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Booth Ventures Waste (Midlands) Ltd

Report No. 5430-BLP-R-009-02
August 2023

Sandown Quarry Landfill

Environmental Permit Application – Emissions, Monitoring & Financial Provision Report

BOOTH VENTURES

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Document Control

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Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

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1 Introduction

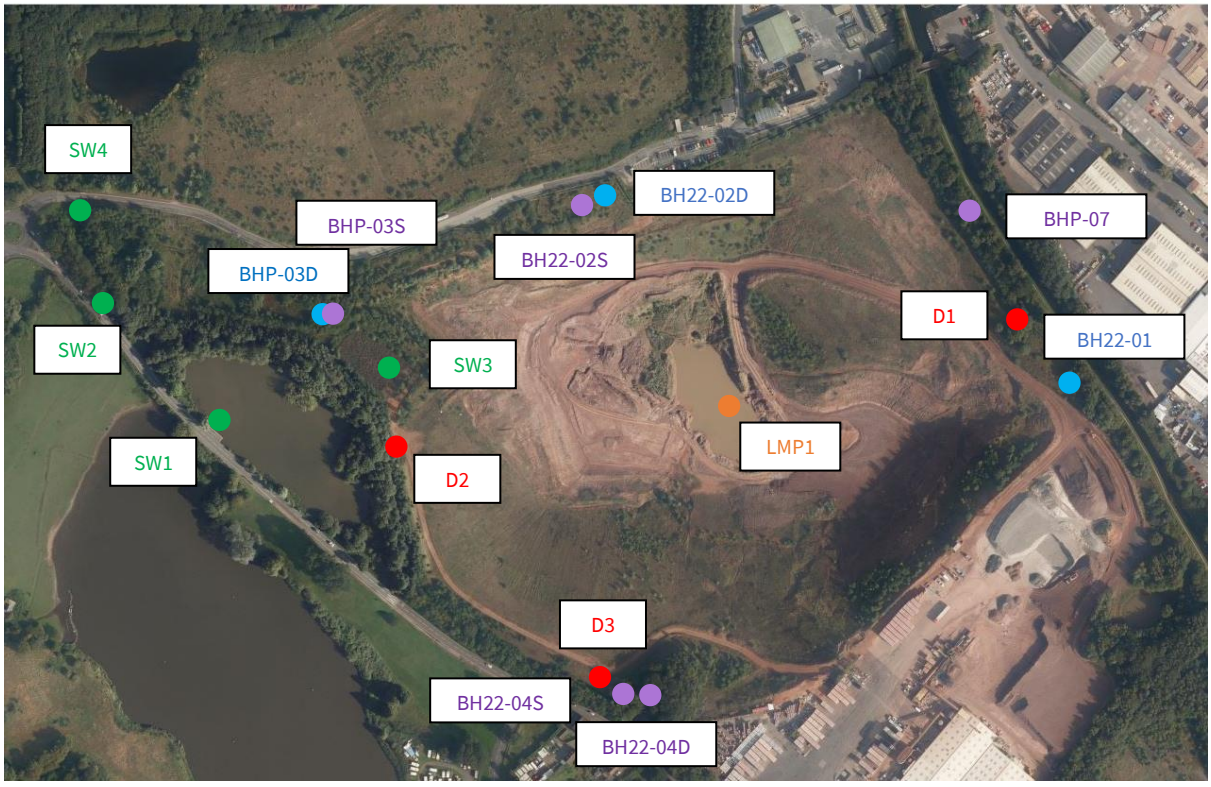
1.1 Report Context

This document supports the permit application for the Sandown Quarry Landfill Site and summarises environmental monitoring in accordance with the proposed engineering and restoration fill.

The report provides a summary of the potential emissions identified in other parts of the application and details the monitoring regime for the installation taking into consideration the waste types to be accepted at the site. Each type of emission is considered in a separate section of this report.

All monitoring locations described in this report are shown on the accompanying Environmental Monitoring Plan (ESID 12). Indicative locations of the proposed monitoring points are provided in Figure 1, with the exception of the in-waste gas monitoring probes which will be designated upon completion of the landfilling.

Figure 1 Indicative locations of proposed monitoring points



In waste gas probes as described will be provided on an updated Environmental Monitoring Plan post installation, SW (Surface water locations) green; GW (Groundwater) blue; Groundwater / Gas (combined) purple, in waste sampling from leachate wells (LMP). BHP-03S and BH03D are nested piezometers. D1, D2 and D3 are dust monitoring locations.

SW3 to be included / monitored when the on-site pond is enlarged and commissioned, or conversely monitored for discharge quality if required to remove collected water run-off collected from the waste mass.

BH22-04D also included for gas monitoring for completeness (deep monitoring adjacent to residential receptor).

2 Landfill Gas

2.1 Monitoring Point Locations

The risks posed by landfill gas emissions are assessed in detail in the LFGRA (report reference 5430-BLP-R-007-02) which forms part of this Permit application. A programme of landfill gas monitoring will be undertaken as follows:

- In-waste landfill gas monitoring
- Perimeter landfill gas monitoring.

In-waste gas monitoring points will be installed through the waste following the completion of the restoration, with a minimum of two points per hectare. The cap area is approximately 15.5 ha hence 30 probes are proposed. Due to number of gas monitoring points / probes they are not shown on the accompanying drawing ESID 12.

The accompanying Environmental Risk Assessment (report reference 5430-BLP-R-004-02) and LFGRA (report reference 5430-BLP-R-007-02) have demonstrated there is only 1 immediate receptor adjacent to the locality of the site that could potentially be impacted upon by possible lateral landfill gas migration.

This is the residential properties on Stubbers Green Road to the southwest, as such a pair of monitoring points have been installed between the site and the receptor (Figure 1 and ESID 12).

The site is contained within the Etruria Formation (a natural geological barrier) thus there is a minimal potential for lateral migration of any ground gas produced from the Qualifying Material waste through the in-situ strata. Prior to contact with the in-situ strata, lateral transit though the engineered clay liner is required.

The proposed landfill gas monitoring regime for the site are detailed in Table 1 and Table 2 below.

Table 1 Gas Monitoring Regime – In Waste

Monitoring Point	Monitoring Frequency		
	Operational	Post-Operational	Parameter
In-waste gas monitoring boreholes / probes ELS-GP01 to ELS-GP30	Quarterly	Quarterly	Methane, Carbon Dioxide, Oxygen and Gas Balance (% v/v), Gas Flow (l/hr), Relative pressure (mBar), Atmospheric Pressure (mBar) Water level and base level

As outlined in the ESID (report reference 5430-BLP-R-003-02) there are significant vertical and lateral thicknesses of interburden / overburden overlying the bedrock. This material in itself will act as a barrier to potential lateral gas migration (albeit no significant gas volumes are expected or predicted from the waste) from the void to the site perimeter. Lateral distances to monitoring points

are (distance to the monitoring locations form the waste) between 15m and 135m at BH22-01, 12m and 55m at BH22-02S / 2D and 20m and 110m at BH22-04S / 4D.

It should also be noted that monitoring locations BH22-04S and BH22-04D are located at an additional 36m from the residential properties, as such the receptor is between 56m and 146m from the waste.

Table 2 Gas Monitoring Regime – Perimeter

Monitoring Point	Monitoring Frequency		
	Operational	Post-Operational	Parameter
At landfill gas monitoring boreholes shown on drawing number ESID 12 BH22-01, BH22-02S, BH22-04S, BH22-04D, BHP-03S, BHP-07	Monthly	Quarterly	Methane, Carbon Dioxide, Oxygen and Gas Balance (% v/v), Gas Flow (l/hr), Relative pressure (mBar), Atmospheric Pressure (mBar)
	Quarterly	Quarterly	Water level and base level

2.2 Action Plan

An action plan has been developed to respond to any significant changes or trends in the monitoring data. The action plan is to be implemented by the Site Manager, or an appropriate nominee, in the event of the following:

- Methane concentrations in the perimeter boreholes breaching the permit limit (to be set based on background data obtained during the determination period);
- Abnormal, adverse trends in monitoring data;
- Reported events (e.g. odour complaints);
- Confirmed migration events; and
- Confirmed adverse impacts on local air quality.

Operator Response

If any of the events identified above occur, the following course of action will be implemented iteratively until the cause of the issue has been identified and any adverse effects have ceased or been remediated (times are cumulative from date of detection / non-compliant gas concentration).

- Report to the Environment Agency in accordance with the permit if the compliance level is exceeded and on progress with any resulting actions detailed below.
- Review the monitoring data to identify any other associated rising trends in perimeter methane / carbon dioxide concentrations in the context of known background processes and seasonal / cyclic trends (week 1). Repeat the gas monitoring as soon as possible but

no later than 7 days to confirm the reproducibility of data. If the repeat reading is below the compliance / action level then no further investigations are required (week 1).

- Review the in-waste monitoring data to identify if gas production has increased in conjunction with reviewing the historical data set for trends which may indicate an increase in gas production (week 2).
- If in-waste gas production is within its normal range then a review of alternative sources / causes of ground gas production will be instigated. This will include changes to site engineering e.g. capping or lining, agricultural practices outside the site boundary such as manure spreading or drainage works (week 3).
- If migration is persistently observed in a specific borehole the monitoring data will be reviewed along with the in–waste gas monitoring data and changes implemented as required (weeks 4-6).
- The surrounding area will be checked for signs vegetation die back (week 7).
- If elevated levels continue, the area of the migration will be audited to establish potential remediation works to be carried out if required (week 8 - 10).

In the unlikely event that remedial action is required, a proposal will be provided to the Environment Agency for approval (week 12).

3 Groundwater

3.1 Monitoring Point Locations

The applicability and extent of the groundwater monitoring is discussed in the Hydrological Risk Assessment (report reference 5430-BLP-R-006-02) that accompanies this application. Assessment has been made that takes into consideration the proposed waste types to be accepted at the site and the reduced risk of environmental impact.

The site is located within a natural geological barrier, however there is the potential for groundwater flow associated with more permeable lenses, layers within the mudstone / marl sequence. Although this is unlikely based on the information reviewed, all layers / lenses identified are “offset” or are encapsulated within thicker sequences of mudstone hence lateral, continual flow is considered unlikely.

Although the groundwater level monitoring indicates there is not a consistent piezometric surface, with a particular flow direction, it is considered conceptually that all flow will be towards the north / northwest in the longer term consistent with both geological dip and fall in topography (report reference 5430-BLP-R-003-02). The water in the Etruria Formation is confined (the water surface is above the interface with overlying made ground / borehole response zone at BH22-02D and BH22-04D) however the presence of the Sandown Quarry void to an excavated level lower than the water / porewater surface indicates that water seepages are capable of draining back towards the quarry void. Conversely however, the water collected within peripheral monitoring boreholes is potentially recording a static water system within mudstone immediately beyond the quarry void margins, evaporative losses are hence considered to be equivalent to seepage volume rates. Low flows /

static waters are consistent with recent pumping trials undertaken (report reference 5430-BLP-R-003-02).

Water quality data collected indicates that the groundwater / porewater is significantly impacted (in the Etruria Formation and overlying interburden / overburden materials) particularly between the site and the Butterley Hole Landfill and Empire Brickworks Landfill to the north (report reference 5430-BLP-R-003-02, 5430-BLP-R-006-02).

This observation has been taken account when assigning EAL's and future compliance limits.

There is an expectation that in the long-term, groundwater levels will fill the monitoring installations to a height / level expressive of the surrounding topography. These observations would be consistent with ByrneLooby's experience of monitoring locations within the Oxford Clay, Mercia Mudstone and Kimmeridge Clay (low permeability) bedrock systems. At this point (consistent with data obtained from the previously installed BH22-03D (full to almost ground level) flow will revert towards the north / north-westerly consistent with the geological dip and topography.

The interburden / overburden materials are not a hydrogeological receptor. Monitoring will be undertaken for completeness however, as such no compliance limits are required.

As a result of the above, there will be a groundwater monitoring points on the southwest perimeter, east and northeast, north and northwest perimeter (this accords with the requirement of LFTGN02 irrespective of groundwater / porewater flow direction). Monitoring is only proposed by way of completeness.

3.2 Groundwater Monitoring

The groundwater within the Etruria Formation will be monitoring for levels and for quality from the proposed groundwater monitoring points BH22-01 (combined with overlying made ground), BH22-02D, BHP-03D, BH22-04D and BHP-07. Monitoring in the made ground will be undertaken for completeness at BH22-01 (combined with underlying Etruria Formation), BH22-02S and BH22-04S.

Baseline data / assessment of pre-existing infrastructure has indicated that BHP-05 and BHP-06 are not suitable for inclusion within the sites monitoring network (both of limited depths and either dry or consisting of organic rich sludge / debris). BHP-03S is not suitable for groundwater monitoring due to the width of the piezometer.

Groundwater level monitoring will be conducted quarterly whilst the site is operational, and six monthly after closure of the site. This is based on the low-sensitivity of the site with no possible / recognisable effects possible from the proposal on the already impacted receptors (report 5430-BLP-R-006-02).

A monitoring regime has been proposed as identified in Table 3 and Table 4 below.

It is proposed that the site should continue to be monitored for a period of 10 years after completion of the restoration programme (consistent with similar schemes that have received Environment Agency approval). This aftercare period is based on a conservative increase to the general aftercare duration requirements for an inert landfill site, the closest analogue to the proposed scheme.

The post-closure monitoring regime will be presented in the site Closure Plan to be submitted to the Environment Agency once disposal activities have ceased.

Table 3 Groundwater Monitoring Schedule (Cast Back materials – Interburden / overburden)

Location	Parameter	Units	Limits	Frequency
BH22-01, BH22-02S, and BH22-04S	Water Level	mAOD	none	Quarterly reverting to 6-monthly
	Dip to base	mAOD	none	Annually
	pH, EC Cl, SO_4, NH_4-N	mg/l	none	Quarterly reverting to 6-monthly
	Ca, Mg, Na, K Alkalinity, Cd, As, Pb Cr, Cu, Ni, Zn Fe, Mn	mg/l	none	6 Monthly reverting to Annually
	Hazardous substances detected in leachate	n/a	none	Annually

Monitoring of the interburden / overburden placed against the in-situ strata is only proposed for completeness and to monitor the effects from adjacent activities.

Table 4 Groundwater Monitoring Schedule (Etruria Formation)

Location	Parameter	Units	Limits	Frequency
BH22-02D, BH22-04D, BHP-03D and BHP-07	Water Level	mAOD	none	Quarterly reverting to 6-monthly
	Dip to base	mAOD	none	Annually
	NH_4-N, TOC, pH, EC, Cl, SO_4,	mg/l	none	Quarterly reverting to 6-monthly
	Ca, Mg, Na, K Alkalinity, Cd, As, Pb Cr, Cu, Ni, Zn Fe, Mn	mg/l	none	6 Monthly reverting to Annually
	Hazardous substances detected in leachate	n/a	none	Annually

3.3 Groundwater Compliance Limits

The HRA (indicates that there will be no discernible discharge of Hazardous and Non-Hazardous substances to groundwater. Despite the low risk posed by the proposed landfill to groundwater it is intended to monitor groundwater quality to ensure that during the operational and post closure phases of the landfill, no actual detrimental effects to the environment occur.

This is not considered possible based on the significantly impacted water quality monitored adjacent to the site during baselining requirements. Any groundwater quality data should always be viewed in the context of the available background quality data obtained prior to infilling.

Based on the results collected to date (report reference 5430-BLP-R-003-02) the "down dip" direction located monitoring infrastructure on the northern perimeter could be assigned the following compliance limits (Table 5). Limits are derived from maximum concentration observed at that particular location to date plus 10% (to account for future variability and a relatively short data set), or alternatively if "up-dip" concentrations are greater they are assigned from those locations (i.e. sulphate at BH22-04D).

Table 5 Groundwater Compliance Limits (mg/l)

Location	NH_4-N	Chloride	Sulphate #	Nickel
BH22-02S	209	15,950	1,155	0.34
BH22-02D	14.5	3,750	1,620	0.25
BHP-03D	4.5	660	1,620	0.025

limit assigned from BH22-04D and BH-04S

However, in actuality the setting of such high limits for encapsulated / confined porewater within a bedrock mudstone (with no linkages to surface water receptors) would serve no regulatory purpose and as such, although compliance limits proposed herein for completeness, they are not proposed to be inserted within the issued permit. There is an expectation (based on the data collected to date) that the water quality monitoring will identify further deterioration in the future, not attributable to the site. Conversely the source term is not capable of deteriorating this significantly impacted water.

Greater sensitivity is associated with near surface linkages through superficial strata to adjacent surface water features (such as the adjacent Swan Pool SSSI). However, the same premise as the above applies. There are no superficial deposits on the site and the extensive lateral and vertical thicknesses of cast back materials (that contain isolated and perched waters) that are present are significantly impacted such that ammoniacal-N, chloride and sulphate concentrations at ~200mg/l, 15,000mg/l and 1,100mg/l respectively render any compliance limits set against the relatively benign infill source term as meaningless.

3.4 Groundwater Action Plan

As no compliance limits for the site are proposed, there is no requirement for an action plan.

4 Surface Water

4.1 Monitoring Point Locations

The monitoring point locations for surface water are shown on ESID 12 (also represented indicatively on Figure 1) and represent the discharge point for the surface water monitoring scheme once constructed (SW3); monitoring will also be undertaken at the culvert on Stubbers Green Road (SW2) which receives flow from the sites surface water (cap run-off and combined potentially high

levels seepages from the under-cap collection ditch, see (5430-BLP-R-006-02) and at Swan Pool (SW1) for comparative purposes and completeness.

4.2 Surface Water Quality

A regular suite of analysis will be performed at each surface water monitoring point (Table 6). It is not proposed to undertake an annual hazardous substance screen as part of the routine surface water monitoring.

Monitoring points SW3 is associated with a surface water discharge from site which is yet to be built (enlarged) to accommodate run-off from the restored site surface, monitoring will commence when the discharge point has been constructed in accordance with the sites approved surface water management plan.

This will be required in advance of final restoration, which could be in approximately 18 years (~2045).

Table 6 Surface Water Monitoring Schedule

Location	Parameter	Units	Limits	Frequency
SW1 (Swan Pool)	pH, EC Cl, SO_4, NH_4-N, visible oil & grease, suspended solids	mg/l	none	Quarterly
SW2 (Culvert – Vigo Brook) SW3 On site Pond SW4 (Upstream – Vigo Brook if accessible)	Ca, Mg, Na, K Alkalinity, Cd, As, Pb Cr, Cu, Ni, Zn Fe, Mn	mg/l	none	Annually

Limits to be assigned to SW3 through an appropriately worded improvement Condition.

4.3 Surface Water Quality

In accordance with the infilling and restoration scheme, compliance limits will be set for SW3 after a review of background surface water quality has been conducted in accordance with the permit. Monitoring collection will establish baseline conditions, restoration is not anticipated for ~18 years, the setting of limits should be established and agreed through an appropriately worded improvement condition.

Discharged water from the sites surface water management scheme in advance of construction of the final surface water pond will accord with the current composition requirements as defined in existing sites consent to discharge (T/08/35782/T).

4.4 Surface Water Action Plan

Once relevant, should the proposed compliance limits for the surface water discharge points be exceeded, actions will be taken in accordance with the site EMS procedures. The action plan is summarised below, and actions should be selected as appropriate:

- The result will be confirmed by the laboratory (1 week) or the sample re-tested if deemed necessary (weeks 2-3);
- Exceedance confirmation through repeat sampling (week 3);
- Review monitoring data to establish significance and apparent trends (weeks 4-6);
- If exceedances are continued, the conceptual model and ultimately the HRA will be reviewed (week 12); and
- If the risks are unacceptable, procedures will be established for implementing permanent corrective measures (week 16).

5 Leachate

5.1 Monitoring Point Locations

The applicability of landfill leachate monitoring is discussed in the accompanying HRA (see 5430-BLP-R-006-02) to this variation application. The low permeability nature of the waste types intended for deposit should result in minimal leachate generation in the site. The leachate strength is also expected to be weak due to the anticipated low leachability of the waste.

The low-risk potential explained in the HRA has informed the monitoring regime proposed for the site.

Leachate level and quality will be monitored from the proposed leachate monitoring point, which will be constructed up from the base of the site. There will be 1 singular leachate monitoring point at the centre of the cell, a target pad will be installed adjacent to the well so that a replacement can be installed if required in the future. A monitoring schedule is proposed in Table 7.

Table 7 Leachate Monitoring Schedule

Location	Parameter	Units	Limits	Frequency
All in-waste wells	Water Level	mAOD	none	Quarterly
	Dip to base	mAOD	none	Quarterly during infilling then Annually
LMP01	pH, EC Cl, SO_4, NH_4-N	mg/l	none	Quarterly
	TOC Ca, Mg, Na, K Alkalinity, TON Cd, As, Pb Cr, Cu, Ni, Zn Fe, Mn	mg/l	none	6-monthly
	Hazardous substances	n/a	none	Annually

The indicative location of the well is shown on ESID 12 and indicatively in Figure 1, monitoring will be conducted as per Table 7.

No leachate level limits will apply.

5.2 Leachate Quality

Leachate Quality (pore-water) will be analysed to the specification and frequency detailed in Table 7. The frequency of the leachate monitoring will be reviewed as more data is obtained or when leachate composition can be shown to be more consistent.

Following the installation of an engineered cap on each phase (i.e. non-operational), the frequency of the hazardous substance screen will be reduced to once every four years.

6 Amenity Monitoring

6.1 Monitoring Point Locations

Quantitative dust monitoring will be undertaken from three dust monitoring points quarterly for 12 months, following issue of the permit. These locations are positioned adjacent to the sensitive receptors located at the site boundary.

6.2 Dust Monitoring

Deposited and directional dust is monitored using 'frisbee' deposition gauges in accordance with the method specified in the Environment Agency guidance document M17. Each gauge is analysed for total dust mass (mg), deposition rate (mg/m^2/day), directional dust (8 compass points), and particulate characterisation (e.g. carbonaceous matter, silicon rich, general dirt, calcium rich etc).

The monitoring frequency for dust monitoring will be quarterly at locations D1, D2 and D3 as shown on ESID 12 and Figure 1.

6.3 Dust Compliance Limits

No compliance limits are proposed for dust. Environment Agency guidance document M17 states monitoring results at mass deposition gauges are usually compared with a 'complaints likely' dust guideline of 200 mg/m^2/day^{-1} the limit being applied to the individual sample and not the annual average value. This has been proposed as the action level for the site. If elevated readings are recorded the below action plan will be implemented.

6.4 Dust Action Plan

In the unlikely event that unacceptable dust emissions arise from the site, as indicated by the quantitative monitoring detailed above, the remedial actions detailed in the Dust and Emissions Management Plan – Appendix B to report 5430-BLP-R-004-02 will be undertaken.

7 Financial Provision Expenditure Plan

The financial provision proposed for the site has been calculated in accordance with the Environment Agency document 'Guidance on Financial Provision for Landfill (EPR5.02.2, 2011)'.

The format of this report and associated Financial Provision Calculations (Appendix A) have been utilised in previous permit applications and subsequently approved by the Environment Agency.

The spreadsheet of costs presented in Appendix A sets out the financial provision analysis for the site. Two sets of figures are provided, the:

- annual expenditure in the post operational phase; and
- financial provision needed for each year of the post operational phase of the site to completion.

7.1 Aftercare Period

Section 4.4 of the Environment Agency guidance quoted above contains guidance on the determination of an appropriate aftercare period, which states:

"For landfills for hazardous and non-hazardous waste we consider it appropriate that you estimate detailed costs for an aftercare period of 60 years, with a contingency fund available thereafter. We consider this to be a reasonable period during which you are likely to have to maintain operational controls over the site, in terms of leachate and landfill gas management. It also represents a period over which costs can be determined with a reasonable degree of accuracy and after which detailed estimates become less and less meaningful. ***Shorter periods may be agreed*** *where you can demonstrate an effective mechanism for rapid stabilisation of the landfill mass (e.g. a system for the introduction of leachate back into the waste mass with necessary management infrastructure and procedures in place), which we have approved."*

The Landfill Gas Risk Assessment (5430-BLP-R-007-02) and Hydrogeological Risk Assessment (5430-BLP-R-006-02) submitted as part of this permit application, consider the proposed landform and predicted waste volumes, types and associated emissions.

The waste types proposed to be accepted are restricted to Qualifying Materials, these are wastes with very low / negligible pollution potential. The risk assessments support the conclusion that the risk of landfill gas and leachate generation from the deposition of the proposed waste types can be considered negligible and there are no short or long term requirements to collect or manage leachate or landfill gas.

Taking the findings of these risk assessments and as previously agreed with the Environment Agency at similar permitted sites, it is considered that with appropriate environmental controls and monitoring, a 10 year aftercare period is sufficient for stabilisation to be achieved.

7.2 Environmental Monitoring

Environmental monitoring costs have been calculated to include all sub-contracted costs (e.g. chemical testing, labour etc.) and are based on prices obtained in the commercial market place by the operator.

The environmental monitoring costs are based on similar permitted schemes at other Qualifying Material Sites and are summarised in Table 8. In-waste gas monitoring points will be retro installed following the completion of the capping and restoration. The installation costs for the in-waste gas points are included in the provision. The cap area is approximately 15.5 ha hence 30 probes are proposed.

The post-operational monitoring costs have been calculated for this provision and are outlined in Table 8 below. It is assumed that following capping and restoration there will be no requirement to undertake dust monitoring.

Table 8 Monitoring Costs - Annual

Item	Cost	No of points	Total No. per year	Annual Cost
Surface Water Quarterly Suite (4 x per annum)	£10	4	16	£160
Surface Water Annual Suite (additional cost to the quarterly suite) (1 x per annum)	£45	4	4	£180
Groundwater Quarterly Suite (4 x per annum)	£10	7	28	£280
Groundwater Annual Suite (additional cost to the quarterly suite) (1 x per annum)	£45	7	7	£315
Groundwater Hazardous Substances (additional cost to the quarterly and annual suite) (1 per annum)	£160	7	7	£1,120
Leachate Quarterly	£10	1	4	£40
Leachate 6-monthly (additional cost to the quarterly suite)	£45	1	2	£90
Leachate Hazardous Substance (additional cost to the quarterly suite) (1 x per annum)	£160	1	1	£160
Sampling / Gas Monitoring Visits[1]	£300		4	£1,200
Annual Monitoring Report	£950	n/a	1	£950
			Total	**£4,495**

Appendix 1 of the Agency's Financial Provision guidance states that monitoring boreholes have a design life of 50+ years. No provision has been made for borehole replacement however a provision of £200 per year has been provided for borehole maintenance throughout the post-closure period. This includes provision for new caps and valves and de-silting if required.

A sum of £3,000 has been included in the provision for the completion of the final surrender report.

7.3 Capping and Restoration

The phasing of the site consists of one singular cell, which will be constructed, filled, capped and restored. Phasing details and final restoration contours on drawings ESID 5A, 5B, 5C and ESID 6.

[1] Includes quarterly monitoring of gas points (30 locations, Section 2.1).

The phasing of the site consists of phases 1 to 19 which will be progressively constructed, filled, capped and restored. As each phase is being filled, the following phase will be constructed. The cap area for the final phase of infilling, i.e. after year 18 (Phase 19, drawing ESID 5C) is approximately 2 hectares. It is predicted that half of the Phase 19 cap will be placed during the last phase of operation and the remaining area capped in the first year of post closure. This gives a final post closure cap area of 1,000 m^2 (1 hectare).

Capping costs for the final phase of capping has been calculated at £5 per m^2, e.g. equivalent to 500mm at k=1x10^{-8}m/s (consistent with similar permitted schemes) equating to a provision of £50,000.

Maintenance of capping in post-closure is specific to repairs to engineered capping. Maintenance costs equate to £200 per hectare per year as per Environment Agency guidance. The total capped area will be approximately 15.5 hectares; therefore, the maintenance cost is £3,100 per year. An allowance of £500 per annum has been made for the maintenance of surface water ditches in the restoration scheme and this is included in the overall cap maintenance provision making a total of £3,600 per year.

A provision of £500 has also been allocated for each of the two in-waste gas monitoring points to be installed following the final capping area of the site. This equates to £1,000.

7.4 Miscellaneous Provision

This section of the provision will provide details on miscellaneous items not covered under the previous section headers.

Maintenance and Security

The potential for unauthorised access minimal. Consequently, a figure of £500 per year is assumed appropriate for general site security and maintenance; this includes provision for the repair of sections of stock proof fencing surrounding the site (50 metres of BS EN 10244 Class A fencing including labour for a day).

Topographical Surveys

A sum £300 per year has been allocated for annual topographical surveys of the site.

7.5 Specified Events

Provision has been made for £3,200 for dealing with any specified event which requires additional expenditure to prevent harm to the environment. Specified events that although very unlikely to occur are detailed in Table 9 below.

Table 9 Possible Specified Events and Solutions

Likelihood	Relevant Event	Remedial Action	Comment /Cost Estimate
Low	Damage to gas monitoring wells on restored areas.	Seal and level or replace if required in accordance with industry guidance.	Replace gas monitoring point estimated cost £500

Likelihood	Relevant Event	Remedial Action	Comment /Cost Estimate
Low	Perimeter borehole damage	Seal and level or replace if required in accordance with industry guidance.	Replace external monitoring point estimated cost £750
Low	Leachate monitoring point damage	Seal and level or replace if required in accordance with industry guidance.	Re-drill leachate monitoring point estimated cost £1,500.
Very low	Leachate accumulation	Removal of excess leachate from a leachate monitoring point.	Tanker hire to collect leachate and dispose of 30m^3 at £15 per m^3, totalling £450

Financial provision for the site based on the above is calculated at £148,150 for a 10-year aftercare period.

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