of maintenance	Requires competent electrician	
Warranty	Difficult due to distance.	Difficult due to distance
Cost excluding shipping	£32,250	£55,960

Figure 7.4: Glassbusters glass crusher viewed in UK during 2015 exposure visit

Glass crushers have been specified to manage current and growing waste volumes. It is projected that both machines will have an operational life in excess of 10years, depending upon the quantity of material processed; the way in which it is housed; and how it is serviced and maintained. Both crushers can produce cullet and sand, although due to the process, production of cullet is more efficient as production of

sand requires glass to be passed through the plant twice. The differential in price currently favours the production of cullet, as although less valuable per m^3 more is produced for less effort. Environmental considerations however may become significant if sand without saltpetre, and consequent damage to plaster, is available it may attract a premium.

SHG would promote glass recycling through provision of red wheelie bins supplied to all bars and clubs. Collections of glass would be via Waste Management Services Land Rover and Trailer substituting full bins for empty at business premises and only emptying wheelie bins on site at HPLS. A twice weekly collection would be sufficient and can be absorbed by normal waste management operations, therefore at no increased cost to SHG. SHG is also in the process of siting new street bins in Jamestown. These bins accommodate both general waste in one end and a recyclable waste in the other. The bins have been procured with a red insert for the recyclable waste, consistent with the red bins for glass. The six bins procured for siting in Jamestown will provide a receptacle for glass to be collected in for recycling. These bins will also be emptied twice weekly in line with wheelie bins above and further add to the volume of glass collected for recycling.

Lastly a large bay for glass recycling has been provided at HPLS as part of the Public Recycling Facility. This sign posted bay is already receiving deposits of glass from the public, ready for recycling.

With the development of the service further collection points may be sited around the island as discussed in a later Section.

Previous glass recycling operations have failed due to inconsistency of collection, so an efficient and regular collection from the outset will be important.

6.4 Glass Options Assessment

6.4.1 Option 1: Do nothing – Business as usual

Table 6.3: Risk profile 'Do Nothing' Glass Crushing

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

As with the standard Do Nothing option, this provides no positive advantages, with the exception of safely disposing of the waste. With the advent of tourism the scale of the problem will only increase.

It is anticipated that the proportion of glass could be improved above 60%, with suitable investment and also likely to increase disproportionately in volume. Therefore, these calculations are likely to be an underestimate.

6.4.2 Option 2: Generate crushed glass product for market

As a concept, glass recycling is one the island is familiar with and easy to engage and participate in. So as an introduction to the public of the wider issue of recycling it is ideal. Adopting glass recycling may have wider implications for improving

recycling rates of other materials. It has the advantage of providing a usable product that could either be taken as an income to the waste management team or as cost efficiency in the roads team. The approach here is likely to depend upon whether the waste management service is seen as an operation ripe for divestment. If it is to be divested in the short to medium term it is important that the revenue returns to the waste management service.

Table 6.4: Crush glass into economically viable product

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	-	☺	☺

Economic Considerations: Glass specifically would provide a kick start into the development of a recycling industry on island that over a period of at least three years has failed to happen.

It would develop a new commodity stream to enhance the local economy and deliver cost efficiency to SHG operations.

Environmental Considerations: It would contribute up to 12% reduction by weight in waste landfilled (SDP KPI, 5% year on year for 3 years in a rising waste scenario).

Glass crushing augments production of natural aggregates on island by offsetting the use of irreplaceable virgin aggregates. If glass sand is produced the demand for marine sand will also be reduced. This reduces the damaging impact of marine sand extraction, the only sand source available to the island, on the marine environment that is central to the tourist product. Lack of saltpeter in the sand may attract a premium in the construction industry which may add to the financial attractiveness of producing sand as opposed to cullet product.

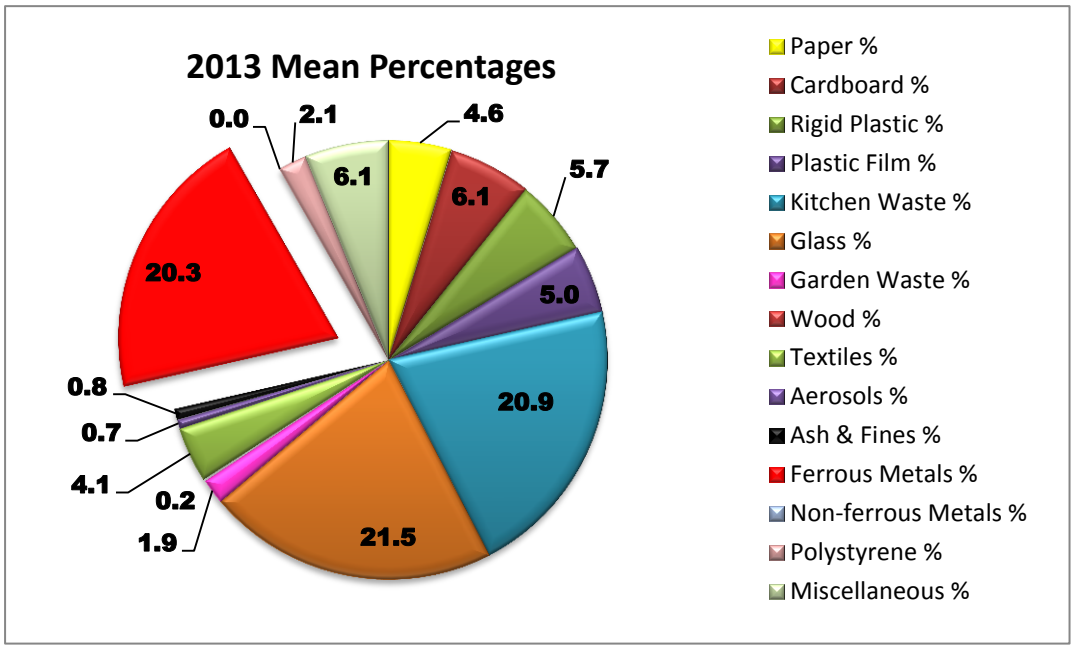
Financial Considerations: A capital investment would be required to purchase the plant necessary to generate cullet and sand. This is in the order of up to **£32-£50K.** There is a case that additional efforts could deliver high recycling rates. The provision of small scale glass crushers to bars and clubs would encourage glass recycling and crushing in to cullet at source. This would provide for a less frequent collection as glass volume is significantly reduced. This also provides opportunity for establishing glass recycling at several locations across the island for the general public to utilize. Costs would be higher than for a single commercial crusher at HPLS however more of the waste stream is likely to be recycled as a result. The cullet or sand has financial value to offset against capital investment as well as building good will by demonstrating linked up thinking within Government.

Reputational Considerations: Glass is a particularly familiar product to recycle, particularly for visitors to the island who would expect to see visible provision in place. It will reinforce a green lifestyle that will underpin the tourist offering on St Helena.

Social Considerations: This is a particularly accessible to the public to recycle. If this is done well and to advantage it will ease the way to recycling more tricky items.

7 Waste Fraction Options Appraisal: Cans and Tins

Figure 7.1: Waste wheel showing cans and tins fraction



7.1 Sources of cans and tins

Cans and tins are made from either steel or aluminium. They are a resource with value. One hundred tonnes of mixed cans were estimated to have been deposited at HPLS in 2013. Suitable bulk densities of compacted and landfilled cans were not identified therefore void space saved cannot be estimated.

At present the majority of tins and cans are steel. Although drinks imported through South Africa produced by a major player (Nampak) is intending to change to an exclusively aluminium product within two years. This is likely to reflect in the reduction of relatively low value steel waste stream and be replaced by a much larger, more commercially valuable aluminium waste stream.

7.2 Markets for recycled cans and tins

7.2.1 Markets & Products

There are no significant on island uses for tins and cans. The only available route is sale for recycling either as in a more valuable sorted, compacted and baled form or significantly less valuable mixed compacted and baled metals. From the calculations presented in Section 5 it is clear that this could be economically viable. However, the viability of this option is vulnerable to:

- the balance of steel to aluminium;
- the activity of the private and third sectors in collecting aluminium; and
- total recycling percentages.

Table 7.1: Waste values for metals (correct at 1st April 2015)

Recycled Material	Bale Size (m^3)	Bale Weight (kg)	Value per tonne (£)
Aluminium Cans	1	650	810
Steel Cans	1	750	110
Copper	n/a	n/a	2,900

Based on current costs and values, an annual income of **£14,900** is anticipated from the export of aluminium and steel cans. This is based on potential value when Nampak migrates to aluminium cans, assuming 50% of cans and tins are aluminium. At present it would be a cost to export the steel waste generated.

7.3 Capital and Operational Investment

In order to sell steel and aluminium at the rates outlined in Table 7.1, some pre-treatment is required. The steel and aluminium requires separation and then compacted into bales. Bales are not standard sizes and the purchaser will dictate the necessary size as the volume we are proposing to export is very small.

The initial separation is key and could be achieved through local collection hubs (discussed later). This would require investment in suitable collection banks or more efficiently a 'dry recyclable' approach could be taken.

There is scope for SHG to adopt a 'dry recyclables' waste collection as part of the domestic/commercial waste collection service. This is achieved through provision of an identifiable sack (e.g. clear pink) to residents who deposit recyclable waste streams into the sack separate to other domestic waste. Dry recyclables can include; glass, cans/tins, plastics, textiles, paper/cardboard. Collection of the dry recyclables sack would be once weekly via Land Rover and Trailer reducing the need for other domestic wastes to be collected from wheelie bins from weekly to fortnightly, therefore no increased collection cost to SHG. Dry recyclables would be delivered to HPLS and then manually sorted on a large sorting table (a more costly option would be via conveyor) into respective waste bins. The waste streams would then be processed accordingly as required for recycling. Cost of clear pink sacks would be off-set by revenue generated from improved recycling rates of saleable materials. This process would have benefits for all dry recyclable waste streams described below and form part of a wider recycling strategy.

Advice received suggested that compactor/balers need to be material specific. We have assumed, therefore, that one compactor/ baler would need to be purchased for the treatment of tins and cans, but would not then be suitable for say card and paper. Clarification is being sought as to why this should be so and whether it would apply to our situation. Due to our very small supply we would need to be able to adopt bale sizes that suit our purchaser. This flexibility is provided by mill size balers. These come in two forms and are compared in Table 7.2.

Table 7.2: Comparison table of features of vertical and horizontal mill balers.

Mill sized vertical baler	Mill sized horizontal baler
Cheaper capital investment (£8-10K +VAT)	More expensive to purchase (£25-£30 +VAT)
Smaller footprint	Larger footprint
Easier to maintain	More complicated to maintain
Cheaper to operate	More costly to operate
More labour intensive manual feed, less easy to operate.	Less labour intensive semi or fully automatic feed, more easy to operate.
Limited capability	More ancillary bin lifts and conveyors can further automate the process
Manual baling process	Process more material, faster
Not scalable for future growth	Scalable for future growth

Further investigation is being undertaken to establish the need for multiple compactor/ balers and the exact degree quantity that could be processed. This will have a knock on effect on the additional operational landfill labour requirements.

Figure 7.1 Baled steel and aluminium ready for recycling.

7.4 Tins and Cans Options Assessment

7.4.1 Option 1 – Do Nothing- Business as Usual

As for the standard Do Nothing options presented in Section 5.

Table 7.3: Option 1 assessment table cans and tins

.Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

7.4.2 Option 2 - Generate sorted, compacted and baled tins for export to recycling markets

Table 7.4: Sort, compact and bale steel and aluminium tins for export

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	-	☺	☺

Economic Considerations: This option could support the economic development of the island through creation of a new export stream.

Environmental Considerations: Steel and aluminium have large carbon footprints, so returning the cans and tins into productivity reduces the island's carbon footprint, despite being exported by ship. This is particularly true of aluminium products.

It is estimated to remove approximately **12%** of the total weight deposited per year could be removed from the waste stream. This would form a significant contribution to the SDP waste KPI for 5% reduction year on year.

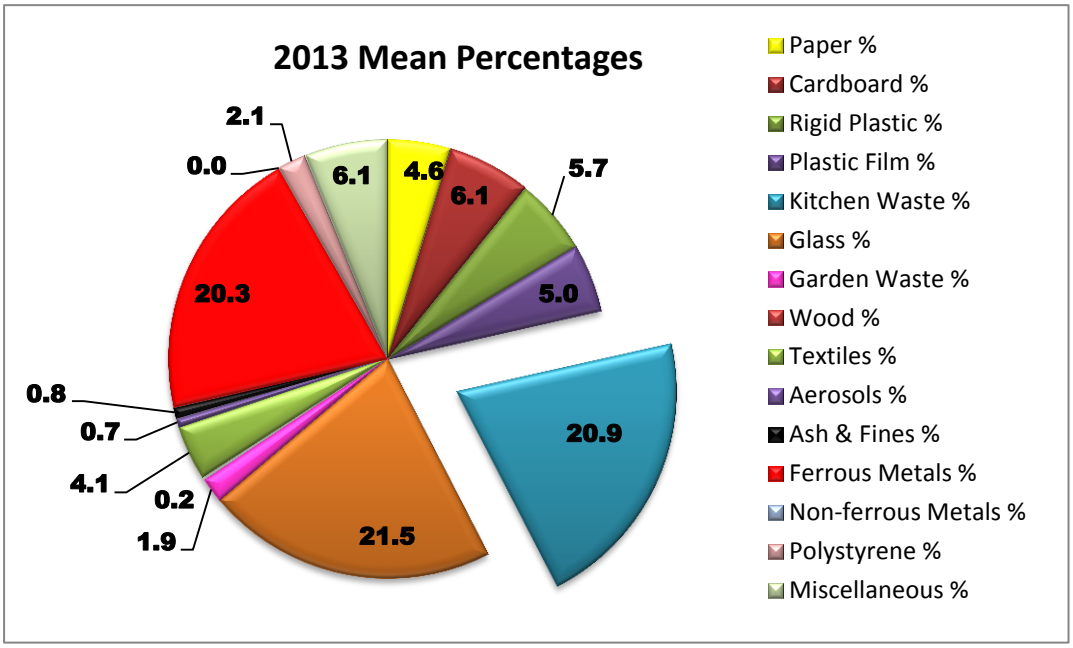
Financial Considerations: A capital investment of **£8-10K** on a compactor/baler would be necessary. Given the high proportion of steel at present the export costs are not likely to be covered. However, when higher proportions of aluminum are imported this could develop into a profitable export stream. Based on estimates 7 containers of 50% steel, 50% aluminium at RMS rates would return a profit **£16,771** per annum. As mentioned above there are a number of vulnerabilities in this calculation, so maybe best reviewed when the new shipping costs are available, Nampak has started to migrate across to aluminium and when the public response to fundraising has become a little clearer in a year's time.

Reputational Considerations: Tin and can recycling is important, although possibly less pressing than glass recycling, in order to reinforce a green tourism product that will underpin the tourist offering on St Helena.

Social Considerations: It delays the need to move the landfill into a more populated area with the additional lorry movements and potential nuisance this has.

8 Waste Fraction Options Appraisal: Kitchen Waste

Figure 8.1: Waste wheel highlighting Kitchen Waste Fraction



8.1 Source of kitchen waste

Kitchen waste, by definition, is food waste. The majority comes from domestic sources, although catering and restaurant outlets will contribute to volumes too. It is estimated that in 2013, 130 tonnes of kitchen waste were generated. It is recognised that more work needs to be done to confirm actual volumes as some kitchen waste will be reused for animal feed as well as composted on a small scale for propagation of vegetables in gardens.

Recycling kitchen waste into compost would improve the generally poor soil quality on island as well as diverting a significant waste stream from the landfill. It would have the added advantage that it could be done in such a way as to reduce the carrying capacity (maximum population that an area can sustain) of pigeons near the airport. These pose a birdstrike risk to aircraft. Removal of kitchen waste from the normal waste collection would assist in reducing other cat and rodent vermin that are bad for both the local residents and endemic species.

Kitchen waste in landfill increases the production of landfill gas (methane and other gases) that build up below ground and require management. In the St Helena context the quantities involved are minimal, however, passive venting of the waste cells would be a distinct advantage, and in different geological conditions elsewhere on the island may require more expensive management methods to control the risks.

There has been some private sector interest in developing composting facilities, but none are currently operational and historically activity has not been sustained. Depending upon the method employed there can be high start-up costs and due to the range of environmental issues the necessary scope of the planning application can be off putting. Siting such a concern at the landfill would overcome many of these issues.

8.2 Markets for recycling

There are no overseas markets, but on island consumption of compost is likely to be good. Although culturally domestic composting has not been adopted significant SHG projects will need material in significant volumes

On island there is a high demand for mulch via the following markets:

- LEMP (Landscape Ecological Mitigation Plan) running until at least Sept 2017 with potential to extend until 2020;
- Landfill restoration;
- EMD nursery;
- St Helena National Trust, Millennium Forest; and
- Domestic and commercial growers.

LEMP compost and mulch requirements for the next 5 years are provided in Table 8.1.

Table 8.1: LEMP Compost and mulch requirements

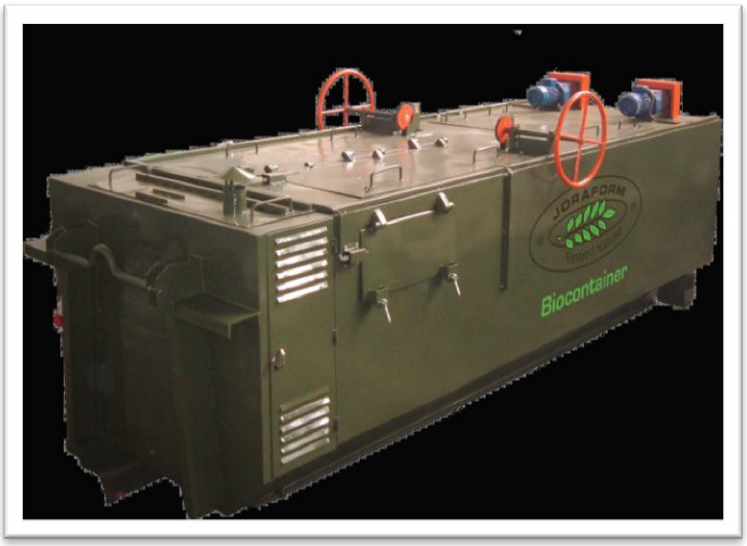
Mulch	Compost
100,000l per year for next 3 years and 500,000l per year for a further 2 years.	40,000l per year for next 3 years and 20,000l per year for a further 2 years.
Total consumption over 5years 400,000	Total consumption over 5years 160,000
No on island source and import prohibited for biosecurity reasons. This increases watering, weeding costs and reduces plant survival rates. All these increase costs of LEMP & reduces its potential for successful rehabilitation. Costs savings are hard to calculate.	Cost for imported substitute material is £3.90 per 55l. Total cost if all compost is imported is **£11,350**.

LEMP alone would be able to use all material generated through this route, even when supplemented by mulch or compost created from green garden waste.

8.3 Capital and Operational Expenditure

In order to compost this material in a way that does not attract vermin, including feral pigeons with their associated bird strike risk significant investment in bio-digesters would be required. Figure 8.2 shows a standard Jora JK5100 compost machine from Sweden with automatic pellets doser with a capacity of 2800-4200 l/week at a cost of €20,475 (£14K) Sweden (cost as at 14th January 2014).

Figure 8.2: Typical large scale bio-digester



8.4 Kitchen Waste Options Assessment

8.4.1 Option 1 – Do Nothing – Business as Usual

Table 8.2 Kitchen Waste Option Appraisal: Business as usual

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

The same issues as for the standard no recycling option, but with the birdstrike risk to aircraft remaining as a risk, which would need to be assessed, measured and managed accordingly.

8.4.2 Option 2 – Kitchen Waste Recycling

Kitchen waste has a potential to be recycled on island. Compost is expensive to import and the quality of some of the compost is not very good. LEMP has a few small scale composters so compost can be used in the habitat restoration around the airport. The composting units purchased are small rotating drums which will make good compost in a fairly short space of time. However, they produce only a very small quantity of the material required for the LEMP.

There are fully automated machines that will produce large volumes of compost rapidly. It is a waste stream that could rise with the rise in tourist numbers and increase in quality of life. It may be viewed as a private business opportunity, although to date ideas have not developed beyond thoughts of business plans. Part of the reason for this may be that the environmental planning element of such a prospect is necessarily intensive.

Table 8.3: Kitchen Waste Option Appraisal: Bio-digestion

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	-	☺	☺

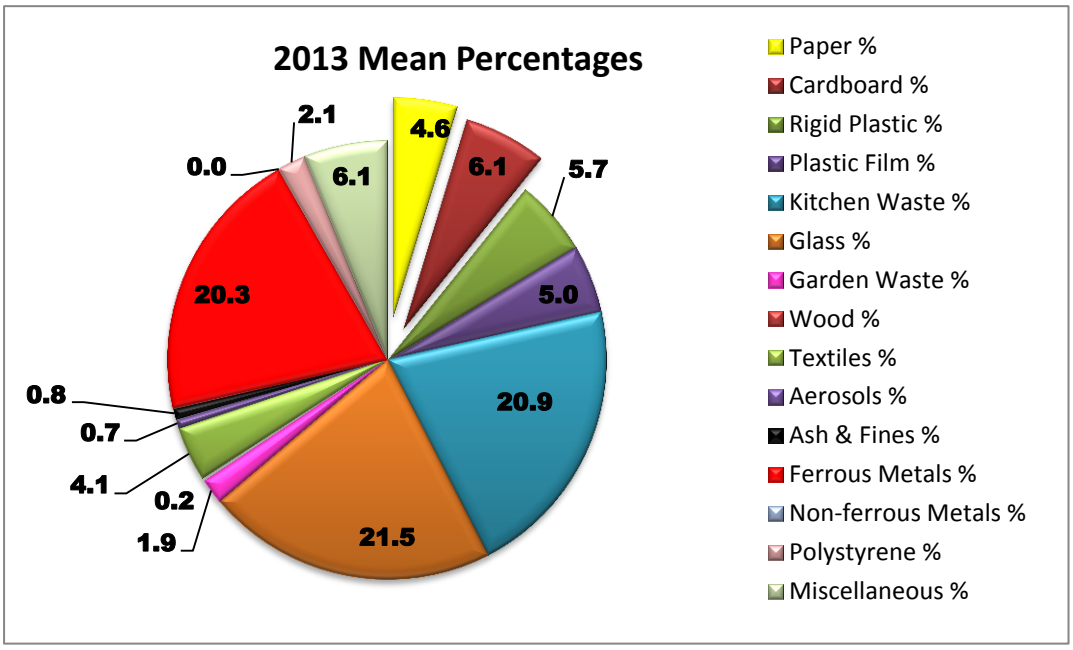
The kitchen waste recycling option needs to be considered as a priority as this high volume waste stream will be removed from landfill, which in turn will extend the life of the landfill site, reduce the production of landfill gas, that in turn can be costly to safely manage and contribute towards reducing the birdstrike risk to aircraft, as the food source for Feral Pigeons and Myna birds is removed.

However, more work is required to understand the scale of any investment and the likely benefits, other than those generally resulting from recycling.

Furthermore it will contribute towards the context of the wider aims of the island for increased economic development, adoption of sustainable practices through provision of support to conservation efforts e.g. the Landscape Ecology Mitigation Project (LEMP) and work undertaken by the St Helena National Trust and promotion of eco-tourism.

9 Waste Fraction Options Appraisal: Paper and Card

Figure 9.1: Waste wheel highlighting paper and cardboard fractions



9.1 Sources of Paper and Cardboard

Unlike most national waste streams, on St Helena newspapers and magazines do not make up a large waste stream. However, paper and cardboard make up nearly 8% of the weight of RCV collected wastes in 2013 (70 tonnes combined paper and cardboard per year). The majority of this is packaging from imported items. As a light weight fraction, it is anticipated that this adds a significant volume to the landfilled waste. As stated in Section 3 this is likely to be a substantial underestimate. It would be unsurprising if two or more times the quantity of cardboard is disposed of per year than estimated by the waste wheel.

9.2 Paper and Cardboard Markets

Currently, small volumes of paper and card are recycled into artisan paper products by SHAPE. Much of their raw material is sourced directly from the producer (at present shredded material from SHG) that does not feature in the current waste stream received at the landfill. SHAPE estimates that they consume in the region of 375kg/week. This is less than 2 tonnes per annum (i.e. equivalent to only 3% of the waste received at the landfill), and this is sourced independently from the landfill, so although contributing to reducing the waste stream it does not reduce the waste wheel figures.

As part of the recent exposure visit SHAPE's Recycling Trainer attended both the recycling and a separate artisan paper pulp craft elements. From this, SHAPE is developing an approach to increase its paper and card consumption by producing

larger items, including furniture. SHAPE plant has a greater capacity, but it seems unlikely to make a more substantial contribution to removing card than say 10%.

Turning card into new items for sale on islands, as SHAPE does, is the most environmentally and financially effective use of the material. The second option is to compact and bale separated paper and card for export into the recycling market. The degree of separation will influence the value. For example, white office paper attracts a significant premium. As seen previously, export sales alone in the current market does not cover the freight costs, however the benefits are seen in the reduction in landfilled volume.

Cardboard, once shredded, could provide a useful addition to green waste or more specifically kitchen waste composting. This would provide the 'brown' element to the otherwise 'green' waste that is necessary for a good composting process. This would have the benefit of increasing compost volumes as well as reducing cardboard disposed of.

An alternative treatment of this waste stream is to reduce its volume through incineration and disposal of the ash to the domestic waste cell. It may prove to be a useful relatively inert blending medium for some of the incineratable hazardous wastes. This has not been evaluated for its practicality, but would be worth further consideration.

9.3 Capital and Operational Expenditure

SHAPE use card and paper to create craft products that are mainly sold on island although they are considering some export outlets. It is anticipated that their range and therefore consumption is likely to grow in the coming months. Currently, they source their own raw material, although all this material would end up at the landfill and additional consumption would reduce the visible volume arriving at the landfill. However, although useful, this flow in its current form will only remove a very small proportion of paper products from the waste stream. No extra investment in plant would be required to allow SHAPE to undergo this expansion in recycling. Despite this potential rise in consumption it is unlikely make a large contribution to reducing landfill waste.

For the remainder of the waste stream it could be sorted and then baled and compacted in the same plant used for tins and cans and then exported for sale into the recyclables market. A baler is likely to be in the region of £8-£10K plus shipping and import.

Some additional value could be achieved through separation of high quality paper, paper and cardboard. A suitable way of separating paper from the general waste stream would be necessary for this. For example, white/office paper and envelopes could be captured through the dry recyclables collection service and associated process as set out in Section 6.

If SHG was to invest in a shredder further consideration may be given to composting or incinerating cardboard. Issues of planning, emissions and bottom ash disposal would need to be considered.

9.3.1 *Option 1: Do Nothing – Business as Usual*

Table 9.1 Paper and cardboard, Options Appraisal: Business as usual.

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
-/X	X	X	X	X

Risks are as per the recycled option with the addition of a waste stream being adopted by SHAPE. This enables some natural development of waste reprocessing and therefore has some economic merit. However although this is useful, it will only consume a small proportion of the cardboard generated.

It is recommended that further work is completed to evaluate the quantities of cardboard generated so that a clearer picture of the extent of the risk can be determined.

9.3.2 *Option 2 – Sorted Paper/Cardboard for Export*

Table 9.2: Sort, compact and bale paper and card export

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	-	☺	☺

Economic Considerations: This option supports the economic development of the island through creation of a new product stream which will consume some of the cardboard waste. It has the benefit of being operated by the third sector and so may also act as an example of what can be achieved to other private sector.

Environmental Considerations: As probably one of the most voluminous waste streams on island it consumes a large landfill void space. By exporting waste paper and card for recycling it is reducing demand on the very limited landfill space on island.

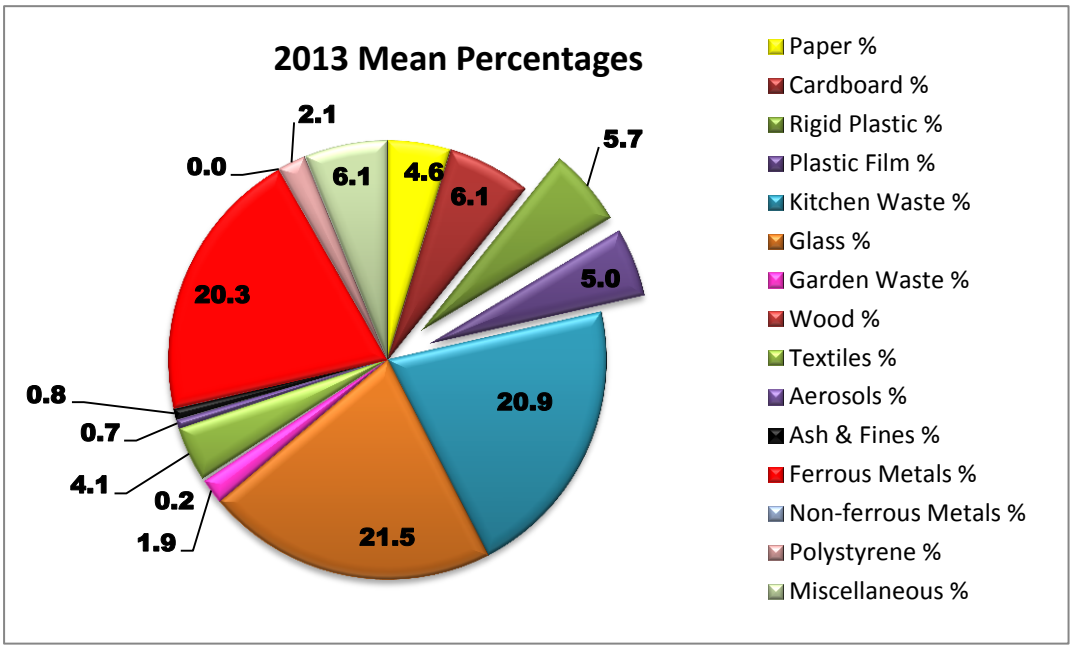
Financial Considerations: To achieve this would require capital investment in a suitable compactor/baler and a means of collecting and storing dry cardboard. There would also be a regular operational cost to export the material, because although it has some financial value at RMS rates it still cost more to export than its sale price.

Reputational Considerations: Reinforce a green tourism product that will underpin the tourist offering on St Helena.

Social Considerations: It is a relatively simple waste stream to harness that would mainly focus on commercial producers, making it socially acceptable and good as an introduction to large scale recycling.

10 Waste Fraction Options Appraisal: Plastics

Figure 10.1: Waste wheel highlighting rigid and film plastic waste fractions



10.1 Sources of plastics

There are several plastic waste streams on St Helena. The most valuable is **rigid plastics**, with **film** waste and **polystyrene** as supplemental streams. The focus of this section is rigid plastics.

Film and polystyrene, although environmentally unsound are more problematic to recycle as they are typically associated with food and therefore have substantial hygiene issues. Quantities of film could be collected at the wharf in bins as this is a significant hazard to marine life, however, this is a very small volume and could be incorporated into a wider recycling strategy. This would be beyond St Helena's capability at present. Moving away from the import of polystyrene is discussed separately (see Section 13).

Rigid plastics are the second most valuable waste stream identified in the waste wheel. The majority of these plastics originate from plastic drinks and water bottles, the majority of which are the less valuable PET. Household commodities like shampoo and laundry liquid as well as plastic lids are HDPE and more than twice the value of PET. However, HDPE is a much smaller element of our waste stream. Like metals, plastics need to be sorted by type to improve value (HDPE and PTE both having marketable value) and then compacted and baled. To maximise value, sorted plastic is flaked prior to sale into the recycling market. It is marginal whether this type of sorting would give a viable financial return.

Based on the percentages recorded in the 2013 waste wheel it is estimated that approximately 35 tonnes of rigid plastic waste makes it to the landfill. This is likely to

create a significant void space as bottles tend to re-expand after compaction, making them 'float' to the surface as well as take up more space.

10.2 Market for rigid plastic

There is no on-island market for rigid plastic. There is an export market for recyclable plastics.

Table 10.1: UK Waste values for plastics (correct at 1st April 2015)

Recycled Material	Bale Size (m^3)	Bale Weight (kg)	No of Bales per container	Value per tonne (£)	Value per bale (£)
Plastic HDPE	1	600	16	390	234
Plastic PET	1	680	16	145-230	100-156
Mixed HDPE & PET plastics	1	650	16	100	65

Chipped or flaked plastic attracts a better value, but given our very limited volumes the financial benefits are likely to be marginal. Should a chipper be available, the benefits of this treatment could be considered.

10.3 Capital and Operational Investment Required

As for card and paper, compacted bales of material need to be able to meet the specification of the purchaser. Therefore, a baler and compactor would be required as described in Section 7.3, where the most likely option is investment in a compactor baler in the region of £8K-£10K. Investigation into Basil Read's assets being offered to the open market at the end of the airport construction project may provide an alternative source of equipment.

10.4 Options Appraisal: Rigid Plastics

10.4.1 Option 1 – Do Nothing – Business as usual

Table 10.2: Plastics Options Appraisal: Business as usual

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

Risks are as for the standard 'do nothing' option, it has little economic, environmental, social or financial merit.

10.4.2 Option 2 – Plastics Sorting, Compacting and Baling for Export to Recycle

Opportunity exists for SHG to recycle plastics waste. There are two grades of opportunity. One is to sort, compact and bale. The second is to treat it further and chip it.

Table 10.3: Sort, compact and bale plastics for export

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	-	☺	☺

Most of the risks/ advantages are the standard issues previously addressed.

Financial Considerations: In order to pursue this option there will be need to invest in a compactor/ baler. To export the material will at current freight and plastic value be an expense, without offsetting capital expenditure. However, the over-riding benefit is the extension of landfill life.

10.4.3 Option 3 – Separation of plastics, chipping and landfilling

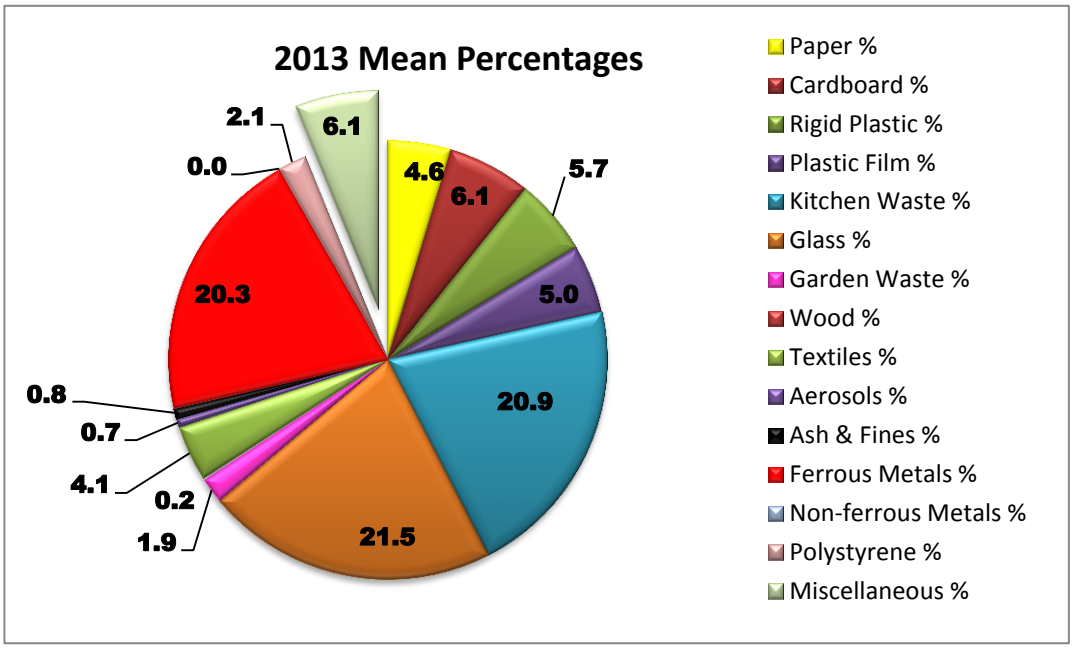
Table 10.4: Chip and landfill plastics

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
-	-	-	X	-

An alternative approach would be to separate plastic generally and chip it before landfill. This would significantly reduce void space consumed and also remove the problems associated with 're-inflating' bottles during landfilling. However, this should not be a first introduction to recycling as it is likely to depress recycling rates in a society where recycling of this type is not typical. Care will be necessary in presenting this as a method of waste management and should not be seen as 'recycling'. This would be seen as a side benefit of purchasing a chipper should it be seen as a benefit for another waste stream (see Section 0).

11 Waste Fraction Options Appraisal: Textiles

Figure 11.1: Waste wheel highlighting textiles fraction



11.1 Source of textiles

The main source of textiles is from the domestic sector. Some is received at the landfill by RCV although much, as yet unmeasured, is also deposited within the bulky waste trench. Some is received directly by the Salvation Army for sale through their Revive shop. With the start of the public recycling facility it is anticipate that there will be a rise in the recorded quantity of textiles received at the landfill.

The 2013 waste wheel figures suggest about 25 tonnes of textiles are disposed of per year. As discussed, the figure may be substantially larger.

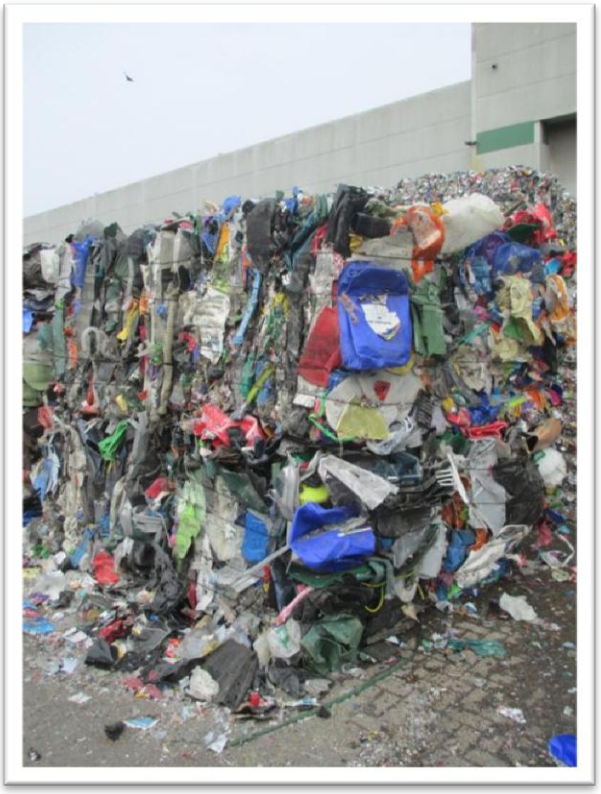
11.2 Market for textiles

Three waste recycling streams have been identified already in action on the island.

- Salvation Army Revive Shop: Where second hand clothes and other items are resold;
- SHAPE: use of life expired clothing made from natural fibres for inclusion in their paper products; and
- Imported rags sold and purchased commercially.

A further strand is anticipated to start with SHAPE trialling a line in reusable bags made from scraps and second hand textiles, with the added advantage that it discourages the use of disposable plastic bags.

Figure 11.2: Baled textiles at a UK MRF (Materials Recycling Facility)



11.3 Capital and Operational Investment

No investment is anticipated. The public will be encouraged to bring their textiles for recycling to HPLS public recycling facility. Materials will then be collected by SHAPE for sorting into resalable clothing via themselves or the Salvation Army, materials for their own use, or resale as rags to the Power Station or other commercial users.

11.4 Textiles Options Assessment

11.4.1 Option 1: Do nothing – business as usual

Table 11.1 Risk profile, 'Do Nothing' Textiles

This option delivers the standard risks of not recycling material.

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

11.4.2 Option 2: Separate and sell textiles to the island market

Table 11.2: Risk Profile, Separate and Donate Textiles

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	☺	☺	☺

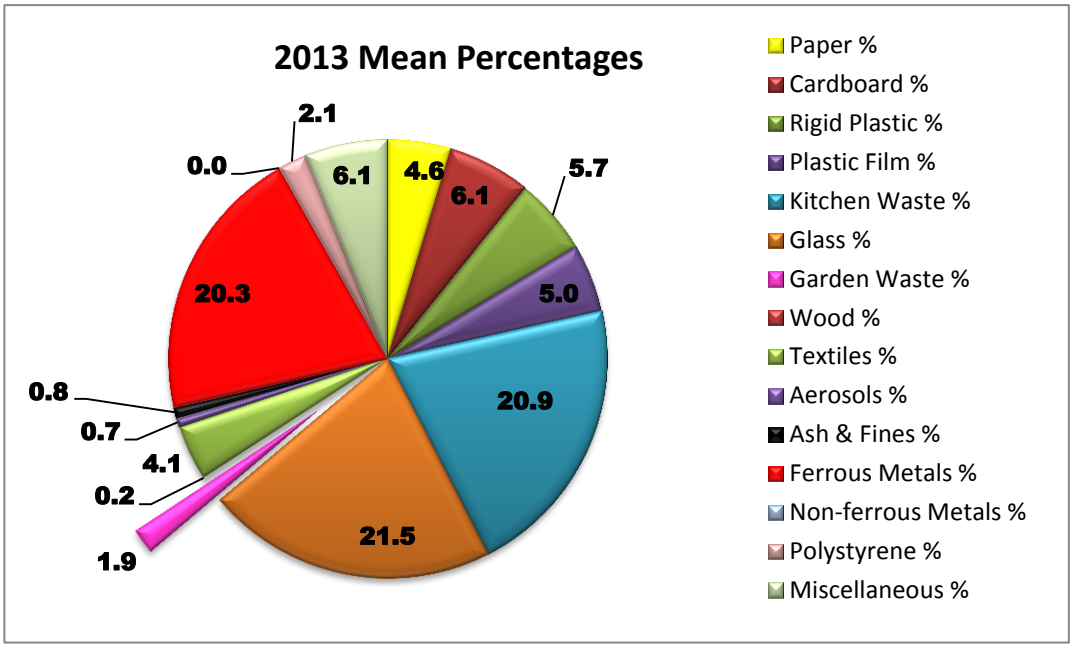
Many of the risks and advantages are as for the standard recycling option, with the following added benefits.

Environmental Considerations: The reuse and recycling of textiles could disproportionately improve the island's carbon footprint by extending clothing life and potentially reducing imports. Specifically rags are imported onto island, if that can be replaced by on island source that would have awareness and environmental benefits as well as keeping a small financial sum on island.

Social Considerations: Builds good will and provides support to SHAPE, a social enterprise, in expanding its commercial output and therefore supporting its continued support the island's disabled and carer's. Also by increasing the supply and quality of second hand clothing available at Revive so providing a less costly clothing supply and supporting the Salvation Army in their wider community support.

12 Waste Fraction Options Appraisal: Garden Waste

Figure 12.1: Garden waste, waste wheel



12.1 Sources of Garden Waste

Garden or green waste is another low waste stream from RCVs. However, significant proportions are generated by SHG Roads Section and other material is deposited at HPLS by the public. At HPLS there is an increasingly large stock pile of material that will become difficult to manage as it is not able to break down effectively and so is unusable as mulch or compost.

12.2 Market for Green Waste

On island there is a high demand for mulch and compost:

- LEMP (Landscape Ecological Mitigation Plan) running until at least Sept 2017 with potential to extend until 2020;
- Landfill restoration;
- EMD nursery;
- St Helena National Trust, Millennium Forest; and
- Domestic and commercial growers.

Compost on island is sold, depending upon type and volume between £5 and £15 per 50kg sack. Although this is not a significant value use of this waste stream has a very real opportunity to increase efficiency of a variety of large scale island horticultural activities. This is especially so as currently, due to lack of availability of both mulch and finance, it is not used.

As an example:

> *The LEMP will re-establish 180 hectares of endemic semi-desert planting. Of this 50% (90Ha) would benefit from mulching. This will improve the efficiency of the LEMP in the following ways:*

- *Reduce water costs (man hours, water consumption and bowser hire);*
- *Increase viability of plants meaning fewer seeds need to be collected, germinated and grown on (man hours and consumables); and*
- *Reduce weeding requirements (man hours).*

These benefits will also be experienced as part of the restoration phase of the landfill, endemic plant propagation at the EMD nursery and the long term rehabilitation of Millennium Forest.

Some efforts have been made to develop composting businesses, but to date none are producing volumes that would have a significant impact.

Volumes anticipated to be required by the LEMP are presented in Section 8.

12.3 Operational and Capital Expenditure

In order for the mulch or compost to be generated, it has to be created under controlled conditions. The plant material needs to be chipped and composted in sufficient volume to allow the temperature to build and kill all disease and invasive plant seeds. It needs to be stored and turned regularly.

At the landfill a number of these requirements could be met. This includes the space to form windrows, plant available to turn the material and the skills to oversee the creation of suitable mulch and compost (via EMD nursery staff). What will be required is a chipper to breakdown the plant material sufficiently to make it compostable.

SHAPE has a chipper surplus to requirements that is for sale. SHG has a suitable tractor unit that would enable the chipper to shred material. The lack of a suitable tractor unit is the reason that SHAPE is looking to divest the equipment. SHAPE do not anticipate a need for an industrial chipper in the foreseeable future.

Local businesses wishing to set up composting activities, have to some extent been put off by the necessary environmental supporting documentation and procedures required to deliver this service. Additional environment support would be required to develop appropriate protocols for composting on a commercial scale to ensure that invasive species are not spread around the island via the compost. At present, SHG does not have the resources (financial or human) to complete this area of work.

The SHAPE chipper would cost £20,306 inc VAT if purchased new, excluding import duty and shipping. Early discussions suggest that SHAPE would look for £15K-£18K without shipping and duty.

This equipment could operate on two kinds of hammers. Round, more resilient hammers and sharp hammers that are better for green waste, but require regular sharpening. The drawback of the Shape shredder is that it will not chip plastic. Expected life of hammers; 500 hours processing. On this basis hammers are likely to last in the region of one to two years at a replacement cost of £537 plus shipping and import duties.

12.4 Garden Waste: Options Assessment

12.4.1 Option 1: Do Nothing- Business As Usual

Table 12.1: Green Waste Options Appraisal: Business as usual

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

The green waste pile will continue to grow, as in its current form it is non-compostable. At present it does not present a pigeon attractant, although this cannot be guaranteed to continue. It would be inappropriate to deposit green waste into the landfill and far from ideal to use in landfill restoration in its current form. It is unsuitable to burn, without chipping it and even then it would be difficult to justify within the constraints of good environmental practice.

Do nothing does not offer a resolution.

12.4.2 Option 2: Chipping and composting

Table 12.2 Green Waste Options Appraisal: Chipping and composting

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	-/☺	☺	☺

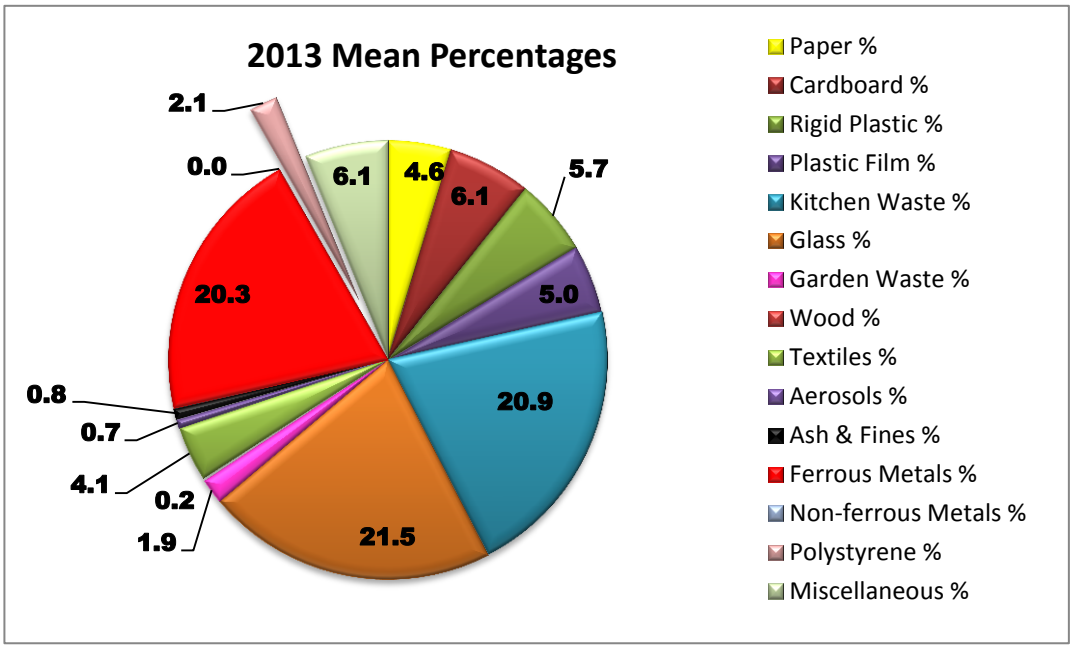
Green waste would be chipped and composted under experienced supervision. The mulch and compost arising could be used by Government for habitat conservation, agricultural and forestry projects and the private sector. This would have an added benefit of reducing imports of imported soil conditioner.

There are significant risks to conservation activities on island by using green waste which has not been properly composted. The use of poor quality compost would significantly increase the risks of spreading invasive weeds across the island.

Some capital investment is required (£15K to £20K) with a sizable proportion of the benefit taken in kind.

13 Waste Stream Options Appraisal: Polystyrene

Figure 13.1: Waste wheel highlighting polystyrene fraction



13.1 Sources of polystyrene

Polystyrene waste pollutes the environment. It is also a highly emotive subject to the environmentally aware tourist. Polystyrene on St Helena, typically in the form of take-away food containers. It tends not only to take up a substantial void at the landfill, but a wider litter problem is impacting our relatively pristine marine environment; the environment that is our tourist product. Not-with-standing the needs to manage the litter issue, countries with more developed waste management legislation have banned polystyrene in favour of biodegradable products. St Helena has taken the first steps towards this approach with the levy on imported polystyrene containers.

From EMD experience, there has been a lack of enthusiasm in adopting other packaging, often due to a lack of knowledge of options available. EMD has provided details of suppliers to Councillors over a year ago and since has taken steps to import some alternatives to encourage importers to change their packaging.

It is notable that large organisations, not known for their corporate social responsibility, have identified polystyrene as a key area to demonstrate their commitment to becoming more environmentally responsible. For example; the McDonald's fast-food franchise has made the global switch to alternative sustainable biodegradable packing, with many more companies following suit.

13.1.1 Option 1 – Business as Usual - Do Nothing

Table 13.1: Polystyrene Options Appraisal: Business as usual

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
X	X	X	X	X

Risks are as for the standard 'do nothing' scenario, but with greater emphasis on the poor impression it will give to the eco-tourism sector. Also polystyrene creates a lot of litter which will either look unsightly or require additional resource to clear it up. Packaging from bio-degradable materials, although also a potential source of littering breaks down more readily into harmless compostable material.

13.1.2 Option 2 – Polystyrene substitution

Table 13.2: Polystyrene Options Appraisal: Substitution

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	☺	☺	☺

Opportunity exists for SHG to substitute polystyrene waste. The private sector has been encouraged to move to more sustainable packaging through recent tax levies on polystyrene packaging. The costs would not be borne by SHG, so reducing financial risks. Environmental risks would still include the consumption of landfill void however this would be a short term issue as the waste packaging would biodegrade over 3 months in the landfill, reducing the overall landfill volume from this waste stream. It will serve to bolster the island's environmental credentials.

13.1.3 Option 3 – Polystyrene and banning

Table 14.3: Polystyrene Options Appraisal: Ban

Economic Risk	Environmental Risk	Financial Risk	Reputational Risk	Social Risk
☺	☺	☺	☺	☺

The first steps have already been taken to discourage the use of polystyrene packaging through the introduction of a tax. This is being supported by the demonstration of some non-polystyrene biodegradable products to show that alternatives are available. It is important that polystyrene is removed from the waste stream, and should these combined measures not be sufficiently effective the banning of polystyrene would not be out of step with the international approach to managing this potential pollutant.

14 Hazardous wastes, hydrocarbons and vehicles

14.1 Hazardous Waste

Other wastes not encountered within the RCV waste stream include **vehicle batteries and waste electronic and electrical equipment (WEEE).** With the exception of the end of life vehicles these wastes will be collected and stored at the Public Waste Facility with the intention to export them for recycling when St Helena has brokered a mandatory Basel Convention agreement to enable the material to be transported (see Section 19). If storage space does not allow, then wastes will be encapsulated in the hazardous waste cell.

14.2 Hydrocarbons – aviation fuel, oil, diesel and petrol

14.2.1 Aviation fuel

With the impending operation of the airport, there is a risk that imported aviation fuel is found to be “sour” after testing at the Bulk Fuel Installation (BFI) laboratory or a fuel load on an arriving plane becomes contaminated and requires disposal. The condemned fuel will need safe, environmentally sound disposal.

At this point in time, St Helena cannot manage large volumes of waste aviation fuel and needs to determine a means of exporting this fuel for recycling or safe disposal. SHG needs to urgently develop a solution through the BFI contract, shipping contract or some other means in order to remove this waste from the island. This solution would need to be developed in tandem with developing a Basal Convention agreement with the receiving country.

14.2.2 Waste oil

Since the RMS has been in operation, the RMS has informally exported the island’s waste oil from the power station to South Africa for recycling/disposal. This option is no longer available and Connect have had to start stockpiling waste oil until a solution can be found. At present, Connect have approximately 3 months of storage left. A solution needs to be found in tandem with the solution for aviation fuel as the island has no response to dealing with waste oil.

14.2.3 Diesel and petrol

There is limited waste diesel and petrol, however a solution needs to be developed in tandem with that identified for waste aviation fuel and oil.

14.3 End of life vehicles

End of life vehicles do form a blight on the landscape as their collection and delivery to the landfill is not currently part of the waste management team’s workflow. One means to reduce the number of wrecks would be for the Government Landlord Housing tenant agreement to be more rigorously enforced.

Other mechanisms could be considered, such as implementation of controls in the EPO, or provide a financial incentive to take old cars to the landfill.

The draft EPO does not allow for the removal of end of life vehicles from private land, but provides for the removal of waste from public places e.g. any place, on land, in water or in the sea, which is open to the air to which the public are entitled or permitted to have access (includes any covered place open to the air on at least one side). The EPO will provide for the removal of end of life vehicles from private land if the vehicle can be demonstrated to be the source of pollution to the land, air or water.

End of life vehicles are currently compacted as well as possible and buried. Further value may be extracted from them were a private sector scrap yard to be established at the landfill. This may attract some planning input, but could also become a commercially viable business.

15 Assessment of recycling collection options

15.1 Workplace Recycling

St Helena, in some ways, has a perfect solution for collecting recycling in as much as there are five large established employers who employ 35% of the islands population e.g. Solomon' s, Thorpe's SHG, Connect and Queen Mary.

Working with these organisations in setting up recycle systems at the workplace would be ideal, as large scale collections of sorted materials could be made from a few key sites and be taken directly to the recycling facility.

15.2 Community Recycling Hubs

15.2.1 Supermarkets

Setting up recycling banks around the island that are close to large population areas would allow others not employed by the main employers to collect recyclable material. For example, Half Tree Hollow supermarket, Longwood Supermarket and Main Street in Jamestown would make good community recycling hubs. Good promotion of their location and purpose would be necessary. They should be well signed so it is clear what is collected in which bins and hubs should be well maintained so that bins are clean and not overflowing.

Making sure that everyone knows where these sites are, using newspapers radio and the internet is essential.

15.2.2 Horse Point Landfill Site

SHG operates the landfill site at HPLS and is in the process of developing a public recycling facility as part of the operation. Historically at the landfill site the general public have been able to leave their waste in the active cell. This is no longer an option as the site needs to be better managed to allow for not only proper segregation of recyclable material, but also to improve health and safety and to allow for airport operations.

The landfill manager looks after the landfill day to day operations and manages how commercial operators and the public drop off their waste into dedicated areas (including at the public recycling facility). Clear signage needs to be in place to make sure the recycling ends up in the correct bay and also to make sure that the site is clean and tidy. Public perception is determined on first viewing the site and a good impression should encourage return visits.

15.2.3 Schools

Schools would also be good locations for the central collection of recyclable material, as much for their educational impact as the materials they collect. However, most children go to school by bus, reducing the opportunity for recyclable material being transported to the school recycling hub. This option should not be ignored as there is a huge educational message to get over at both Primary and Secondary level. There are opportunities for getting key students within the schools to act as ambassadors to promote a recycling programme and working with the Education department to create topics on recycling as part of the curriculum.

Other opportunities could include running competitions through schools such as plastic bottle top collection. The money raised through recycling bottle tops could be used to buy play equipment in the schools and would also have the added benefit of separating two types of plastic (PET bottles and HDPE caps).

Getting school children involved in creating a character that is synonymous with a recycling campaign is also a useful education tool. If recycling is learned at an early age, the habit of recycling stays with children for life, plus they also act as positive pressure on their parents to do the right thing. Education is a huge and very cost effective way of creating a successful recycling campaign: see an example using the web link below.

http://www.amberol.co.uk/bins/educational-bins

Amberol developed the Percy Penguin bin, which also had a voice activation unit inside so when the children put the recycling material in the bin, it gave them a happy message thanking them for using the bin.

15.2.4 Bars and Restaurants

The bars and restaurants around the island generate a large amount of waste which cannot only be a hazard with birds and rodents feeding off the litter, but also as the island is promoting itself as a tourist destination is a huge detriment to the environment and the first impressions of Saint Helena.

To site the recycling bins adjacent to general waste bins would greatly enhance the island and hopefully would be another way of collecting valuable recyclable streams. Maintenance is again key to this, as residents and tourists will not appreciate dirty overflowing bins which will then see the system fail and generate litter.

16 Can we find a partner to buy the recycled commodities?

The biggest challenge in the operation of a recycling solution on Saint Helena is getting the separated recycling material off the island in a cost effective manner.

At the moment the island is serviced by the RMS St Helena until the opening of the airport in 2016. A new shipping service will operate in mid-2016, but will be a reduced service from Cape Town, visiting the island every 6 to 8 weeks.

The logical solution will be to try and get recycled material to the nearest country and work with a commercial partner. South Africa has many commercial recyclers and to reach an agreement with one of these would be a huge step forward. Whoever we work with will be a commercial operation. Any discussions with recycling partners in South Africa should consider the PR potential for these partners. Saint Helena is one of the most remote islands in the world, is promoting eco-tourism and provides a great opportunity for recycling companies to demonstrate their market reach and capability. There may be even a partner would be willing to put in some equipment to help with the recycling on island.

SHG needs to identify a recycling partner in South Africa. This is an essential element to a co-ordinated recycling service and will enable the trans-boundary shipment of certain recyclable wastes (domestic batteries and white goods) which would otherwise be deemed to be hazardous waste.

17 How could we fund recycling?

17.1 Self Funding

Previous Sections describe how some waste streams are totally or partially self-funding, should funds be permitted to stay within the waste management service. This will not be the instance in all cases and additional funds will be required to cover all operational costs.

17.2 Landfill Tax

At present, waste is collected and taken to the landfill by EMD. There is no direct charge to the public or commercial sector for doing this. In order to set up a recycling system this has to change. Taxation can be used as a method to drive recycling and is just one method of increasing recycling rates. Using education and praise is a far more successful option as well as being less technically complicated to implement. However taxation has the benefit of giving a financial value to the service and provides an income to fund it.

The priority would be commercial operators who generate large amounts of waste as this would address a major waste stream as well as being technically simpler to implement. UK rates for landfill tax are £80 per tonne for active waste e.g. example plastic and metal. Inert waste is £2.50 per tonne e.g. topsoil, concrete, building rubble.

This maybe a high value to charge for disposing waste on Saint Helena, but a fee levied to try to assist in the promotion of recycling wherever possible would provide a substantial driver to increase recycling rates.

Once a recycling system is up and running on the island, then potentially the value generated by the recycle stream will pay for some of the service, or at least the capital depreciation of assets.

Another revenue stream could be charging a tourist tax to assist in managing the increased pressures put on the island after the advent of a successful tourist industry.

Landfill tax levied on domestic producers is likely to be more complicated to implement.

18 Exporting waste as a raw material for recycling

18.1 Position regarding waste exports to the UK, South Africa and Namibia

In all cases, export is possible in principle under international law (each country is party to the Basel Convention, but not the Bamako Convention). However, this does not mean there is a *right* to export waste and in practice each country has a discretion to permit import of waste which must be exercised in accordance with national legislation and national policy.

Export to the UK is possible in principle under UK law, including transit of waste through South Africa (under South African law). A bilateral agreement would need to be concluded, but this should be achievable within UK policy.

Export to South Africa is possible in principle under South Africa law, and South African policy seems favourable towards waste imports generally, although does appear limited to SADC countries in practice. Nevertheless, there appears to be a prospect of concluding a bilateral agreement, which would have to be discussed with the relevant authority.

Export to Namibia appears possible under Namibia law, although it is somewhat obscurely defined. Namibia policy appears more restrictive than in South Africa, and the availability of suitable facilities is less, making Namibia a more difficult option than South Africa.

18.2 Detailed analysis

18.2.1 International law position

In the cases of South Africa, Namibia and the UK each is a “Basel only” country and so export of waste should be possible in principle, subject to entering into a “not less environmentally sound” agreement.

International law country of import has ratified	International law position	National law position
Neither Basel nor Bamako	No restrictions	Potentially possible: need to check with national legislation / administration
Basel only	Import may be possible, on the ground that SH “does not have the technical capacity and the necessary facilities”	Potentially possible: need to check with national legislation / administration As St Helena is not a party, there must be a bilateral agreement or arrangement “not less environmentally sound” than the Convention
Bamako	All imports banned	Not possible.

While, none of the countries has notified the Basel Secretariat of stricter national measures (which it would be required to do if it had adopted any), this does not necessarily mean that they do not have stricter national measures (legally or administratively). It is therefore necessary to check with the authorities of each country as to whether they are prepared to accept the material in question.

18.2.2 United Kingdom

The UK does not have any additional restrictions on waste imports, and imports from overseas territories for disposal or recovery are expressly permitted within government policy. As such, the wastes intended for export from St Helena should be acceptable in the UK.

The particular administrative procedure for the waste depends on the type of waste and the intended use, but in general consists of the Basel-type notification procedures. Under the EU regulation, there is also a “green list” procedure which permits certain less hazardous wastes being imported with lesser restrictions.

18.2.3 South Africa

South African policy and legislation is intended to be aligned to the Basel Convention. Thus, materials which can be exported/imported under the Basel Convention should in principle be capable of being exported to South Africa (subject to a bilateral agreement).

At a policy level, it appears a stricter approach might be applied on imports for disposal where stated policy is that it will only accept imports from other SADC countries, if the waste cannot be disposed of in the country of export. However, this could very well be dislodged in specific cases but this would need to be verified with the relevant SA authorities.

18.2.4 Namibia

Namibian legislation is somewhat obscure. The legislation currently in place appears to be a 1974 Ordinance (Hazardous Substances Ordinance 14 of 1974, as amended by the Atomic Energy and Radiation Protection Act, 2005) but regulations envisaged under this Ordinance regulating imports and transport never appear to have been promulgated. A draft Namibian environmental law has been reviewed, the content of which most likely more closely represents Namibian practice, although the draft law does not elaborate specific regulations on trans-boundary waste.

Also relevant is s. 95(l) of the Namibian Constitution, which requires the State to actively promote and maintain the welfare of the people by including by:

maintenance of ecosystems, essential ecological processes and biological diversity … in particular, the Government shall provide measures against the dumping or recycling of foreign nuclear and toxic waste on Namibian territory.

In practice, while imports are not definitely banned s. 95 does create a potential restriction on imports. Imports have been refused from some countries in the past based specifically on s. 95 of the Constitution.

The various instruments indicate that import of wastes from St Helena should be possible in principle, but Namibian policy is more restrictive than that in South Africa. The lack of clear definition in the legislation means that the policy discretion is wide, and could be dictated by current considerations.

18.2.5 Conclusions, next steps

It appears that South Africa offers a prospect for export, and it would be worth opening up discussions on this possibility with the relevant authority. Further details on the South African framework is contained in extracts from the Basel Convention Secretariat, taken from the Basel Convention website, although only up to date as of 2011 (see Appendix B).

19 Proposed Programme

19.1 Short Term Proposals – Within one year

There are wastes on island with financial value. This can be extracted in a number of different ways:

- Wastes generating revenue as a saleable item on island;
- Waste to be sorted, compacted and baled for sale as a product into the African recycling market; and
- The extension of landfill life span on this highly space constrained island (this should not be underestimated, as it is probably the dominant factor).

From this Options Assessment it is apparent that the best returns from waste are to be found where materials can be reused on island. These should therefore be first priority waste streams to address e.g.

- Glass;
- Garden waste; and
- Textiles.

Paper and cardboard should also be considered, as the option to purchase a compactor/ baler from Basil Read may represent good value to the island.

The reduction of polystyrene and replacement with bio-degradable materials will also pay dividends and send a positive message about the island to the eco-tourism industry.

19.1.1 Glass

Glass requires capital investment in a glass crusher, but as a waste stream it has a number of benefits:

- it is relatively simple to separate;
- it is a recycling waste stream that is familiar and the public can easily engage with glass as a recycled commodity;
- glass has a viable on island market that would generate an income;
- glass off-sets a range of negative environmental impacts such a reducing demand on marine sand extraction and incorporation of marine sand into block-work which reduces the block-work life span and can damage plaster;
- recycling glass will establish reputational good will by showing joined up government thinking (linking waste and highways team to generate cost efficiency);
- enhance reputational good will from ‘green’ tourists who would expect to see this sort of provision; and
- removes a substantial proportion of the waste from landfill increasing its life span.

To implement glass recycling it would be necessary to procure a suitable glass crusher. Collection bins and a collection service would need to be established however through recent streamlining of existing waste management operations and the use of resources already available e.g. red wheelie bins, this will not incur very much additional cost to the waste management operation.

19.1.2 Garden waste

Garden waste requires further work to develop as a recycling programme, but there is potential for significant efficiencies. Garden waste recycling has the following benefits:

- is relatively simple to separate;
- has a viable on island market that would generate an income;
- establish reputational good will by showing joined up government thinking (linking waste, LEMP and conservation teams to generate cost efficiency through better plant survival rates and reduced resource requirement be it manpower or water);
- enhance reputational good will from ‘green’ tourists who would expect to see this sort of recycling; and
- removes a substantial proportion of the waste from landfill increasing its life span.

Green waste recycling will require consideration as to how it might be implemented at the landfill, so as to remain within current planning permission and avoid attracting further birds to the site. A chipper would be required, which is likely to cost in the region of £15K to £20K.

19.1.3 Textiles

Textiles can be addressed with almost no additional commitment, other than signage and publicity at the Public Recycling Facility.

19.1.4 Paper and cardboard

Paper and cardboard is likely to be one of the largest waste fractions to consume landfill volume. As discussed previously, this is SHGs over-riding interest in recycling. Although SHAPE uses a proportion of waste paper and cardboard, the vast majority is returned as landfill waste. It has some value when sold into the African recycling market, but is vulnerable to fluctuations in freight costs and recycling values. However, there is a current opportunity to purchase a compactor/ baler from Basil Read that may help reduce the price differential. This should be investigated with a degree of vigour to ensure the best outcome for the island.

19.1.5 Polystyrene

Work has already started on this strand with taxes levied on imported packaging. Alternative food packaging has been demonstrated to local businesses. A watching brief is necessary to establish whether changes in tax on polystyrene is having a meaningful effect on landfilled waste. This will influence medium term choices.

19.1.6 Basel Convention Negotiation

Negotiation of Basel Convention for the export of hazardous wastes, particularly those that can be recycled is required. This is likely to include vehicle batteries, waste oils, waste electrical and electronic equipment (WEEE). This will enable the export of a range of materials that currently contribute to the bulky waste fill and may be directed to the very limited hazardous waste cell.

19.2 Medium Term Options (Two to four years)

With the establishment of the ethos of recycling on island, other waste streams could be tackled. These are likely to include:

- Kitchen waste;
- Cans and tins;
- Rigid plastics.

These would require capital investment in an anaerobic digester and compactor/ baler respectively.

They would then form the hub of a MRF (Materials Recycling Facility) potentially housed in the Waste Reception Building at HPLS, where materials can be sorted and processed. If necessary, there may be some scope for storage until markets give best returns.

19.2.1 Long Term Options (Five years onwards)

Full development of a MRF, with appropriate collection services and substantially reduced landfill filling rates. Depending upon speed of early recycling investment and up-take there may be a necessity to start the process of identifying and developing a new landfill site.

At this point it would be possible to include some of the smaller volume waste streams, such as the very lucrative copper and the very environmentally damaging, but clean packing film generated at the wharf.

19.3 Outstanding issues

An economic evaluation of the development of a new landfill, to gain a full appreciation of the benefits of extending the lifespan of HPLS.

Further investigation is required into baler/compactors. One may be available from Basil Read, but we shall require full details and cost to understand if it is suitable for our requirements. One specific area that requires confirmation is the bulk density that can be achieved by these balers as this has a significant influence on the number of bales will need to be created for export, particularly relating to tins and cans and therefore transport costs. This aspect can be highly variable.

It will be necessary to understand the cardboard waste stream as the waste wheel significantly under-estimates the volumes, but we have inadequate information to provide a robust estimation of numbers. Even at current consumption it is clear that although SHAPE makes a contribution to the diversion of this waste stream it is not a significant one. A clearer understating of the actual waste volumes will justify an approach to its management.

An assessment of incineration of paper and card is required to establish whether it could deliver the volume reduction without unacceptable air-quality impacts. This would be an alternative to compacting and baling for export.

So far no reliable bulk densities of different waste streams have been identified. This has the disadvantage that the actual volumes of landfill that could be saved as a result of recycling have not been calculated. Further consideration of how this might be achieved would require prioritisation and planning.

Appendix A. Indicative cost for new landfill site

Estimated costs for identification, consultation and construction / transfer of assets to a 10Ha site in Donkey Plain

Item	Rate	Units	Indicative Cost	Reference (date)
Options Appraisal	£40,000	1	£40,000	Estimate
EMD Project Management	£4,000	18	£72,000	Estimate Full time at Head of Waste Management Grade (months) plus junior support
Chief Engineer to oversee construction	£1,666	12	£20,000	Estimate EMD time cost planning EIA & consultation
Two way access road avoiding quarry.	£275	1200	£330,000	(£275/ linear m, total length 1.2km) (B Hathway, road division *pers coms* June 2015) £
Land cost	£27,500	24.7	£679,250	£25-£30,000 per acre for Donkey Plain Area (G Henry, Crown Estates, *pers coms* June 2015). Current site is 10Ha is 24.7 acres
Site clearance	£1.64	10,0000	£164,000	Site clearance BR BoQ 2014
Fencing	£23	1240	£28,520	2m high security fencing, installed. BR BoQ 2014. R
Double leaf gates	£483	3	£1,449	BR BoQ 2014
Internal roads and drainage channels	£100,000	1	£100,000	BR BoQ 2014
Public Recycling Facility	£105,000	1	£105,000	BR BoQ 2014
RCV Waste Reception Building	£520,000	1	£520,000	BR BoQ 2014
Landfill surface preparation	£6.04	67000	£404,680	For area of same size as was currently cleared. Donkey Plain is on rock so taken to be hard rock excavation value.
Waste cell excavation	£6.04	2880	£17,395	Cost per cell excavated into rock.

Item	Rate	Units	Indicative Cost	Reference (date)
Utilities & infrastructure	£3,000	1	£3,000	Estimate based on Landfill upgrade costs
Incinerator compound	£30,193	1	£30,193	Budget sheet 2015
Hazardous waste cell	£22,707	1	£22,707	Budget sheet 2015
Relocation and contingency	£65,000	1	£65,000	Estimate
Planning Application	£800	1	£800	2012-13 Capital Budget

Appendix B. Basel Agreement – South Africa

South Africa

19.3.1.1 Competent Authority	**Focal Point**
The Director General Chief Directorate: International Negotiations Department of Environmental Affairs and Tourism Private Bag X447 Pretoria 0001 South Africa phone: (27 12) 310 35 32 fax: (27 12) 322 26 82 or 320 00 24 email: jbeaumont@deat.gov.za	The Director General Department of Environmental Affairs and Tourism Private Bag X447 Pretoria 0001 South Africa phone: (27 12) 310 37 64 and 310 34 52 fax: (27 12) 320 52 16 email: globalengagements@environment.gov.za and ngwayi@environment.gov.za

National Definition

National definition of waste used for the purpose of trans-boundary movements of waste exists in South Africa.

The National Environmental Management: Waste Act 58 of 2008, defines waste as any substance, whether or not that substance can be reduced, reused, recycled and recovered

(a)that is surplus, unwanted, rejected, discarded, abandoned or disposed of;

(b) which the generator has no further use of for the purposes of production;

(c) that must be disposed of; or

(d) that is identified as a waste by the Minister by notice in the Gazette, but – (i) a by-product is not considered waste; and (ii) any portion of waste, once reused, recycled and recovered ceases to be waste.

National definition of hazardous waste used for the purpose of trans-boundary movements of waste exists in South Africa.

The National Environmental Management: Waste Act 58 of 2008, defines hazardous waste as waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

South Africa regulates/controls additional wastes as hazardous that are not included in Art. 1 (1)a of the Basel Convention and would be controlled for the purpose of trans-boundary movements pursuant to Art. 1 (1)b.

South Africa has made use of the opportunity offered by the EU to be

informed of shipments of non-hazardous waste for recovery in non OECD countries, regulation (EC) No. 1013/2006. South Africa requested that all wastes listed in Annex IX of the Convention be submitted to the Basel procedures.

South Africa requires special consideration for the following waste(s) when subjected to trans-boundary movement:

Radioactive mining waste.

Restrictions on Trans-boundary Movement

19.3.1.1.1.1.1 Amendement to the Basel Convention

The amendment to the Basel Convention (Decision III/1) has not been implemented in South Africa.
South Africa has not ratified Decision III/I of the Convention as such the provisions have not been implemented in the country. South Africa accepts waste for disposal from SADC countries where the exporting country is able to motivate that they do not have facilities to allow for the environmentally sound disposal of waste in their countries.

Restrictions on export for final disposal

South Africa restricts the export of hazardous wastes and other wastes for final disposal.

South Africa is a signatory to the Basel Convention. South Africa uses the provisions in the Basel Convention to restrict the export of hazardous waste for disposal in other countries. Department of Environmental Affairs is also developing a National Policy for the control of exports and imporst of waste in line with the requirements of the Basel Convention. Addtional restrictions to exporting wastes are anticipated specially e-waste.

In addition the International Trade Administration Act No. 71 of 2003 requires that a permit be issued by the International Trade Administration Commission (ITAC) before any wastes identified in Annex III of the convention can be imported or exported.

South Africa restricts the export of hazardous wastes and other wastes to all non-Parties to the Basel Convention and any country which cannot demonstrate that it has the necessary technology to dispose of the waste in an environmentally sound manner which is protective to human health.

Restrictions on export for recovery

There is no information concerning restrictions on the import of hazardous wastes and other wastes for final disposal provided for South Africa.

The provisions of the Basel Convention apply to any exports of

waste for recovery.

The International Trade Administration Act No. 71 of 2003 requires that a permit be issued by the International Trade Administration Commission (ITAC) before any wastes can be imported and exported. This will apply to wastes being exported for recovery.
South Africa restricts the export of hazardous wastes and other wastes to all non-Parties to the Basel Convention and any country which cannot demonstrate that it has the necessary technology to dispose of the waste in an environmentally sound manner which is protective to human health.

Should a South African company wish to export waste to another country for recovery, the exporting company would need to motivate why the waste cannot be recovered in South Africa. In addition the Department would require a copy of the environmental permits required for the technology being used to recover the waste in the country of import as well as a copy of the recovery companies ISO 14001 which would demonstrate that they are able to manage the waste in an environmentally sound manner.

Restrictions on import for final disposal
There is no information concerning restrictions on the export of hazardous wastes and other wastes for recovery disposal provided for South Africa. South Africa is a signatory to the Basel Convention and uses the provisions in the convention to restrict the import of hazardous waste for final disposal in the country. South Africa does however, accept waste from SDAC countries who do not have the necessary capacity to disposal of hazardous waste in their own country.

Near end of life computer and electronic equipment is imported into the country as second hand goods. The Department of Environmental Affairs will be developing a Policy on the Import and Export of wastes which will manage the import and export of near end of life goods.

In addition the International Trade Administration Act No. 71 of 2003 requires that a permit be issued by the International Trade Administration Commission (ITAC) before any wastes identified in Annex III of the convention can be imported or exported.

The restriction covers all countries other than SADC countries. South Africa allows the import of waste for final disposal from SADC countries that are able to demonstrate that they do not have adequate disposal facilities in their own country to dispose of the waste in an environmentally sound manner.

The waste management company in South Africa would need to have the necessary permits and/or licenses required by the various environmental laws in the country which allow for the disposal.

Restrictions on <u>import</u> for recovery

South Africa restricts the import of hazardous wastes and other wastes for recovery.

South Africa is a signatory to the Basel Convention and uses the provisions in the convention to restrict the import of hazardous waste for final recovery in the country. The country specifically does not support the import of e-waste into the country where the majority of the waste will be required to be disposed of.

The Department of Environmental Affairs is developing a National Policy for the control of exports and imports of waste in line with the requirements of the Basel Convention and the matter of importing e-waste will be considered and managed through this policy.

South Africa has indicated to the European Commission, in relation to Regulation (EC) No. 103/2006 on shipment of non-hazardous waste from OECD countries to non OECD countries that shipments of all wastes listed in the Convention to South Africa should fall under the provisions of the Basel Convention.

The restriction covers all EU Commission countries.

South Africa would only import hazardous waste for recovery if the importing company could provide proof that they had a technology which would recover the waste in an environmentally sound manner which is protective of human health and that the technology meets the permit/licensing requirements of the country.

Restrictions on <u>transit</u>

South Africa restricts the transit of hazardous wastes and other wastes.

South Africa is a signatory to the Basel Convention and uses the provisions in the Convention to restrict enforce conditions of transit of hazardous wastes and other wastes through the country.

The restriction covers all countries who are Parties to the Basel Convention.

Hazardous wastes and other wastes in transit through the territorial waters of the country may not be repackaged in the country and may not leave the export area of the port should they merely be on route through the territorial waters of the country.

Transport regulations apply to the transporting of hazardous goods and waste in the country and should waste be in transit through the country via road these regulations apply.

Reduction and/or Elimination of Hazardous Waste Generation

National strategies/policies

A Cleaner Production Centre has been set up in South Africa to assist industry to reduce wastes and pollution;

The Department of Environmental Affairs has promulgated the National Environment Management: Waste Act 58 of 2008 which provides for among others the following:

- The requirement for industries to produce Industry Waste Management Plans, these plans will identify how they will implement the waste hierarchy;
- The development of a National waste management strategy, which will set targets for waste recycling;
- The national waste classification procedures are being revised which will identify a procedure for the reuse of hazardous and general wastes; and
- The identification of priority waste streams, which will then allow for certain interventions including the setting of targets for reductions, phase out or banning of these priority wastes;

19.3.1.1.1.1.2 Legislation, regulations and guidelines

- A draft policy and regulations are being developed for the environmentally sound management of Healthcare Risk waste. This policy will include provisions for the correct separation of Health Care Risk waste from Health Care General wastes which will reduce the Health Care Risk Waste stream requiring treatment;
- A Policy which supports High Temperature Thermal Treatment of waste has been published early in 2009. This policy promotes the use of high calorific hazardous waste as an energy source in cement production, which will effectively reduce waste.
- Waste Tyre Regulations were published in 2008, these regulations require that the waste hierarchy be applied to the management of tyre waste. By utilising waste tyres to produce further products or for energy substitution in cement kilns, waste from tyres will be avoided.
- Plastic bag regulations were published in 2003 which among others requires consumers to pay for plastic bags. These regulations have effectively reduced the number of plastic carrier bags being disposed of.
- Draft Waste Information Regulations, which require registration of waste Generators and Waste Managers in the national Waste Information System. This system also requires reporting by the Waste Managers on the waste that has been managed. The regulation is imminent and due for promulgation by June 2011.
- Draft Regulation for Classification and Management of Waste due for promulgation by September 2011. This Regulation aims to support the management of waste with the application of waste management hierarchy favouring waste minimization and disposal as the last waste management option.

Economic instruments/ initiatives

South Africa promulgated and is implementing plastic bag regulations which require manufacturers of flat carrier bags to pay a levy on each

bag produced.
An industry initiative to place a voluntary levy on the purchase of new tyres will pay for the environmentally sound management of waste tyres, which is required in terms of the Waste Tyre Regulations of 2008.

Measures taken by industries/waste generators
The waste tyre industry will pay a voluntary levy to finance the environmentally sound management of waste tyres.

19.3.1.1.1.1.3 Others

Trans-boundary Movement Reduction Measures

National strategies/policies
Preventative measures
- South Africa is a signatory to the Basel Convention which restricts the trans-boundary movement of hazardous and other wastes.

Department of Environmental Affairs is developing a Policy for the control of exports and imports of waste in line with the requirements of the Basel Convention. Issues to be considered through the development of this policy include among others the trans-boundary movement of waste batteries and e-waste.

Legislation, regulations and guidelines
Basel Convention.

Economic instruments/ initiatives
None.

Measures taken by industries/waste generators
A Cleaner production centre has been established and is located at the CSIR, the Chemical Industry have a Responsible Care Initiative.

Others

Disposal/ Recovery Facilities

Disposal facilities
The information on permitted waste disposal facilities can be obtained from the Department of Environmental Affairs Waste Information System website, i.e. www.sawic.org.za

19.3.1.1.1.1.4 Recovery/recycling/re-use facilities

- Collect-A-Can (Pty)Ltd, P O Box 30500, Kyalami, 1684; ;
- FFS Refineries, P O Box 36979, Chempet, 7442; ;
- FFS Refiners (Pty) Ltd, P O Box 25102, Sea View, 4072; ;
- Nampak Poly-cyclers, P O Box 356, Olifantsfontein, 1665; ;
- Oil Separation Solutions Lowveld (Pty) Ltd, P O Box 17854, Sunward Park, 1470; ;
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Information can be obtained from Department of Environmental Affairs Waste Information System website: www.sawic.org.za and www.pacsa.co.za/links.asp
For more information concerning the "Description of the facility, operation or process" contact the focal point and/or competent authority (the field designated to hold this information in the Reporting Database has limited storage space).

Bilateral, Multilateral or Regional Agreements

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Technical Assistance and Training Available

- Department of Environmental Affairs
- Department of Water Affairs
- Potchefstroom University
- Institute of Waste Management
- Basel Convention Regional Centre
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Department of Environmental Affairs (DEA) is developing database of institutions available in the country with information on the kinds of services these institutions are offering. Once finalized the database will be made available on the DEA Waste Research network website; www.deat.gov.za/waste