

SOUTHLEIGH LANDFILL SITE

RESTORATION SOILS QUALITY ASSURANCE PLAN

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Southleigh Landfill

Restoration Soils Quality Assurance Plan

1.0 INTRODUCTION

Restoration operations at Southleigh Forest Landfill are regulated by Waste Management Licence EAWML 19870 issued originally in May 1995 as Waste Management Licence EH44c. The site is operated under the Working Plan EA/EPR/XP3692HC/V003 (WML019870). The site was formally accepted as definitively closed by the Environment Agency in February 2007.

Engineered capping of all waste and associated restoration works were substantially completed in 2008. Remaining restoration work comprise import, processing and placement of additional restoration soil to complete restoration profile to agreed levels and infill areas of settlement to provide a suitable landform for final installation of gas and leachate infrastructure, permanent drainage ditches and planting.

The site is to be restored in accordance with Planning Permission F27242/1/C and amendment F29043/6C and approved restoration drawing "Pre Settlement Restoration Levels and Landscaping Plan – Drawing 1 (February 2011)".

2.0 SOIL IMPORTATION MANAGEMENT AND REPORTING

2.1 General

All restoration activities are supervised by Veolia staff. The contractor must agree specific areas of restoration in advance of commencing work and report any non compliant material within 24 hours.

All imported soils for use in restoration work must originate from uncontaminated sites.

All imported soils shall be visually inspected on arrival to site at the site control office and at active tipping/soil processing area. Should contamination within the load be observed the soil shall be rejected and the cause of the contamination at the donor site investigated?

All imported material shall be recorded using the waste transfer notes collected on arrival at the control office. These shall be collated daily and reported on a monthly waste import return to Veolia.

2.2 Site Investigation

- (i) Large donor sites for restoration soils (import >2,500 m³) shall be inspected and site history, soil analysis information pertaining to the site recorded in a “Soils Import Site Investigation Report”
- (ii) Small donor sites (import <2,500 m³) will be randomly inspected and developer/consultant’s soil investigation and analysis data will be utilised wherever possible, to assess whether or not materials meet the acceptance criteria.

3.0 SUBSOIL/TOPSOIL ACCEPTANCE CRITERIA

3.1 Background

Restoration soil acceptance criteria for Paulsgrove landfill have been developed between Veolia Environmental Services (VES) and Portsmouth City Council (PCC) for a site end use as public open space comprising woodland and grasslands. Although Southleigh will not be open to the public the restoration to woodland and grassland is similar to Paulsgrove and therefore it is proposed to use the same soil acceptance criteria and testing regime agreed for the restoration of Paulsgrove landfill.

The soil acceptance criteria have been divided into two categories as follows:-

Category A soils (including Topsoil) - within 300mm of the surface; and
Category B soils - placed at a depth greater than 300mm below the surface.

3.2 Soil Acceptance Specification

Topsoil and subsoil specifications have been developed using CLEA guidance/model and the principles discussed above, in order to maximise suitable soils available for restoration, whilst ensuring the end use for the site is not compromised.

The topsoil and subsoil quality requirements Tables are presented in Appendix A

The upper layer of soils placed in the woodland areas are to be definable as Topsoil (ie comply with the specification for multi purpose grade Topsoil set out in BS3882:2007).

4.0 IMPORTED SOIL PROCESSING, STOCKPILING AND PLACEMENT

4.1 General

Restoration subsoil shall be stockpiled and processed in a designated Tax Free Information Area. Processing will be via a trommel screen to remove oversize product and deleterious material. Processed material in accordance with the relevant specification will be transported either to stockpile or final placement.

Appropriate quantities of screened soil that meets the Topsoil specification shall be screened and stockpiled separately.

Soil remediation and placement depths will vary dependant on final levels as set out and marked on pegs by Velia surveyor as work progresses.

4.2 Compost Blending

The suitability of surplus or out of specification compost (when available) shall be determined by inspection of geochemical parameters reported in material analysis reports before allowing importation. If the compost is deemed suitable for blending it will be imported and stockpiled separately adjacent to screened sub-soil stockpile.

The compost and sub-soil shall be blended at the ratio of 5 sub-soil to 1 compost by volume by passing through trommel screener. The resultant material shall be tested (each 2,500 m³ batch) to verify it complies with the topsoil/sub-soil quality A specification.

4.3 Soil testing and placement

During screening one composite soil sample shall be taken from the processed soil every 2,500 m³ in accordance with procedure set out at section 5.1.

Wherever possible all processed materials will be moved on a daily basis from the screening area to a specific location for stockpiling, prior to placement.

Following receipt of processed subsoil analysis test certificates, any samples which do not comply with the relevant soil acceptance criteria shall be re-tested. Should these retests fail and in the event that the soils are deemed unsuitable for restoration in any form, they shall be removed from site to a suitable landfill licensed to accept this material.

Screened soils shall be transported to final placement location and graded to level using suitable plant and equipment, (L. G. P. Dozer or similar).

Soils depth shall be controlled by using pegs or profile boards to define the required depth of soil for that location.

5.0 FINAL SOIL TESTING

5.1 Soil sampling – Geochemical Testing

Following final placement of soils, a “fit for purpose” survey shall be undertaken to verify that the restoration soil complies with the soil quality acceptance criteria..

The soil sampling strategy will be analogous with the protocols set out in DOE Contaminated Land Research Report CLR04 and as defined in BS10175:2011 *Code of Practice for the Investigation of Potentially Contaminated Sites*. Sampling shall be undertaken by a suitably experienced person. Sample locations shall be set out within 100 x 100m grid across the restored area..

Sampling to verify the suitability of the Category A soils shall be undertaken at a frequency of 1 per 10,000m² (equivalent to a 100m x 100m grid). At each location a trial pit shall be dug to a depth of between 100mm and 300mm and a sample of the excavated soil collected. The whole surface of the grid area to be sampled should be walked to ensure that the samples collected are as representative as possible of the soil in that area and the depth being sampled.

Sampling to verify the suitability of the Category B soils shall be undertaken at a frequency of 1 per 40,000m² (equivalent to a 200m x 200m grid). At each location the soils shallower than 300mm shall be excavated and set to one side; the trial pit shall then be deepened to

between 350mm and 1000mm below ground level and a sample of the excavated soil collected.

Samples shall be taken using an inert tool such as a stainless steel trowel. The trowel should be kept specifically for the purpose of soil sampling and should not be used for any other purpose. The trowel should be cleaned between each sample collection to prevent cross-contamination between samples occurring.

Once a sample has been recovered, the trial pit will be infilled with the remaining soil. In the locations from which a Soil category B sample has been taken the trial pit shall first be backfilled with the remaining soil from a depth greater than 300mm, then with the soils excavated from within 300mm of the ground surface.

Each location shall be marked with a peg to ensure the location is recorded by the final soil testing survey.

Each sample shall comprise 1 x 250g glass jar, 2 x 60g glass jars (minimum headspace) and 1 x 400g plastic pot. Sample containers shall not be re-used. Each sample vessel shall be indelibly labelled with the following details:

Company Name:

Site Name:

Project Reference (if applicable):

Individual Sample Reference Number:

Sample Location (reference to the herringbone grid):

Depth:

Date of Sample

Initials of Sampling Technician:

These details shall also be recorded on a Chain of Custody (CoC) Form to accompany the sample(s) to the laboratory. A copy of the CoC Form will be retained for inclusion in the Restoration Soils Quality Assurance Report.

Samples shall be stored in a fridge or cool box to ensure the samples are kept cool (below 4°C) and in the dark. The samples shall ideally be despatched to the laboratory within 48 hours of sample collection but within 5-days of sample collection in any case. Samples not despatched within this period shall be rejected and fresh samples collected.

5.2 Geochemical Analysis of Soils

Samples shall be forwarded to a UKAS accredited laboratory and scheduled for the full list of geochemical parameters indicated in Appendix C - Table 1.

The test methods will be as follows:

Metals	by GC-MS
Speciated (US EPA Priority 16) PAH	by GC-MS
TPH (total) screen C6 to C40	by EZ Flash (GC-FID)

As indicated in Note **3 to Table 1, where the TPH total exceeds 28.2mg/kg a speciated analysis of aliphatic and aromatic hydrocarbons is required:

TPH CWG (Ali/Aro banding) including BTEX MTBE by GC FID

The results of this additional testing shall be compared to the limits defined in Appendix C – Table 2

The test results comprising the analysis Certificates and a summary table (as appropriate) will be collated into the Soils Quality Assurance Report; the Report will also include a drawing showing the sampling grid and sample locations, together with the Chain of Custody Forms to validate the provenance of each sample.

5.3 Soil sampling and Horticultural Testing

Topsoil is required for the woodland planted areas shown on the landscaping plan (Drawing SWS-01-W4) These soils shall be sampled and tested in accordance with British Standard BS 3882:2007 *Specification for Topsoil* to confirm the soil matches the characteristics of Multi Purpose Grade Topsoil.

The total extent of the Topsoil placement and the Topsoil sample areas are shown on Drawing 3

Annexe A of BS3882:1994 specifies that individual sampling areas should not exceed 5ha. The Topsoil placed at Southleigh has been acquired from a variety of sources therefore the total area of soil placement has been divided into sample areas of maximum extent 2ha.

Each sample shall comprise 25 subsamples taken in a 'W' pattern across the sample area. The Topsoil is expected to include some coarse particles (>20mm), therefore each subsample shall be a minimum of 150g for a total sample mass greater than 4kg. The sample shall be collected in a suitably sized bag or tub.

Samples shall be taken using an inert tool such as a stainless steel trowel. The trowel should be kept specifically for the purpose of soil sampling and should not be used for any other purpose. The trowel should be cleaned between each sample collection to prevent cross-contamination between samples occurring.

Each sample shall be indelibly marked with the following details:

- Company Name:
- Site Name:
- Project Reference (if applicable):
- Individual Sample Reference Number:
- Sample Location (reference to the sample area):
- Depth:
- Date of Sample
- Initials of Sampling Technician:

These details shall also be recorded on a Chain of Custody (CoC) Form to accompany the sample(s) to the laboratory. A copy of the CoC Form will be retained for inclusion in the Restoration Soils Quality Assurance Report.

Samples shall be stored in a fridge or cool box to ensure the samples are kept cool (below 4°C) and in the dark. The samples shall ideally be despatched to the laboratory within 48 hours of sample collection but within 5-days of sample collection in any case. Samples not despatched within this period shall be rejected and fresh samples collected

The test results comprising the analysis Certificates and a summary table (as appropriate) will be collated into the Soils Quality Assurance Report. The Report will also include a drawing showing the sampling grid and sample locations, together with the Chain of Custody Forms to validate the provenance of each sample.

5.4 Re-testing of non-compliant locations

Sample locations where the test results do not comply with the relevant soil acceptance criteria shall be retested as follows:

The original sample location and an additional location within a 5-10m radius from the original sample point.

The samples will be collected, stored and transported in accordance with the procedure set out in Section 5.1;

The 'retest samples' shall be scheduled for analysis of the geochemical parameter which did not comply with the specification in Table 1 of Appendix C for the original sample.

5.5 Remedial Works

Where the retests conform to the specification, the anomalous soil is considered to be of such small extent that no action is required.

Where the retest samples do not conform to the specification, the soils within the test area shall be excavated and replaced as follows:-

- ♦ Upper 300mm layer (Category A soils)
Top 300mm layer of soil to be excavated over test area and placed in stockpile (to be buried at depth assuming they are compliant with Category B soils).
Clean subsoil from previously tested area (below 300mm) to be excavated and placed in contaminated area. If soil to be replaced is topsoil this may have to be imported if suitable soil cannot be found on site.

The excavated contaminated soil shall to be buried in the sub-soil excavation below the top 300mm layer and clean topsoil/subsoil to be replaced over the contaminated soil.

APPENDIX A

Assessment Criteria for Restoration Soils

Assessment Criteria for restoration soils

Table 1 – Geochemical Parameters

		TOPSOIL AND SUBSOIL QUALITY A All soils placed at or near the final surface	SUBSOIL QUALITY B Screened soils to be placed at depth
Placement Depth (below final ground level)		0-300mm	>300mm
Parameter	Units		
Arsenic (total)	mg/kg	20	40
Boron (Soluble)	mg/kg	3	3
Cadmium (total)	mg/kg	30	30
Chromium (total)	mg/kg	200	200
Copper (total)	mg/kg	130	200
Cyanide (total)	mg/kg	250	250
Lead (total)	mg/kg	450	650
Mercury (total)	mg/kg	15	15
Nickel (total)	mg/kg	75	100
Phenols (total)	mg/kg	5	10
Selenium (total)	mg/kg	260	260
Sulphate (total)	mg/kg	N/A	N/A
Zinc (total)	mg/kg	300	450
PAH (total)	mg/kg	50	250
Benzo(a)Pyrene	mg/kg	1.7	1750 * ²
TPH	mg/kg	28.2 ** ³	545 * ²
pH		5.0-8.2	5.0-9.0

Notes

*² Soil organic matter = 2%

**³ If TPH (total) exceeds 28.2 mg/kg then speciated aliphatic & aromatic hydrocarbon analysis is required and the results compared to the table 2 below

Subsoil quality A comprises:

- 300mm depth of screened imported topsoil in the woodland areas.
- 300mm depth of screened imported sub-soil in meadow areas.

Subsoil quality B comprises:

- All screened imported subsoil placed at a depth greater than 300mm below finished ground level.

Table 2 – Aliphatic & Aromatic Hydrocarbon Analysis

		TOPSOIL AND SUBSOIL QUALITY A All soils placed at or near the final surface	SUBSOIL QUALITY B Screened soils placed at depth.
Placement Depth (below final ground level)		0-300mm	>300mm
Parameter	Units		
Indicator Compounds - PAH			
Benzo(a)pyrene	mg/kg	1.7	1750
Naphthalene	mg/kg	2,775	
Indicator Compounds			
Aromatic Hydrocarbons			
Benzene	mg/kg	28.2	545
Toluene	mg/kg	20,100	
Aliphatic Hydrocarbons			
Aliphatic EC5 – EC6	mg/kg	101,000	
Aliphatic EC6 – EC8	mg/kg	101,000	
Aliphatic EC8 – EC10	mg/kg	2,020	
Aliphatic EC10 – EC12	mg/kg	2,020	
Aliphatic EC12 – EC16	mg/kg	2,020	
Aliphatic EC16 – EC35	mg/kg	40,300	
Aromatic Hyrdocarbons			
Aromatic EC5 – EC7	mg/kg	See Benzene	
Aromatic EC7 – EC8	mg/kg	4,030	
Aromatic EC8 – EC10	mg/kg	807	
Aromatic EC10 – EC12	mg/kg	807	
Aromatic EC12 – EC16	mg/kg	807	
Aromatic EC16 – EC21	mg/kg	605	
Aromatic EC21 – EC35	mg/kg	605	

Notes Refer to Table 5 & 6 in Site Specific Assessment Criteria Derivation for Restoration Soils prepared by Bureau Veritas dated January 2008.

Table 3 – Horticultural Parameters

Parameter	Screened Topsoil Woodland Areas	Screened Sub-soil Meadow Areas	Screened Sub-soil
Placement depth from final surface	0 – 300 mm	0 – 300 mm	> 300mm
Soil acceptance quality	A	A	B
Max stone content (%)			
>2mm	60	60	-
>20mm	30	30	-
>50mm	10	10	-
Soil Texture	Sandy Loam	Sandy Loam	Sandy Loam
Bulk Density	1.5g cm ⁻³	1.5g cm ⁻³	1.7g cm ⁻³
pH	5.0 – 8.2	5.0 – 8.2	5.0 – 9.0
Organic content	>2.0%		-
Available phosphorus	16 mg/kg minimum		-
Available potassium	120 mg/kg minimum		-
Available magnesium	26 mg/kg minimum		-
Total Nitrogen	0.2% minimum		-

DRAWINGS

Drawing No.	Title
SWS-01-W4	Surface Water Scheme Proposed Lagoon and Landscaping Plan
3	Final Soil Testing Locations and Topsoil Areas