St Helena Government

HORSE POINT LANDFILL SITE LANDSCAPING PLAN

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Environmental Management Division

Saint Helena Government

March 2016

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

St Helena Government

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01					
02					

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CONTENTS

GLOSSARY OF TERMS

EMD Environmental Management Division

ERM Environmental Risk Management

HPLS Horse Point Landfill Site

LEMP Landscape Ecology Mitigation Programme

MF Millennium Forest

SHG St Helena Government

SHNT St Helena National Trust

WRB Waste Reception Building

1.0 HORSE POINT LANDFILL SITE LANDSCAPING PLAN

1.1 Introduction

This document describes a series of procedures for re-landscaping at Horse Point Landfill Site (HPLS). The procedures have been designed to meet the requirements of key documents summarised in Section 1.2, to reinstate and protect the rural appearance of the area and blend the development into its setting.

It is intended that the document is retained on site, for use by operatives in carrying out their daily duties. It should not be relied upon for other purposes unless formally agreed in writing by EMD.

This landscaping plan is considered to be a 'live' document which should be routinely reviewed and updated by operational management, as a minimum on an annual basis.

1.2 Key Documents and Publications

The following documents and publications have been used in the preparation of this plan:

1.2.1 Planning and Development Control – Decision Notice

Application for Development Permission – 2012/137/PB – Solid Waste Management – dated 14th February 2013.

> On behalf of the Governor in Council, I am pleased to inform you that your application for development permission has been granted with the following conditions:
>
> 1. No development shall be commenced until a scheme of landscaping has been submitted to and approved in writing by the Planning Officer. The landscaping proposal shall be carried out within six months of the development being commissioned and thereafter maintained;
>
> **Reason:** To reinstate and protect the rural appearance of the area and blend the development into its setting
>
> 2. Roof water is to be collected in storage tanks, not less than 450 litres capacity for re use;
>
> **Reason:** To encourage use of natural resources, and 'planning policy W.2, H.9 g ii'
>
> 3. The colour of roofs shall be dark slate grey;
>
> **Reason:** To blend the building with the surrounding landscape and in accordance with '1(b) of the colour of the roof policy'
>
> 4. Any external lighting shall be designed to achieve zero upward lighting and shall be sited such that it will not emit light beyond the boundaries of the property;
>
> **Reason:** To comply with 'planning policy E.8' in order to minimise light pollution on the island

1.2.2 CAP 772 Wildlife Hazard Management at Aerodromes (2014)

CAP 772 provides best practice guidance to support an airport operator managing bird/wildlife strike risks. CAP 772 notes that an "*aeronautical assessment*" should be performed, focusing on potential flight safety implications at the relevant aerodrome(s) that an existing or proposed bird attractant development may

cause. Such a study should consist of the overall assessment of the ambient bird strike risk at the aerodrome and a site-specific risk assessment relating to any development or site in the vicinity.

HPLS is a site in the vicinity of the airport which has the potential to increase the risk of bird strike at the airport.

1.2.3 Flowering Plants and Ferns of St Helena by Phil Lambdon

Lying 1800km from Africa, St Helena is a tiny island of dramatic landscapes, from barren desert to lush cloud forest. The vertiginous volcanic slopes which rise steeply from the South Atlantic Ocean are populated by a unique fauna of great evolutionary interest, including 45 endemic species of flowering plants and ferns, some of which belong to groups found nowhere else. This is the first identification guide to cover all of the island's native and established vascular plants, and is accompanied by a wealth of ecological and historical information supported by extensive original research.

1.3 Consultation

The landscaping plan is not a conservation program and EMD has no intention of turning the landfill site into another Millennium Forest, because we need to maintain vehicle access across the site for landfill gas and leachate monitoring, safety etc. The principal aim is landscaping for visual aesthetics and erosion control. The easiest and cheapest way to do this is to use fast-growing, low-lying, drought-tolerant plants like Hair Grass, Creeper and Samphire.

This document has been produced in consultation with environmental specialists to ensure appropriate plants are selected due to the possibility of hybridisation with endemic plants currently encountered at MF and future LEMP sites.

1.4 Limitations of the Report

This document is produced for the exclusive use of SHG to enable the effective landscaping of HPLS following re-development.

2.0 GENERAL INFORMATION

2.1 Location

Horse Point landfill site (HPLS) has been operational for a number of years. It is situated 2.3km from Saint Helena airport which is currently under construction. As the landfill is within 13km of the airport, it has been necessary to consider the implications of the landfill operation on birdstrike risk encountered within airport airspace.

HPLS is owned and operated by St Helena Government (SHG). The airport is owned by SHG and operated by Basil Read. Birdstrike risks are managed at the airport by the airport operator (Basil Read) in accordance with methodologies outlined in the airport operator's Wildlife Hazard Management Plan (WHMP). As a responsible landowner SHG is required to use reasonably practicable means to reduce the attractiveness of the landfill to birds. In this case that is feeding feral pigeons.

The site is located in the north eastern corner of the island in excess of 500m from residential development (Drawing HPLS1). HPLS is located in the north eastern corner of the island, at grid reference 15.3592S, 05.4040W. A detailed site plan is provided in Drawing HPLS2.

2.2 Waste Management

HPLS provides St Helena's waste management facility. Given the remote nature of the island, its limited economy and lack of international hazardous waste agreements the site comprises historical uncontained landfilling of all materials. Preparations for airport certification have enabled the re-development of the landfill so that a degree of waste segregation is possible, notably separation of:

- Domestic waste into a netted, un-engineered, waste cell;
- Bulky waste disposal into an un-engineered un-netted cell;
- Green waste into a separate stockpile;
- Hazardous waste disposal into an engineered hazardous waste cell; and
- Thermal treatment of select biosecurity, medical waste and hazardous wastes in a Macrotec V70B incinerator.

In addition, a Public Recycling Facility has been created, resulting in a reduction of public access to the wider site.

2.3 Endemics Trial Restoration Area

On 5th July 2013 members of EMD, SHNT and Basil Read worked on site at Horse Point to commence a restoration project, through planting of endemics, on the Landfill Site.

400 plants (200 Gumwood and 100 each of Ebony and Hair Grass) were planted within a 20m x 20m area on the site, the results of which would determine the possibility of further restoration as the need arises.

The aims of the trial were to;

- Monitor the planted trees for pests, to water the trees as required and to weed the site.

- To monitor the growth and survival rate of all the planted species, to observe the maintenance requirements of the plants at the site and to make recommendations for best practice for successful establishment.

3.0 LANDFILL DEVELOPMENT

The landfill shall be excavated sequentially and will comprise a series of 18 cells of dimensions 24m x 12m x 12m. The initial construction process is outlined below:

1. the area of the landfill site will be set out by the Landfill Manager, to indicate the layout of the cells and excavation levels;
2. where present, top soil from the excavation area will be removed for use in restoration. It shall be hauled by tractor and trailer to separate stockpiles defined by the Landfill Manager;
3. the cell will be excavated to the lines and levels set out, the final excavated levels will be checked by the Landfill Manager;
4. the excavation soils shall be stockpiled adjacent to the cell for use as daily cover or for re-profiling as part of restoration;
5. surface water ditches will be excavated using the 360^{o} excavator to divert rain water runoff around the landfill site;
6. the main access road is provided up to the point of entry to Cell 1; the access road into Cell 2 and beyond will be constructed as needed; and
7. the mobile aerial netting system shall be installed over the active landfill cell prior to commencing waste deposition.

Once constructed, the landfill site shall be filled on a phased basis, with only one active cell operational at any one time. The phased approach is intended to minimise the generation of leachate, reduce odours, manage landfill gas and encourage the progressive restoration of the site.

The phased development of the landfill is outlined below:

1. the cell to be filled shall be identified on site;
2. the cell shall be cleared of any vegetation and erosion of the slopes and base shall be repaired by infilling, particular care shall be taken when assessing the condition of slopes and bunds upon which the mobile aerial netting system may be founded making them suitable foundation for the netting;
3. access to the cell shall be established. This may require the construction of a ramp or forming a route across the restored areas of the landfill;
4. the mobile aerial netting system over the cell shall be installed;
5. waste shall be transported to the cell;
6. waste shall be compacted in accordance with Section 4.0 and covered with soils in accordance with Section 5.0;
7. 6-monthly or as required topographic surveys of the cell shall be performed to monitor filling progress and as required set out final waste levels;
8. adjust / move the mobile aerial netting system as required to allow the required waste profile to be achieved;
9. once final waste levels are achieved, the final soil cover layer (minimum of 500mm depth) shall be laid such that no waste is exposed. The netting system shall be dismantled; and
10. restore the completed cell area in accordance with Section 6.0.

Individual cells will be separated by internal dividing bunds at base level (approximate 3-6ft – depending on the stability of the soil). These bunds will need to be approximately 1.0m in height and wide enough to accommodate the mobile aerial netting system.

4.0 LANDFILL ACTIVE CELL

The working face is defined as the active portion of the landfill where wastes are deposited and where they are spread and compacted with landfill equipment. Material shall be deposited at the furthest point and filled in strips back towards the cell entry points. Material will be compacted using the tracked landfill vehicle.

Compaction of waste is required to:

- maximize waste density to optimize utilization of the landfill airspace and to reduce consolidation and settlement;
- minimize soil cover by providing an even surface on which soil cover is placed; and
- reduce the potential for wind-blown litter.

The following compaction technique(s) shall apply:

- waste shall be spread in thin lifts not to exceed 0.6 metres in thickness and at the end of a push the machine should roll beyond the deposited refuse;
- waste shall not be placed on top of a previous 0.6m lift until the previous lift has been compacted by a minimum of three (3) equipment passes. Compact the refuse until the equipment “walks out” of the refuse (does not sink into the waste but stays on top);
- 3 - 5 passes are considered necessary to achieve the required level of compaction;
- trimming the refuse: before the cell is covered, the refuse shall be graded to as smooth a surface as possible. After the waste has been compacted, the operator shall re-grade, filling areas that have settled and trimming any high spots so that the finished cell has a smoothly graded surface; and
- care shall be exercised in placing waste to ensure that non-compatible or hard to compact bulky wastes are placed at the bottom or deep in the cell.

5.0 WASTE COVER SOILS

Waste cover soils shall be sourced from the stockpiled material excavated to form the cells. All waste shall be covered with an adequate amount of cover soils with such frequency that it:

- prevents windblown litter;
- prevents odours being a problem off-site;
- ensures that scavenging birds are not attracted to the site;
- ensures that flies and vermin are not attracted to the site or infest the site;
- ensures that the risk of fire on or within the site is minimised; and
- ensures that the visual appearance of the site is not seriously detrimental to the amenity of the locality.

Waste cells shall be covered with available soil material to a minimum depth of 150 mm. Cover soils shall be placed over waste no later than the end of each working day.

To minimize cover soil usage and maintain waste void space, the following steps shall be taken:

- minimize the waste surface area requiring soil cover;
- leave the waste surface smooth and void-free after compaction; and
- prior to placing additional waste, strip all available soil from the area over which the waste will be placed that day. This stripped soil shall be moved to the side of the cell and reused at the end of the day for daily cover.

6.0 RESTORATION AND CAPPING

As landfilling progresses above the original ground level the Landfill Manager will be required to set out the final waste levels.

Once the final waste surface elevation has been achieved within a cell, capping and restoration of the cell will commence. This shall consist of a regulating layer, capping layer and restoration soils.

Regulating Layer: A layer of excavated soil materials placed over the final waste levels to provide an even free draining surface.

Capping Layer: This layer consists of a minimum of 500mm of clay compacted to form a low permeability barrier. The clay cap should be placed in 150mm thick layers and compacted with 8 passes of the tracked loading shovel or 360^{o} excavator. 'Clay' shall be sourced from the stockpiles of deeper excavated materials collected as part of the cell excavation process.

Restoration Soils: Restoration 'soils' shall be placed over the clay equal to a depth of 500mm. Soils shall be placed and care shall be taken not to compact the soils. Should areas become compacted the surface shall be carefully ripped using the bucket teeth of the 360^{o} excavator. Soils shall be sourced from the stockpiles of near surface materials excavated as part of the cell excavation.

Note: The capping and restoration design to be adopted for the areas of the site outside of the new netted landfill cells is described in Annex A.

7.0 LANDFILL GAS MANAGEMENT

As part of the capping and restoration scheme, a simple passive venting system shall be used to allow any landfill gas produced to vent rather than build up beneath the capping layer.

Upon completion of waste placement in a cell, a 1m x 1m (minimum dimensions) hole will be excavated into the top of the waste, penetrating a minimum of 0.5m.

Within the excavation, a 2.5m long 100mm diameter pipe shall be installed. The lower 400mm of the pipe shall be perforated to allow gas to flow. Perforations shall be 5mm in diameter and drilled at 100mm intervals along the length of the pipe and at 90^{o} around the pipe perimeter (pipes may be drilled on site).

Once the pipe has been installed the excavation within the waste shall be backfilled with clean 20mm single size stone.

The pipe will penetrate up through the cap and restoration soils. Care must be taken not to damage the pipe when placing the clay cap and restoration soils. Within 500mm of the pipe, placement and compaction of the clay cap around the pipe should be undertaken using shovels to place 100mm layers of clay and a steel rammer to compact each layer.

At the surface, the pipe shall protrude by 0.5m and shall be fitted with a T-Junction to form a cowl preventing materials falling into the pipe and deterring access by vermin.

One gas extraction pipe shall be installed per waste cell (domestic waste cells only). Monitoring of landfill gas will be undertaken regularly by EMD, through their environmental monitoring programme. Should it be determined that additional gas extraction vents are required then further vents can be installed per cell.

An alternative method of construction can be to excavate a hole upon completion of the capping and restoration. In this case a 1m x 1m (minimum dimensions) hole would be excavated through the soils into the top of the waste, penetrating a minimum of 0.5m. Care must be taken to excavate the soils and clay separately from the waste, for later use, and the excavated waste disposed of to the active cell. Backfilling would then be undertaken as described above. This method would eliminate the risk of damaging the pipe with mechanical plant when installing the cap and restoration soils.

8.0 LANDSCAPING AND PLANTING

Landscaping and planting needs to be carefully considered in order to;

- reinstate and protect the rural appearance of the area and blend the development into its setting;
- ensure appropriate plants are selected due to the possibility of hybridisation with endemic plants currently encountered at MF and future LEMP sites;
- reduce the attractiveness of the site to feral pigeons by limiting accessibility to waste and fruiting weeds as a food source;
- protect the site from high levels of erosion.

Planting to retain the surface layers will be assessed. Ideally, if stocks allow, topsoil will be used to cover the area of restoration. Alternatively, septic tank effluent cake could be used as a soil enhancer. The area would then be closely planted with native and non-native plants suited to the environment and then have limited requirement for on-going maintenance.

Areas both in and outside of the site perimeter fence currently support a variety of plants, but not all are best suited for the landfill site.

8.1 Endemics Trial Restoration Area Results

A final report was received from SHNT on 13th April 2015 in relation to the Trial Restoration Area, the results of which are as follows;

- **Survival rate:** out of the 400 plants that were planted in July 2013, 65 Gumwoods have died 2 Ebonies and 1 Hair Grass. This gives 67.5% survival rate for Gumwoods, 98% for Ebony and 99% for Hair Grass.

- **Weeds found on site:** Common Goose Foot, Spinach, Saltbush and other annual weeds. On some visits to the site SHNT removed some alien weeds e.g. Kikuyu Grass (*Pennisetum clandestinum*) and Common Goose Foot (*Chenopodium Mura*le).

- **Rubbish found on site:** mainly plastic bags and plastic bottles.

- **Pests:** Mice, caterpillars and mealy bug have been observed on rare occasions. However, no mark of damage from rabbits or mice. Mealy bug are present in soils and widely distributed everywhere.

- **Watering:** A hose is accessible on site with tap at its end and linked to the main waste water supply of Millennium Forest. Rain water collection tanks have been installed to allow for easier hand watering.

- **Total 'Leaf Growth rate';**

  Gumwoods; 7.6 of growth rate from July 2013 (7.6 times the amount of leaves).
  Ebonies; 12.2 of growth rate from July 2013 (12.2 times the amount of leaves).

- **Total 'Height Growth rate';**

  Gumwoods; 1.4 of growth rate from July 2013 (1.4 times the height).
  Ebonies; 2.2 of growth rate from July 2013 (2.2 times the height).

8.2 Erosion Control

Soil erosion can be problematic, caused through heavy rains and long periods of dry weather and excavation of soils through normal landfill operations.

Picture 1;
Landslip through erosion at HPLS

Picture 2;
Creeper growing up landscaped slopes at HPLS

Plant varieties that combat soil erosion could be considered, even if they are not native to St Helena. Creeper *(Carpobrotus edulis)* for instance which is non-native, can support soils and protect against erosion. Creeper is already established both in and outside of the perimeter fence at HPLS.

8.3 Planting

Native plants currently growing within HPLS, that should be included in the landscaping plan, need to be very low maintenance to the point of being self-supporting and they must not provide a food source for feral pigeons e.g. through seeds or fruiting berries.

Various plants are naturally growing within the site. Whilst some are beneficial to support the landscaping plan others require removal so not to impact on landfill operations or provide a food source for feral pigeons, which could increase the bird strike risk to aircraft. Plants requiring watering should be discouraged for restoration of capped waste cells due to water retention of plants on or near waste cells that can contribute towards the creation of leachate.

8.4 Native plants encouraged

8.4.1 Samphire (Suaeda fruiticosa)

Samphire is a low sprawling shrub, often forming large patches. Samphire exists within the site. It would be of particular benefit to encourage further growth, especially for restoration of capped

waste cells, as the plant survives well in hot, dry habitats such as semi-desert, arid slopes and gulley's and does not require irrigation.

8.4.2 Hair Grass (*Eragrostis saxatilis)*

A resilient grass, forming dense tufts up to 1m across, that survives well in arid and wind exposed locations. It survived neglect in the trial restoration area so would do well in other locations. If planted at a low rate (1 plant per m2) it would be easy to walk and drive over without making a trip hazard or impacting on landfill operations.

Picture 3; Hair Grass growing in the trial restoration area within HPLS

8.5 Non-native plants encouraged

8.5.1 Creeper (Carpobrotus edulis)

Creeper is a succulent, creeping sub-shrub with long stems, forming wide mats that deter colonisation by other plants. Creeper is one of the few species to survive in arid, eroded areas and is capable of surviving very dry conditions. Creeper is promoted in areas for erosion control. Creeper exists within the site and would be of particular benefit to encourage further growth, especially for restoration of areas around buildings and along roads, as the plant does not require irrigation. Being low laying Creeper would not impact on landfill operations and can easily be driven on when accessing areas around buildings and fence lines for visual inspection and maintenance etc.

Picture 4; Creeper growing behind the WRB

Picture 5; Creeper growing along the site roads

8.6 Non-native plants discouraged

8.6.1 Saltbush (Atriplex semibaccata)

A straggling shrub and one of the most common species on the island and is widespread in almost all dry areas. Saltbush exists within HPLS, but whereas it is an excellent grower in desert environments and will hold the soil together, it should be discouraged from growth because seeds were found in quantity in culled feral pigeons. It may be that *Atriplex* is a key attractant, or it may be an artefact as a result of *Atriplex* being a robust seed that can be readily identified within a wide range of less recognisable crop contents. As such existing Saltbush within the site will be removed.

Picture 6; Saltbush growing within HPLS

8.6.2 Tungi (Opuntia elatior and Opuntia ficus-indica)

Tungi is a large shrubby cactus that can grow up to 4m high. Tungi can cover large areas and therefore can be problematic for landfill operations, especially impacting on people and vehicular movements due to their size and prickly spines. Tungi exists within the site in small crops and should be removed to prevent further growth and their potential impact to Millennium Forest and other areas outside of the perimeter fence. Existing Tungi found on site should be removed and buried within the landfill site at least 500mm below ground.

Picture 7; Tungi growing within HPLS

8.6.3 Wild Tomatoes (Lycopersicon esculentum)

Wild Tomato, a straggling growing along the ground or climbing over other vegetation, exists within the site in small crops and should be removed to prevent further growth or sprayed with herbicide due to their potential as a food source for feral pigeons on the red berries.

8.6.4 Aloe (Furcraea foetida)

Aloe, a very large, herb with tough leaves that can grow up to 2.8m long and a stalk that can exceed 10m high. Once established this can be problematic for landfill operations, especially impacting on people and vehicular movements. Aloe is also a bird attractant when fruiting. Aloe exists within the site in small crops and should be removed, being careful to remove tap roots to stop regrowth and their potential impact to Millennium Forest and other areas outside of the perimeter fence. Plants removed should be buried within the landfill site at least 500mm below ground.

Picture 8; Aloe growing within HPLS

9.0 IRRIGATION OF PLANTS

Rain water collection tanks (not less than 450 litres) capacity have been fitted to the Waste Reception Building, Garage, Site Office and Public Recycling Facility for re use, to encourage use of natural resources and meet the requirements of planning policy W.2, H.9 g ii. Collected rainwater can be used to support irrigation of plants where required.

Picture 9 and 10; Rain water collection tanks fitted to either end of the Waste Reception Building

EMD previously commissioned SHNT to supply and fit a tee off from the water supply to MF that comes from the settlement ponds at Bottom Woods, to provide irrigation for the endemics test plant area within HPLS. This water was used to provide watering of the 400 endemics, a mixture of hair grass, ebony and gumwood that was test planted to determine survival rates within the landfill site.

Increased planting at MF may give SHNT cause for concern that additional planting of endemics within HPLS may drain their water supply, but this should not be a factor as HPLS benefits from rainwater collection tanks and LEMP have offered to bowser water to the ponds when necessary, to facilitate plant establishment at MF.

10.0 ENVIRONMENTAL MANAGEMENT

10.1 Litter

The landfill operator shall carry out a daily visual litter inspection on arrival at site and record the findings in a Site Diary. Areas of litter which require attention shall either be cleared by the site operative or reported to the Environmental Risk Manager for further action to be taken. In addition to this, a series of surface water ditches should be excavated around the perimeter of the final landform to divert runoff away from the landfill. Surface water ditches also capture and exposes blown litter and facilitates easy removal of this waste.

10.2 Perimeter Fence

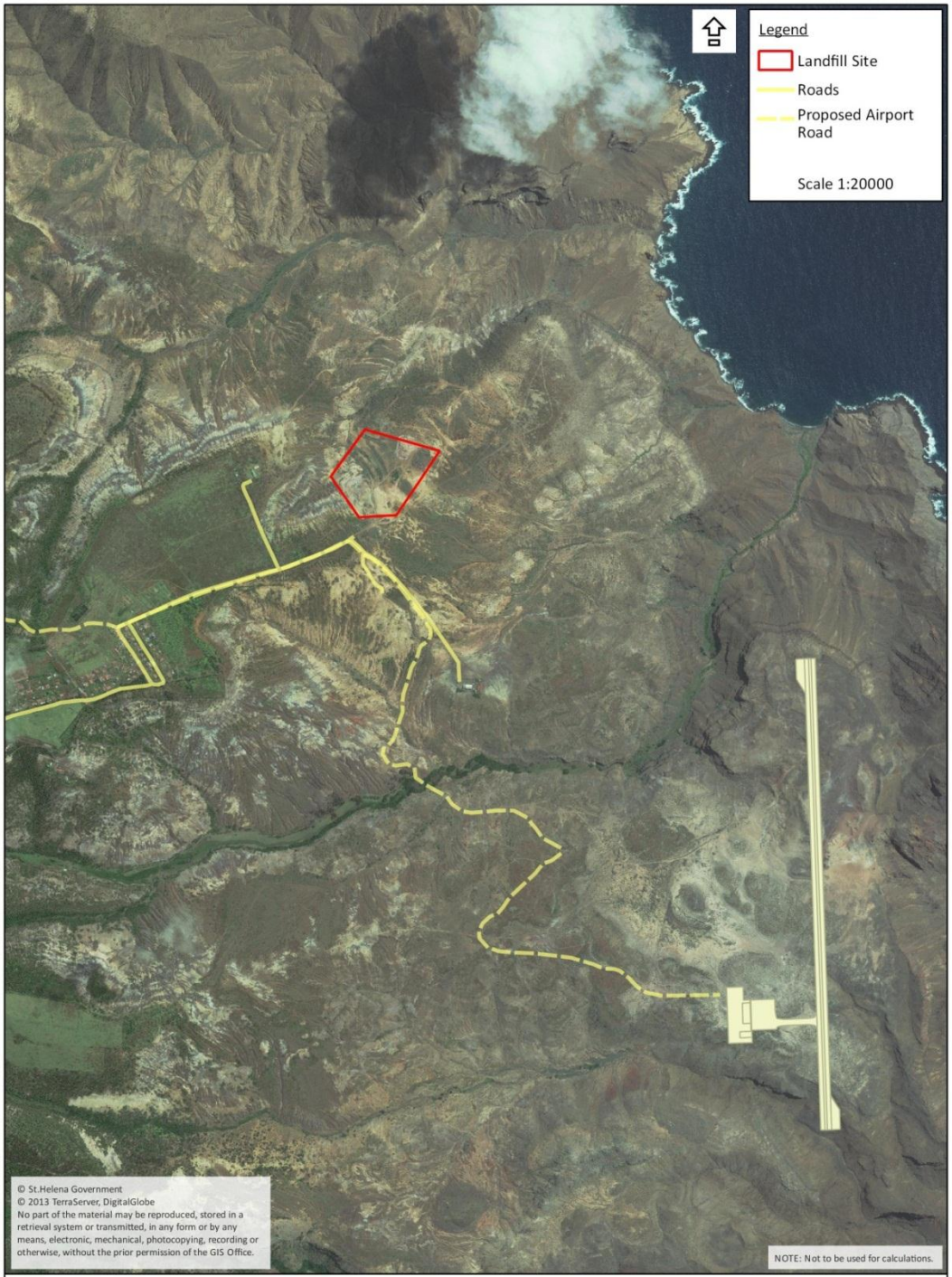
The perimeter fencing and gates shall be inspected monthly by the landfill operator, with the findings being recorded in a Site Diary. Any identified need for repair or maintenance shall be reported to the Environmental Risk Manager for further action to be taken.

10.3 Surface Water Management

Whilst the site is not designed to provide engineered containment, it is important to minimize the volume of leachate produced by the infiltration of precipitation and runoff into the waste mass. Final restoration levels for the general waste cells have been designed to help shed surface water thereby preventing infiltration and generation of leachate.

DRAWINGS

Drawing HPLS1: Site Location



Horse Point Landfill Site, Site Location Plan.

Drawing No: HPLS 1
Created by: Samantha Cherrett. Checked by: Ceri Sansom on 06/03/15

Drawing HPLS2: Landfill Site Plan

The area for cell 1 and 2 has now been redeveloped into two engineered hazardous waste cells.

ANNEX A – RESTORATION OF HISTORICAL AREAS OF WASTE

Area to be restored

The main area of previous landfilling to be restored is to the north of the new general waste cells and west of the bulky waste trench where an endemic plant restoration trial has been taking place. This area does not comprise putrescible waste and is not an attractant to birds. Ideally, these areas would be re-profiled to improve the visual amenity of the area.

Restoration of the older areas of the site should be carried out in a similar manner to the future cell area (as described in Section 4.0). However, a layer of cover material has already been applied across some of the older landfilled areas. Therefore this layer can be used as the basis for the regulating layer.

Prior to completion of the restoration works, the layer of existing cover should be checked for consistency and levelled off or increased as required to provide an even, free draining surface. The capping and restoration layers should then be applied as follows:

Restoration Layer

This layer consists of a minimum of 500mm of excavated materials compacted to form a low permeability barrier. The materials should be placed in 150mm thick layers and compacted with 8 passes of the tracked loading shovel or 360^{o} excavator. Materials will be sourced from the stockpiles of excavated materials collected as part of the cell excavation process. If areas are to be seeded, the upper 150mm layer should be carefully ripped using the bucket teeth of the 360^{o} excavator or suitable agricultural equipment (rake/harrow attached to the tractor).

Planting to retain the surface layers will be assessed. Ideally, if stocks allow, topsoil will be used to cover the area of restoration. Alternatively, septic tank effluent cake could be used as a soil enhancer. The area would then be planted with plants suited to the environment in accordance with Section 8.0 and then have limited requirement for on-going maintenance. Planting would ideally be watered (where required) utilising rain water collected in the tanks fitted to site buildings.