

Restoration Plan

For the use of wastes for restoration at:

Dogsthorpe Landfill Site

Welland Road

Dogsthorpe

Peterborough

Cambridgeshire

PE1 3TD

In accordance with Condition 2.9.1 and Improvement
Condition 1 of consolidated permit EPR/BV3740ID

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Appendices

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1.0 Introduction

This restoration plan has been compiled to provide an overview of the proposed management and use of wastes identified for restoration purposes. Please refer to Appendix 1a-1b for the site location plan and landscape restoration plan.

2.0 Restoration Plan

2.1 Types and quantities of wastes

The site permit was varied on 23 February 2017 and includes an improvement condition (IC1) which requires the submission of a restoration plan for the site which includes waste acceptance criteria and procedures for waste for restoration. Schedule 2, Table S2.2 of the permit references IC1 with respect to waste types. This restoration plan outlines the waste codes for use in restoration (Table 1).

2.2.1 Wastes for use in the Restoration Layer

Table 1 below outlines the range of materials that it is proposed are imported to the Dogsthorpe Landfill for use in the Restoration Layer. These waste types are typical of wastes used in restoration and are in line with the Environment Agency’s standard list of wastes for restoration.

Table 1. Range of waste types suitable for the *Restoration Layer*

Waste Code	Description
01	WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS
01 04	Wastes from physical and chemical processing of non-metalliferous minerals
01 04 08	Waste gravel and crushed rock other than those mentioned in 01 04 07
01 04 09	Waste sand and clays
02	WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING
02 04	Wastes from sugar processing
02 04 01	Soil from cleaning and washing beet
03	WASTES FROM WOOD PROCESSING AND THE PRODUCTION OF PANELS AND FURNITURE, PULP, PAPER AND CARDBOARD
03 03	Wastes from pulp, paper and cardboard production and processing
03 03 05	De-inking sludges from paper recycling
03 03 09	Lime mud waste
10	WASTES FROM THERMAL PROCESSES

10 12	Wastes from manufacture of ceramic goods, bricks, tiles and construction products
10 12 08	Waste ceramics, bricks, tiles and construction products (after thermal processing)
10 13	Wastes from manufacture of cement, lime and plaster and articles and products made from them
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 01	Concrete, bricks, tiles and ceramics
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 04	Soil and stones other than those mentioned in 17 05 03
17 05 06	Dredging spoil other than those mentioned in 17 05 05
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 05	Wastes from aerobic treatment of solid wastes
19 05 03	Off specification compost
19 08	Wastes from waste water treatment plants not otherwise specified
19 08 05	Sludges from treatment of urban waste water
19 09	Wastes from the preparation of water intended for human consumption or water for industrial use
19 09 02	Sludges from water clarification
19 12	Wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 09	Minerals (for example sands and stones)
19 13	Wastes from soil and groundwater remediation
19 13 02	Solid wastes from soil remediation other than those mentioned in 19 13 01
19 13 04	Sludges from soil remediation other than those mentioned in 19 13 03
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 02	Garden and park wastes (including cemetery wastes)
20 02 02	Soils and stones

Soils delivered to the site for use in restoration will meet acceptance criteria defined in the FCC Environment soils acceptance criteria Appendix 2a.

3.0 Waste Acceptance

Wastes are accepted in accordance with FCC Waste acceptance procedures for the acceptance of soils and organics (Appendix 2a and 2b).

3.1 Maximum Quantities

Dogsthorpe Landfill Site is c. 65 ha which is required by planning consent to be fully restored for future agricultural and open mosaic ecological after use. Table 3 outlines the maximum quantities of wastes required for the *Restoration Layer* made up from wastes listed in Table 1.

Table 3. Maximum quantities of wastes required for *Restoration Layer* at Dogsthorpe Landfill Site

Site Area	M ³	Tonnes
Area A re-profiling	221,171	442,342
Area B – areas requiring 1m depth of soils	15,661	31,322
Area B – areas requiring 0.5m soils	47,034	94,068
Area C – 1m soils depth	43,085	86,170
Total Requirement	326,951	653,902
Material on site	12,418	24,836
Shortfall	314,533	629,066
Conversion rate 1m³ – 2.0 tonnes		

The site requires further inputs of 629,066 tonnes of soil to form the restoration layer.

The above totals represent the volumes of materials required to complete restoration of the site (Areas A, B and C). There may be a future requirement to import additional materials to address any areas of differential settlement or capping repairs which may occur throughout the aftercare period. These areas tend to be discrete and any additional waste volumes required to address differential settlement or cap repairs etc. will be agreed with the Environment agency prior to carrying out the work.

3.2 Operational Method

FCC Environment operate an Environmental Management System which is accredited to ISO 14001. The following FCC Environment procedures are appended to this Restoration Plan, which clearly set out how the receipt, acceptance and management of the Restoration Operations will be conducted:

- Appendix 2a FCC Soil Acceptance Procedure
- Appendix 2b FCC Organic Waste Acceptance Procedure
- Appendix 2c FCC Site Operations Procedure – Waste Acceptance
- Appendix 2d Site Staff Flowchart

In addition to the detailed instructions in the procedures, a simple flowchart, for the site staff, mapping out the material assessment, acceptance and receipt of the Restoration materials is included, in Appendix 2e.

3.2.1 Personnel

The operation will be staffed as a MINIMUM by the following personnel:

- Site Business Manager/Contract Manager
- Closed Site Operations Supervisor
- Weighbridge Operator (either FCC or third-party)
- Machine Operator

Should additional personnel be required by site operations, this resource will be brought in on a reasonably practicable timescale.

3.2.2 Resources

The operation shall require the following resources, in addition to the staffing and material resource as listed above:

- Plant. This typically will be a bulldozer equal to a Caterpillar D6 in size
- Tractor and Water Bowser for dust suppression activities
- Wheel wash facilities

In addition to this, it may be required that hard-core or a similar material is required for engineering purposes. This will be to engineer internal site haul roads.

3.2.3 Delivery

Prior to arrival at the site all waste material will be assessed and approved to ensure it is suitable for receipt, is a listed waste type for restoration and meets the relevant acceptance criteria. Once approved, and issued with a unique approval number, the waste must be booked into the site, giving at least 24 hrs notice.

Importation of restoration wastes, to Dogsthorpe Landfill, will only be carried out by a registered waste carrier, under relevant Duty of Care. On arrival at the weighbridge, the load will be checked and visually inspected for conformance. All incoming loads must be sheeted.

3.2.3. Storage

The designated Restoration area will be divided into suitable working phases and the creation of any temporary stockpiles will be adjacent to the phase which is currently being restored.

The restoration materials will be tipped in appropriate designated stockpiles according to material type (i.e. soils or organics) and intended use. Soil stockpiles will be placed at appropriate locations preferably near to the area being restored in line with Table S1.4 Pre-operational measures for future development.

3.2.4. Quarantine

The *technically competent manager* will designate a quarantine area for each phase of the restoration work to temporarily isolate any restoration materials deemed unsuitable for use prior to removal off site. Please refer to FCC's Operational Procedures in Appendix 2c.

3.2.5. Application

Imported soils will be placed to the required depth to create the *Restoration Layer*. Please refer to FCC's Operational Procedures in Appendix 2c.

Appendices

Soils for restoration assessment



Assessment procedure for accepting soils for use in restoration

PURPOSE

The purpose of this procedure is to ensure that a consistent approach is undertaken for the assessment of soils for the potential use in reclamation and restoration of sites within FCC Environment.

This procedure does not directly apply to any wastes other than soils. For all other types of wastes a site and waste specific assessment will be required to determine the suitability for use in restoration activities and acceptability under the site's environmental permit.

A further purpose of this procedure is to outline a consistent approach to the sampling requirements for compliance testing undertaken at a FCC landfill site following the receipt of any soil wastes used in restoration.

PRINCIPLES OF THE USE OF SOILS FOR RESTORATION ACTIVITIES

The following overarching principles will be used in the assessment procedure for the determination of whether a soil waste is suitable for use in restoration and reclamation:

- **NON-HAZARDOUS**
For any soil waste used in a restoration activity the soil must be classified as nonhazardous in accordance with the Hazardous Waste (England & Wales) Regulations 2005 (as amended) which implements the definition of 'hazardous waste' in the revised Waste Framework Directive (2008/98/EC)
- **SUITABILITY FOR USE WITHOUT SIGNIFICANT RISK OF POLLUTION**
For any soil waste to be used in restoration and reclamation the potential contaminants of any soil waste must, by prior chemical analysis and assessment, be suitable for the intended use without significant risk of pollution.

** A table of guideline concentrations below which a soil waste would be classified as suitable for restoration is used within the assessment procedure. This has been developed for a range of common analysis determinants of soil. The table of guideline concentrations and the principles used to develop the guideline concentrations are provided in Appendix A.*
- **GENERIC CONSIDERATION OF THE END USE OF THE RESTORED SITE**
The guideline concentrations in Appendix A have been derived from published sources and take into account the risk posed by a generic proposed end-use of a site following restoration. For these guideline concentrations to be appropriate it is proposed that grassland and trees/shrubs are planted on the restoration area for the foreseeable future and that it will never be used for any crops entering the food chain. The guideline concentrations are also considered to be appropriate for the planting of energy to waste grasses/crops (such as miscanthus crops).

Soils for restoration assessment



A site-specific assessment of the suitability of any soil for restoration must be undertaken for any sites where a different and specific end-use is proposed and/or the sites are located nearby any protected sites (such as a European Site or a Site of Special Scientific Interest) or other vulnerable receptors.

RESPONSIBILITY

It is the responsibility of nominated managers of any staff performing waste assessments to ensure that their staff carry out the requirements of this procedure and ensure assessments are recorded as necessary.

Any soil waste enquiry that does not meet the requirements as laid out in this procedure, or where any concerns with making such a determination exist, the soil waste must not be used for restoration or reclamation purposes.

TRAINING / COMPETENCE

Any person undertaking waste and soil assessments that should be applied to a waste must be trained in following this procedure and in the characterisation and assessment of wastes.

The waste assessor must have a comprehensive understanding of the following technical aspects of soil waste assessments:

- Review of site investigation reports
- Reviewing laboratory analytical reports
- Hazardous properties and hazardous waste assessment
- List of Wastes (LoW) code assessment
- Waste and soil sampling objectives and requirements
- Waste acceptance criteria suite and results

A record of the induction and training on this procedure must be made.

SOILS USED IN RESTORATION - ASSESSMENT PROCESS

The assessment process for each and every soil waste stream must follow a series of steps as detailed in the decision tree within this procedure. The decision tree describes the steps that must be taken during the determination of whether a soil waste is suitable for restoration or reclamation purposes.

This procedure does not cover the standard assessment steps that must be taken for all wastes to ensure the waste is acceptable to FCC Environment. The steps not covered include the requirements for basic characterisation of the waste, the hazardous waste assessment and any site specific requirements.

Soils for restoration assessment



1. Use of soils for restoration – Initial confirmation requirements

a. *Confirm that the soil waste is not classified as hazardous.*

- If the soil waste arises from a site which includes both hazardous and non-hazardous classified soils and wastes then any hazardous waste must be able to be appropriately segregated from all non-hazardous waste.
- Confirmation of such segregation must be obtained as evidence.
- Only analysis and information representative of the non-hazardous soils is suitable for use in the determination for restoration use for the non-hazardous soils. If insufficient analysis or information available for the segregated non-hazardous waste to make an adequate assessment - then the waste must not be approved as suitable for restoration uses unless further information and/or analysis is provided (and subsequently determined as acceptable for restoration uses).

b. *Determine whether there is a requirement for any site-specific assessment of suitability for use in restoration.*

- Due to generic aspect of this procedure and the guideline concentrations developed there must be consideration of the potential sites that the soil may be used for restoration. Site specific assessment will be required for the following:
 - Sites near vulnerable receptors – such as SSSIs and European Sites;
 - Sites for which the proposed end-use does not fit within the generic proposed end-use (open space end-use such as grassland and/or trees/shrubs and/or the use of energy to waste crops).

2. Assessment of chemical constituents of a soil waste

Following appropriate confirmations as detailed in section 1 the soil for restoration assessment decision tree below should be used to assess whether the soil waste is suitable for use as restoration material.

This assessment decision tree is used to assess the suitability for use in restoration based on the analytical data accompanying the waste.

A judgement of the adequacy of the information provided must be made prior to the determination. For any determination as 'suitable for restoration' there must be sufficient information available that can be retained as evidence to justify such a decision.

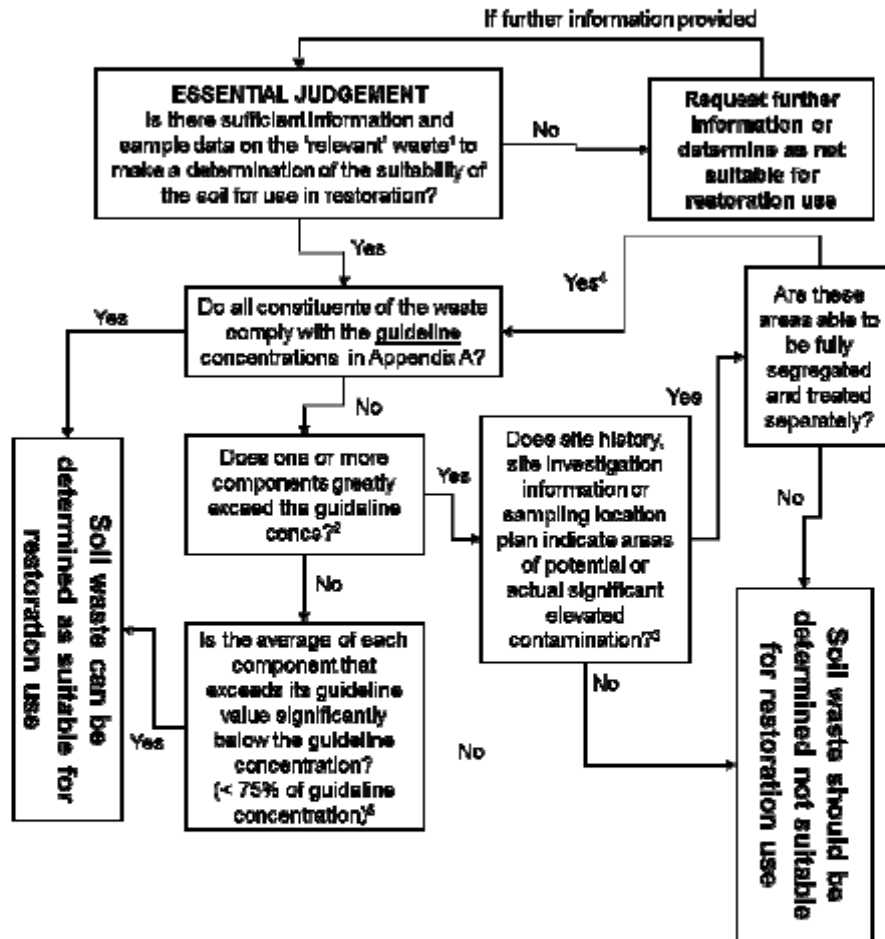
The assessment requires consideration of the different constituents in the waste and whether the presence of these constituents is likely to be contrary to any of the principles for determination of the suitability for restoration use (described above). The assessment uses some guideline concentrations for specific constituents.

If these guideline concentrations are exceeded then, for some of the constituents, further assessment options of the data are provided.

Soils for restoration assessment



Soil for restoration assessment decision tree



Notes to the use of the soil for restoration Decision Tree:

1. Relevant waste – refers to the specific volume of waste from any site that is specifically being assessed for its suitability for use in restoration. Information for any soils remaining on site or soils classified as hazardous is not suitable for use within the determination.
2. A component will be considered to greatly exceed a guideline concentration if one or more of the concentrations are at or above 125% of the guideline concentration. This does not include guideline concentrations that approach the hazardous waste thresholds for the constituent – which must not be exceeded.

Soils for restoration assessment



Note a – ensure the waste is not classified as hazardous due to sum of all dangerous compounds (especially with respect to H14 ecotoxic property).

Note b – the guideline concentrations for the potentially phytotoxic metals of copper and zinc may be elevated above their lower guideline concentration for soils where there is comprehensive evidence that the pH is at or greater than 7.

3. Does the site history, site investigation or sampling location plan provide any indication why one or more samples maybe showing greatly elevated concentrations of any component? The potential source of contamination may be different across the site (such as different locations for a diesel tank, an industrial processing area, a car parking area or waste storage area etc). Information on the sampling locations will allow assessment of the different areas on the site to determine whether some areas show elevated concentrations of specific components and whether these areas can be fully segregated. This would allow assessment of the suitability for restoration of those soils not exhibiting greatly elevated concentrations of any constituent.
4. If areas of greatly elevated concentrations of components are able to be segregated then the remainder of the waste will need to follow the full assessment process to confirm whether suitable for use in restoration. Confirmation of such segregation must be obtained as evidence.
5. The assessment of the average of any components exceeding the guideline concentrations do not include those constituents with guideline concentrations approaching their hazardous waste threshold – which must not be exceeded. Note – the averaging and comparing to a figure < 75% of the guideline value is an arbitrary but a conservative approach. This approach would indicate that, even if some elevated components exist above the guideline threshold, then these are unlikely to pose a significant risk of pollution as the entire waste stream, on average, is well within the guideline restoration concentrations.

ON-SITE SAMPLING REQUIREMENTS FOR RESTORATION SOIL WASTES

Inspection of restoration soil wastes – General requirements

- a. Each site accepting soil wastes to be used in restoration must ensure compliance with those conditions of the Environmental Permit that detail waste inspections and waste monitoring.
- b. The Duty of Care paperwork for all deliveries of restoration soil wastes must be inspected and compared with the relevant contract set up on the system. No soil wastes are to be accepted for restoration unless approved by the Compliance Team and a relevant contract has been arranged.
- c. Staff at the reception and deposit point *must be aware of classification of the soil waste* in order for them to carry out a visual inspection, to determine any potential non-conformance with respect to:
 - i. Load security and containment;
 - ii. Unexpected components of the waste (e.g. paper, plastic, metals etc), the appearance of obvious contaminants within the soil*, hazardous items, etc);

Soils for restoration assessment



- iii. Health & Safety and Environmental impact considerations (*including any nuisance such as odour and/or dust*);
- iv. Compliance with the Duty of Care paperwork and the Environmental Permit.

* Soils that comply with the guideline concentrations are unlikely to appear 'contaminated' due to dangerous components (such as organics or heavy metals, for example). If any specific soil has an incidental amount of contamination that causes the soil to appear contaminated then this information must be fully detailed on the contract and information provided to the site operatives undertaking visual inspections.

- d. When this visual inspection results in the discovery of non-conforming waste (i.e. waste that is not suitable for use in restoration) the procedure(s) for dealing with, investigating and recording non-conformances must be followed.

Inspection of restoration soil wastes at landfills – sampling requirements

The sampling requirements for soil wastes classified and accepted as suitable for restoration will be determined by the Compliance Team on a waste stream by waste stream basis. The testing requirements for any soil samples taken will be detailed on the waste assessment.

However, the sampling requirements should be based on the following principles:

- Each site accepting restoration soil wastes must ensure compliance with those conditions of the Environmental Permit that detail waste inspections and waste monitoring including any sampling requirements.
- A soil waste regularly generated in the same process (for example soil treatment facility outputs) will require regular compliance sampling to determine the classification of the soil waste and whether suitable for use in restoration. The frequency of compliance sampling will be determined on a waste by waste basis by the Compliance Team, although, for such regularly generated soil wastes, the sampling may either be:
 - o undertaken at the landfill site by FCC, or
 - o undertaken by the waste producer at the site of production - in accordance with an agreed protocol and sampling plan with FCC.
- A soil waste that is a 'one-off' waste stream* and for which comprehensive characterisation has been undertaken, does not require any compliance sampling at the landfill site. During the technical assessment of the soil waste, the Compliance Team will determine whether the soil waste has undergone such comprehensive characterisation.
 - * Such as soil arising from the remediation of a contaminated land site for which a comprehensive site investigation or stockpiling and testing has been undertaken and provided with the waste enquiry.
- Sampling of the soil waste should be undertaken where there exists any suspicion of contamination (either from visual inspection or an uncertainty of the origin of the waste).

Soils for restoration assessment



PROCEDURE REVIEW

This procedure will be reviewed on an annual basis to ensure that it remains relevant, compliant with current guidance and hazardous waste determination and takes into account practical experiences from its use.

Appendix A – Guideline concentrations table for soil wastes used in restoration

Component	Proposed guideline concentrations for soils used in landfill restoration	Source and comments
Arsenic	100	Less than Atkins ATRISK soil SSV (for open spaces)
Cadmium	50	Less than Atkins ATRISK soil SSV (for open spaces)
Chromium (not hexavalent)	1000	Less than Atkins ATRISK soil SSV (for open spaces)
Chromium (hexavalent)	200	Less than Atkins ATRISK soil SSV (for open spaces)
Copper	500 ^{*2}	Possible phytotoxic substances - significantly less than Atkins ATRISK soil SSV (for open spaces)
Lead	800	Less than Atkins ATRISK soil SSV (for open spaces)
Mercury	20	Less than Atkins ATRISK soil SSV (for open spaces)
Nickel	400	Possible phytotoxic substances - significantly less than Atkins ATRISK soil SSV (for open spaces) and approximately 20% below hazardous waste threshold for worst-case compound.
Selenium	500	Less than Atkins ATRISK soil SSV (for open spaces)
Zinc	500 ^{*2}	Possible phytotoxic substances - significantly less than Atkins ATRISK soil SSV (for open spaces)
Boron (water soluble)	3	Former ICRL limit - no SSVs determined for open spaces
pH	5 - 10	Guideline values to avoid extreme acidic or alkaline conditions
Sulphate (water soluble)	2000	Former ICRL limit - no SSVs determined for open spaces
Free cyanide	30	Less than Atkins ATRISK soil SSV (for open spaces)
Phenol	2000	Less than Atkins ATRISK soil SSV (for open spaces)
Total Petroleum Hydrocarbons / mineral oil (UNSPECIATED)	800	Significantly less than Atkins ATRISK soil SSV (for open spaces) and 20% below hazardous waste threshold.
Petroleum Range Organics (PRO) (C6-C10)	450	Less than Atkins ATRISK soil SSV (for open spaces) for aliphatic PRO C8-C10.
Diesel Range Organics (DRO) (C10-C25)	1000	Significantly less than Atkins ATRISK soil SSV (for open spaces) and an order of magnitude below the hazardous waste threshold.
Unknown lubricating / other oil (not fuel) (inc C25-C40) (no PAH specification)	800	Significantly less than Atkins ATRISK soil SSV (for open spaces) and 20% below hazardous waste threshold.
PAHs (total) - unspicated (must be non-hazardous*)	900	Less than former ICRL limit (for landscaped areas) - no SSVs determined for open spaces for total PAHs. Any total PAH analysis exceeding 100mg/kg requires specification and compliance with individual PAH guideline concentrations (at or below SSVs for open spaces) as described in the table below.

All thresholds for metals stated in mg/kg dry weight

Soils for restoration assessment



*1 All PAHs must individually be classified as non-hazardous. This is especially relevant for any PAHs which have assigned a substance specific hazardous threshold (used for H14 ecotoxic hazardous property assessment).

*2 The acceptable concentration of the potentially phytotoxic metals of copper and zinc may be elevated to 800mg/kg (dry weight) for soils where there is comprehensive evidence that the pH is at or greater than 7.

Note – for soil wastes expected to have a potential for elevated conductivity (such as soils containing ashes, dredgings, silts etc) then there is a requirement to determine the conductivity of the soil wastes. The guideline concentration to be used for conductivity is 3,700µS/cm.

Individual PAH guideline concentrations for restoration use

Acenaphthene	250	Less than Atkins ATRISK soil SSV for open spaces
Acenaphthylene	250	Less than Atkins ATRISK soil SSV for open spaces
Anthracene	250	Less than Atkins ATRISK soil SSV for open spaces
Benzo(a)anthracene	20	Less than Atkins ATRISK soil SSV (for open spaces) and 20% below hazardous waste threshold.
Benzo(a)pyrene	4.2	Atkins ATRISK soil SSV for open spaces
Benzo(b)fluoranthene	35	Less than Atkins ATRISK soil SSV for open spaces
Benzo(ghi)perylene	250	Less than Atkins ATRISK soil SSV for open spaces
Benzo(k)fluoranthene	250	Less than Atkins ATRISK soil SSV for open spaces
Chrysene	250	Less than Atkins ATRISK soil SSV for open spaces
Dibenz(ah)anthracene	4.5	Atkins ATRISK soil SSV for open spaces
Fluoranthene	250	Less than Atkins ATRISK soil SSV for open spaces
Fluorene	250	Less than Atkins ATRISK soil SSV for open spaces
Indeno(1,2,3,cd)pyrene	35	Less than Atkins ATRISK soil SSV for open spaces
Naphthalene	250	Less than Atkins ATRISK soil SSV for open spaces
Phenanthrene	250	Less than Atkins ATRISK soil SSV for open spaces
Pyrene	250	Less than Atkins ATRISK soil SSV for open spaces

Notes on the development of restoration soil guideline concentrations

There are a range of criteria that can be justifiably applied to soil chemical characteristics for the use of soils in restoration and reclamation but, as yet, there are no industry standards. For instance, levels of metals in soils applied to the use of sewage sludge use differ to those specified by contaminated land guidance. Conflict can arise between the need to assess soil analytical results for the purposes of waste management and/or disposal (e.g. waste acceptance criteria for landfill) and the need to retain or create viable soil materials for intensive and non-intensive restoration uses.

The proposed restoration soil guideline concentrations to be imported to a 'generic' restoration activity* are set out in the table above and are derived from screening values based on an Open Space end-use with fairly limited public access. These Soil Screening Values have been derived by Atkins and their ATRISK guidance (March 2011). The Atkins ATRISK SSVs are calculated by using the current Contaminated Land Exposure Assessment protocol (CLEA).

Soils for restoration assessment



The Atkins ATRISK SSVs are available on-line and have been purchased by FCC to aid in the development of a consistent decision-making tool for soils to be used in restoration.

For the majority of components the guideline concentration has been set at a value significantly lower than the SSV to ensure a conservative approach has been taken and also to ensure that the hazardous waste threshold for any component will not be exceeded. For the potential phytotoxic metals of copper and zinc a lowered guideline concentration has been applied unless evidence is available that the soil waste is not acidic.

** The proposed generic end-use of a restoration activity is that grassland and trees/shrubs are planted on the restoration area for the foreseeable future and that it will never be used for any crops entering the food chain. The guideline concentrations are also considered to be appropriate for the planting of energy to waste grasses/crops (such as miscanthus).*

The procedure makes it clear that a site-specific assessment for the suitability for restoration must be undertaken for any site near vulnerable receptors or for sites with proposed end-uses different from the generic proposed end-use.

This list is not exhaustive and the guideline concentrations are not necessarily absolute upper limits as there may be instances where less stringent soil limits may be applied, particularly when compared to the likely risk associated with extensive uses such as forestry or for lower soil layers (>1.0m depth below final level), where the risk of exposure to contaminants is less likely. Thus, existing guidance and contaminated land methodologies can be tailored specifically to a site and proposed soil uses.

These guideline concentrations do not specifically consider the requirement for plant nutrients in the soils accepted. For site specific cases or for the final layers of a restoration scheme the availability of plant nutrients within the soil waste may need to be determined and used within the assessment approach.

Guideline concentrations for other components will need to be developed on a case-by-case basis.

FCC Environment

Procedures for the Specification, Acceptance and use of Organics in Landfill Restoration

Specification, Acceptance and Use of Organics in Landfill Restoration

1. Specification and Pre-acceptance Procedures for 3rd party organics imports

1.1 All organics imports will be subject to FCC's Quality specification:

Parameter	Units ¹	Limit	Source document ²
Total zinc	mg/kg dm	<2,500	EEC (1986)
Total copper	mg/kg dm	<1,000	EEC (1986)
Total cadmium	mg/kg dm	<20	EEC (1986)
Total nickel	mg/kg dm	<300	EEC (1986)
Total lead	mg/kg dm	<750	EEC (1986)
Total chromium	mg/kg dm	<1,000	EU (2000)
Total mercury	mg/kg dm	<16	EEC (1986)
Organic matter	% dm	>15	IPTS (2012)
<i>E.coli</i>	cfu/g	<1,000	BSI (2011)/BSI (2014)
<i>Salmonella spp</i>	/25g	Absent	BSI (2011)/BSI (2014)
Stability ³	mg CO ₂ /g OM/day	<16	BSI (2011)
Total plastic >2 mm	% w/w	<2.5	Based on BSI (2015) and SNIFFER (2010)
Total other physical contaminants >2mm	% w/w	<2.5	Based on BSI (2015) and SNIFFER (2010)

Where applicable, all wastes will be compliant with ABPR regulations. Leachability limits for ammonia and chloride may also be required, as related to the landfill permit for the site in question

1.2 In addition to the parameters identified in 1.1, a site specific selection procedure will be undertaken to ensure the organic amendment is compatible with restoration plan for the site and can be safely stored and deployed.

¹mg/kg dm = milligrams per kilogram dry matter; % dm = percentage in dry matter; cfu/g dm = colony forming units per gram dry matter; /25g = per 25 grams; Mg CO₂/g OM/day = milligrams of carbon dioxide per gram organic matter per day; % w/w = percentage weight for weight.

² Taken from a series of reference documents, collated by the BioCompost Alliance for the Separated Organic Materials end use standard for land restoration.

³ Composted materials only

1.3 Prior to importation of organics to site, the 3rd party Contractor must supply compliance testing data of the organic materials to demonstrate its suitability to meet the criteria identified in the Specification. This data is to be reviewed by FCC to confirm compliance.

1.4 The 3rd party contractor will supply details of the proposed EWC code for the material in question. FCC will ensure the supplied EWC is correct and seek additional confirmation from the contractor as necessary. This may be in the form of further testing or in the case a blended material, evidence of the original of the blended materials.

1.5 Should the 3rd Party Compliance sampling data be deemed to be acceptable, a suitable site for reception of the organic material will be identified using the criteria outlined in Section 2 and this communicated to the 3rd Party Contractor. A Sampling Plan will be issued to determine the frequency of compliance sampling to be undertaken on delivery of the organic material.

2. Site Selection and Land Use Planning

2.1 Sites to be utilised for organic applications will be identified using a number of parameters to include:

- A requirement for restoration materials to comply with the current planning consent.
- A requirement for organic fertiliser as part of an agricultural or non-agricultural cropping or woodland planting programme.
- A suitably acceptable volume of organic materials based on modelling of site parameters such as discharge consent and surface water management issues
- Potential odour issues at adjacent receptors
- Restoration specification precluding the use of high nutrient soils.
- The ability to deploy organics in a safe environmental manner to include soil type, topography, crop type, proximity to water courses, geology and hydrogeology

2.2 The current planning consent will be reviewed to determine if organics can be used as a soil ameliorant. Individual organic waste sources and analysis of the waste types will be assessed to ensure that they bring benefit to the restoration and do not constitute disposal. Sites where food crops or grazing are proposed will be excluded from non source segregated organic application owing to concerns around contaminants entering the food chain. Sites where non source segregated organic are utilised may not be used for a period of 5 years for the above land uses and until it can be demonstrated to the EA that there is no detriment to human or animal health.

2.3 Sites where industrial crops are proposed (such as Miscanthus, Short Rotation Coppice, Maize etc) may be suitable for organics application either prior to planting or overspreading post planting. Organic application rates will be determined based on crop type, soil type and modelling of site parameters as identified in paragraph 2.4.

2.4 Potential sites identified for organics applications will be subject to a site specific risk assessment to determine application rates based on discharge consent levels for leachable elements and current levels of PTEs in the indigenous soil. The outcome of this risk assessment exercise will determine organics application rates both during initial restoration and subsequent annual applications if proposed. This risk assessment will include the following assessments:

- Slope angle onto which organics are to be deployed.
- Potential for surface dilution through vegetated boundaries and soil type.
- Rainwater catchment areas which do not have organics applied, but can positively contribute to interception prior to off-site discharge
- The nature and extent of the existing surface water control systems.
- Application rates based on previous experience of good practice on other FCC sites.

2.5 Sites will be assessed for potential environmental impact (such as odour) on adjacent receptors. Some organic materials have a potential to generate odour during delivery and spreading and where such an impact may be deemed unsatisfactory, the method of delivery, stockpiling and spreading will be modified to minimise odour.

2.6 Delivery of organics will be reviewed in order to efficiently manage imports and their safe placement. Such a review would include the following:

- Ensuring deliveries are timed in accordance with the need for restoration to minimise stockpiling timescales.
- Delivery and stockpiling to a suitable area of the site to minimise environmental issues and access problems for delivery vehicles.

3. Licensing of Sites for the Acceptance of Organics in Landfill Restoration

3.1 Where the waste code for the proposed organics waste stream is included within the permitted waste types for restoration, agreement of a restoration plan will be required with the Environment Agency prior to materials import. Where the waste type is not included on the permit, a minor technical amendment to a site based permit will be required, or if the site is closed then a Standard Rules Permit for Mobile plant can be obtained allowing importation of materials and improvement for ecological/agricultural benefit.

3.2 An assessment of the soils into which the organics are to be blended will be undertaken prior to acceptance. The assessment will include:

- Soil sampling of all areas to receive organics or stockpiles of soils that will be blended with organics to identify background levels of PTEs and nutrients to determine loading rates.
- A review of the organics analysis data to determine its suitability for use as a soil ameliorant.
- A Risk Assessment to identify human and environmental receptors.

3.3 Once completed, the assessment will then propose:

- A deployment tonnage based on indigenous soil PTE and nutrient levels. This will determine the maximum tonnage, the actual tonnage being determined by ongoing risk assessments of the receptor soils.
- Methodologies to mitigate and minimise risks identified that will include deployment methodology, timing, suitable weather conditions and staff training.

4. Deployment of Organics to land

4.1 A number of general conditions will apply to the importation and deployment to land of organic materials:

The Sniffer code of practice will be followed to provide guidance on the application of organics. This will ensure:

- Organics are managed recording their quantity and composition on each area to be treated.
- No more than the maximum quantity allowable under the permit or soils assessment is stored at any one time.
- Application rates will be determined by the analysis of the materials to be applied and the properties of the soils in place.
- Spreading and storage prohibited within 50m of a spring, well or borehole supplying water for human consumption or 250m for other purposes.
- Spreading or storage is prohibited within 10m of a watercourse or drain.

4.2 A pre-deployment meeting will be held on site involving all interested parties. This meeting will determine:

- Any specific requirements of the use of organics in restoration. These will typically include restrictions on use of organics within 10m of a watercourse or public footpath, storage limitations and spreading restrictions based on slope angle and weather. *Typically this includes:*
- Location for any proposed stockpiling of organics in accordance with the agreed restoration plan.
- Methodology of placement and ground preparation
- Proposals to control potential environmental impacts such as odour, surface water and groundwater contamination.
- Requirements for post acceptance sampling of blended organics and soil.
- Controls to ensure the correct quantity of organics is placed (either through the use of profile boards or agreed number of passes if a spreader is used).
- An understanding of the quality of the organics that is due to be delivered with regards to EWC code, odour, physical contamination, moisture content etc.

4.3 Direct Placement and in-situ blending of organics

4.3.1 Organics placement will ideally be through direct tipping of delivery vehicles at the location of final deployment followed by dozing out to the correct depth. The depth will be determined by a tonnes per m³ conversion rate to be agreed in advance in accordance with the FCC Risk Assessment.

4.3.2 Should prior stockpiling of organics be required, the stockpile location will be agreed in advance to ensure there is no risk of contamination of surface water through run-off.

4.3.3 Should the use of a dozer not be possible, a tractor and spreader method for placement will be employed. Where this method is used, care should be taken to avoid spreading when the prevailing wind is towards sensitive receptors to prevent odour issues. Should odour be a significant problem, odour suppression measures may be required.

4.3.4 Post acceptance checking of organics delivered will be undertaken through sampling as identified in paragraph 4.4 and visually on arrival. Should the delivered material not

meet the specification with regards to odour or physical contamination, importation will cease with immediate effect until the issue has been resolved.

4.3.5 Sampling will be undertaken at a frequency to be determined in the Site Sampling Plan (ref. Para 1.5). The location of stockpiles sampled will be noted and should any samples fail, these will be re-tested and if still found to be non-compliant, stockpiles removed for further processing.

4.3.6 Once the organics have been placed, in order to ensure the correct blending with the soil appropriate cultivation i.e. ploughing, discing or mixing by excavator will be carried out to ensure appropriate mixing of the organics and receiving soils.

4.3.7 Once mixed into the soil, The site will then be seeded with a temporary grass mix to bind the soil / organic mix to minimise run-off.

4.3 Blending organics in stockpiles prior to placement

4.2.1 Ideally, soils will be placed prior to organics placement to ensure correct in situ blending. Should this not be possible however, pre-blending of organics with soils will be undertaken in stockpiles with a pre-determined mixing ratio blend of organics / soil achieved. Once blended the organic / soil mix will be placed to an appropriate depth sufficient to achieve the aims of the restoration. Following this placement the site will be and cultivated as per the method outlined in paragraphs 4.3.6 and 7.

4.3.2 Any water which comes into contact with the stockpiled organics must be monitored and controlled in such a way so as to prevent the water from leaving site and entering a controlled water. This may be through control systems (valves etc) within the site's drainage and discharge points or other method of containment. Surface water will be sampled prior to discharge and non-compliant waters will either be re-circulated to vegetative areas or removed from site through tankering.

4.3.3 In order to minimise any environmental impacts during the placement and deployment of organics, a number of controls measures will be put in place during both stockpiling and placement.

- Spreading of organics or blended soils and organics will only be undertaken during favourable weather conditions to avoid problems of run-off. Spreading will be avoided during periods of high rainfall or snow melt.
- The risk assessment will identify any potential for excessive run-off due to slope gradient. In general, organics deployment will not be undertaken where slope gradients exceed 1:5.
- In order to ensure the correct blending of compost and soils can take place, heavy compacted clay soils will be avoided unless suitable conditioning of the soil can be undertaken prior to organics deployment.
- Organics deployment from non source segregated sources will be confined to those areas where tree planting or non-food agricultural restoration is to take place. Areas to be grazed will also be avoided.
- Organics deployment or storage will not be undertaken within 10m of a watercourse. Where deployment may adversely affect an adjacent watercourse greater than 10m away, this will be avoided unless measures such as vegetation interception or surface water diversion can be achieved.

- The take up of contaminants in food crops will be avoided through use of industrial crops (such as maize, Miscanthus or SRC) or woodland which do not enter the food chain.
- The exposure of contaminants to human health will be avoided in addition to the use of non-food crops by avoiding deployment within 10m of a public footpath or storage within 100m.

4.4 Post deployment testing and reporting

- 4.4.1 Once organics have been deployed as per the above procedures, post acceptance sampling of the blended soil / organics will be undertaken. This should be undertaken once the organics have been deployed and not pre blending either previously with soils or while stockpiled.
- 4.4.2 The extent of sampling will be determined by the FCC Risk Assessment in line with the SNIFFER Code of Practice.
- 4.4.3 Sample data will be compared against the predicted soil concentrations of PTE's (and other elements) Where samples show specific failures, the site will be re-sampled to verify the results and then a remediation plan drawn up.
- 4.4.4 Quarterly waste returns will be required to be kept for the deployment of all soils and organics used for restoration. These should be collated from transfer notes collected upon delivery in accordance with FCC's procedures on soil acceptance.

5 References

- BSI (2011). *Publicly Available Specification No 100. Specification for Composted Materials*. British Standard Institute, London.
- BSI (2014). *Publicly Available Specification No 110. Specification for Whole Digestate, Separated Liquor and Separated Fibre Derived from the Anaerobic Digestion of Source-Segregated Biodegradable Materials*. British Standard Institute, London.
- BSI (2015). *Specification for Topsoil and Requirements for Use. BS 3882:2015*. British Standards Institute, London.
- EEC (1986). European Economic Commission Sludge Directive 278. 86/278/EEC
- EU (2000). 3rd Working Document of the EU Commission on Sludge Management. ENV.E3/LM, 27th April 2000, Brussels, Belgium.
- IPTS (2012). *End-of-Waste Criteria on Biodegradable Waste Subject to Biological Treatment*. Third Working Document. Institute for Prospective Technological Studies. 10 August 2012. http://susproc.jrc.ec.europa.eu/activities/waste/documents/IPTS_EoW_Biodegradable_waste_3rd_working_document_wo_line_nr.pdf.
- SNIFFER (2010). *Code of Practice for the Use of Sludge, Compost and Other Organic Materials for Land Restoration*. Scotland and Northern Ireland Forum for Environmental Research, Edinburgh, Scotland.

Appendix 2d. Site Staff Flowchart

Restoration Materials Approval & Acceptance Flowchart

