Dogsthorpe Landfill Site

Permit Variation Application – Tonnage Increase

FCC Waste Services (UK) Limited

Report No. K0162-BLP-R-ENV-01-01
January 2022
Revision 01

FCC Environment

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Document: Permit Variation Application – Tonnage Increase

Project: Dogsthorpe Landfill Site

Client: FCC Waste Services (UK) Limited

Report Number: K0162-BLP-R-ENV-01-01

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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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Contents

FIGURES

TABLES

[redacted]

[redacted]

[redacted]

1 Introduction

1.1 Background

This document, prepared by ByrneLooby supports a permit variation application (report reference K0162-BLP-R-ENV-01-01). The current permit is a consolidated version issued in modern condition format, EPR/BV3740ID/V015. This recent permit determination (2022) accounts for the infilling of the eastern area of Site, known as "Area C", the Eastern Void or Cell 15. The following key documents and data sources have been consulted in the preparation of this variation application report including:

- Application documents referenced 4232/R/001/01 to 4232/R/009/01 (2019) and Schedule 5 responses (2020) – Documentation that supported variation EPR/BV3740ID/V015 to infill Area C will Qualifying Materials as defined by the reduced list of wastes which fall within the groups of wastes specified by Her Majesty's Revenue and Customs (HMRC) in The Landfill Tax (Qualifying Material) Order (application duly made 02/10/2019);
- Application documents referenced 2328/R/01 to 2328/R/04 (2015) associated with variation EPR/BV3740ID/V011; and,
- FCC Environmental monitoring data and relevant drawings.

1.2 Variation Objectives

This application proposes a change the site's annual waste input limits. This change only relates to the quantity per year. The extant permit (Table S1.5) specifies the following limits:

- Non-hazardous waste in Area C – 150,000t/y
- Waste for restoration – 150,000t/y

The proposal is to increase the tonnages to 500,000t/y (for both aspects), this is to facilitate and support the delivery of the HS2 project. No other changes are proposed.

- Non-hazardous waste in Area C – 500,000t/y
- Waste [redacted] – 500,000t/y

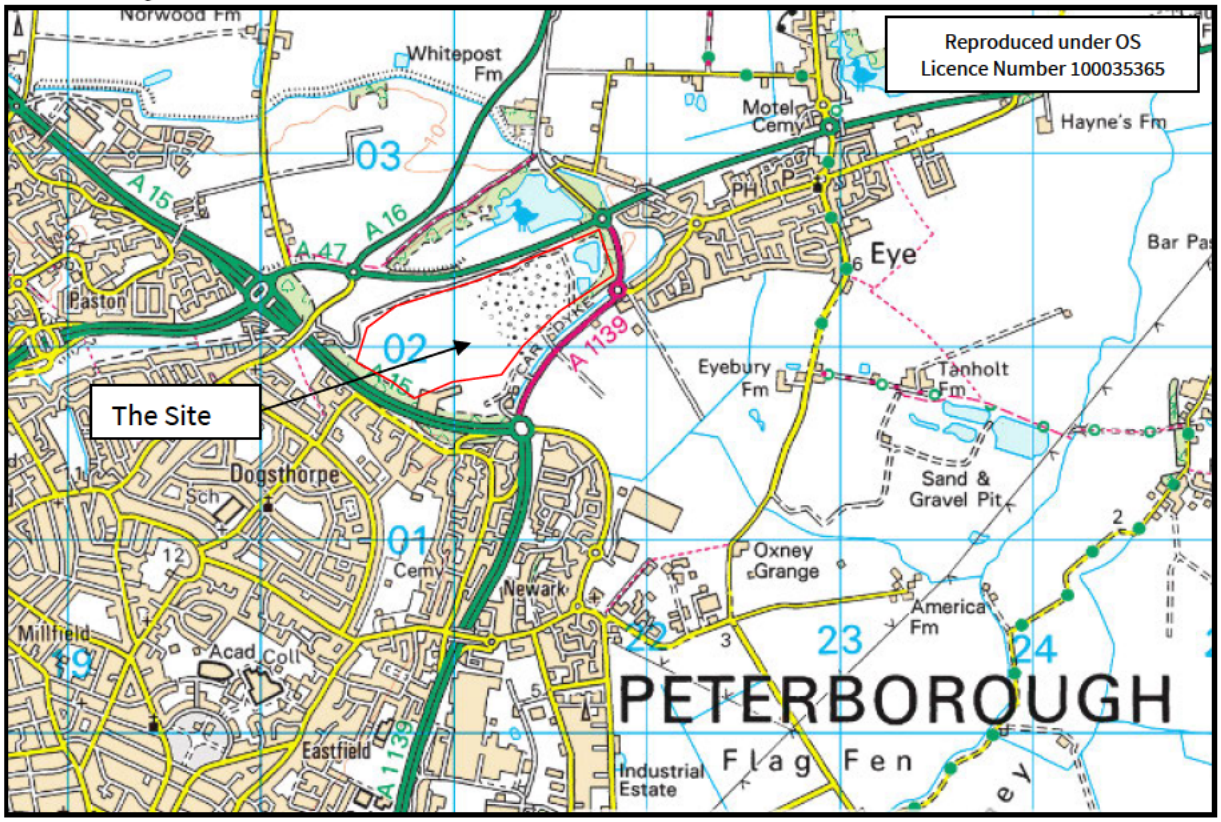
1.3 Site Location

The Dogsthorpe Landfill Site is located east of the A15, south of the A47 (Figure 1). The closest residential [redacted] eastern void (Area C) are ~100m to the southeast (Peterborough Road) and northeast on Chancery Lane (~140m). It is noted that these residences are separated by a significant (busy) link road that joins the A15, A16 and A47 dual carriageways. The Site is subdivided into three [redacted] further in Section 4), the remaining void is only within Area C (Figure 2).

1.4 Permitting and Operational History

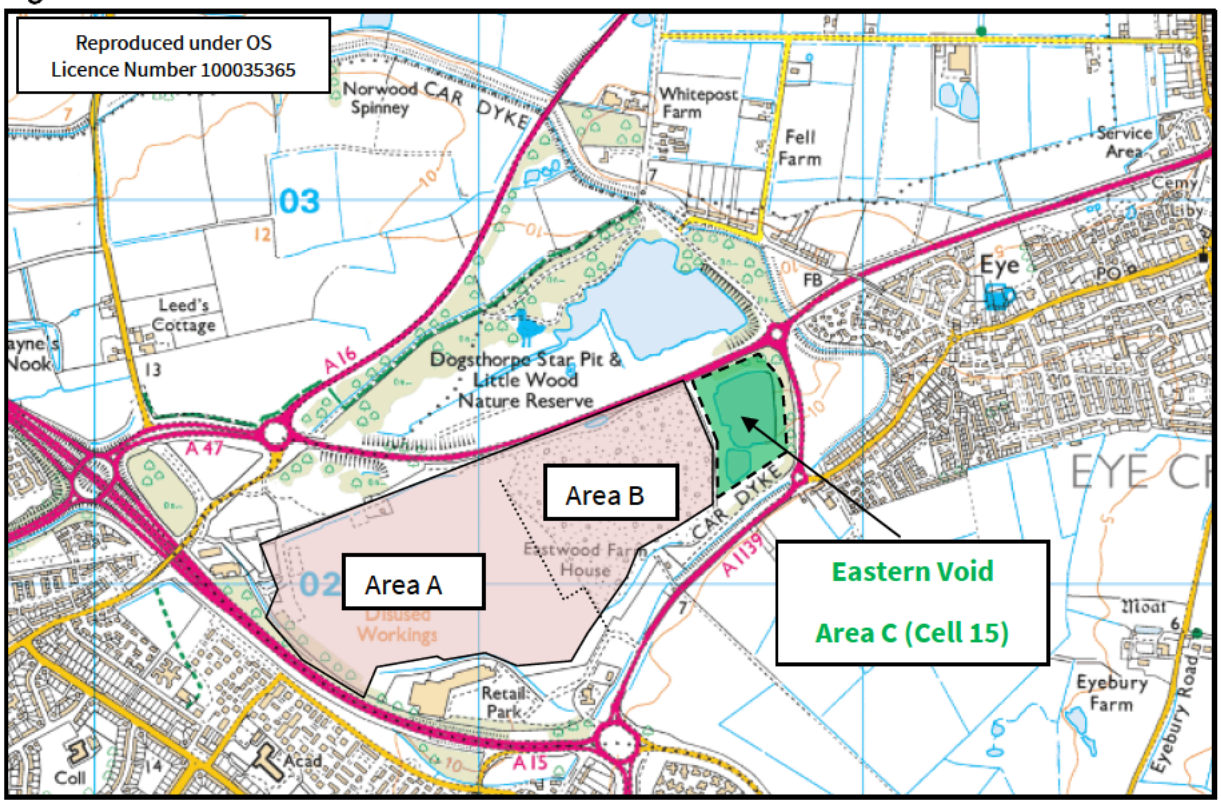
The Dogsthorpe Landfill Site was first granted an Environmental Permit in January 2005 (Permit Reference EPR/BV3740ID). Numerous variations have taken place subsequently including a leachate level increase in 2015. Waste disposal and restoration by landfilling (post 1993/1994) has utilised the void space resultant form the extraction of the Oxford Clay in the manufacture of bricks. The site is oriented northeast-southwest, with a length of some 1.3 km and width of some 600 m (northwest-southeast) and is divided into three zones.

Figure 1 Site Location



Indicative Permit boundary shown (red line) – this shows the extent of the permit area.

Figure 2 Site Areas



This application relates to the eastern void area only (for disposal) and all areas for restoration.

Area A in the western part of the site is the older part of the site and predates the requirements for CQA engineered containment. Area B in the central / eastern part of the site comprises 14 engineered landfill cells to CQA standards (Figure 2). Area C is the eastern area of site which is the future current area of operations and is developed as a non-hazardous landfill cell for the receipt of non-hazardous wastes which are restricted to those that appear on the List of Qualifying Materials.

Area A has an approximate area of 25 hectares (Ha) and was unlined apart from placement of some overburden material (weathered Oxford Clay, sometimes termed Callow). Area B is around 49 Ha in total area (46 Ha basal area). The landfill cells within Area B have all been engineered using Oxford Clay taken from a borrow pit at the eastern end of the site. This borrow pit (formerly known as Area C, or Cell 15 has a volume capacity calculated at 375,000m^3) and has been designated as a repository for HS2 waste materials.

2 Application Detail

2.1 Non-Technical Summary

FCC Waste Services (UK) Ltd are seeking to change the Annual Waste Input Limits from those specified in Permit Table S1.5. An increase is required to assist in the delivery of the HS2 project which will be sending soils to the site for disposal. This variation application proposes to increase tonnages for disposal from 150,000t/y to 500,000t/y and the same increase is proposed for restoration material tonnages. This is necessary to accommodate increased tonnages in HS2 diverted waste not previously envisaged for disposal at Dogsthorpe when the variation application for Area C was prepared and submitted in 2019.

There are no changes to the:

- previously calculated void volume of 375,000m^3;
- area for disposal (as defined in the 2019 application drawings) or design;
- waste restoration profile and restoration detail;
- waste [redacted]
- surface water management plan; or
- emissions limits.

A re-appraisa[redacted]ubmitted technical justifications at the Site has not indicated any detrimental environmental impacts or negative health effects from the proposal (Sections 4 to 6, including Appendix B – Stability appraisal).

The proposa[redacted]bly shortens the length of time to complete the infilling operation, previously considered as ~6 years + 2 years for restoration. At the increased waste input tonnages per year, the expected duration of infilling would be reduced significantly to ~2years.

2.2 Further Supporting Detail

The following sections of this variation application report outline and formalise the appropriate assessment updates which include consideration within the Environmental Setting and Installation Design report (ESID), Hydrogeological Risk Assessment (HRA), Stability Review, Gas Risk Assessment

(GRA), H1 and Amenity Assessment. Correspondence between the Environment Agency and FCC (December 2021) has been considered within these appraisals and updates.

3 Permit Variation Application

3.1 Introduction

The variation application proposes a change to the Annual Waste Input Limits.

The associated Permit Variation Application Forms and relevant Company details are provided at Appendix A.

3.2 Supporting Documentation

In accordance with the proposed increase to the waste input rates associated with the infilling of Area C and subsequent Site restoration, the following Section updates are provided:

- Section 4 (ESID)
- Section 5 (H1 and Amenity)
- Section 6 (Technical Updates)
  - HRA, GRA, SRA (See Appendix B)

3.3 Proposed Changes

In accordance with the proposed changes the following Permit details / conditions require amendment:

- The Annual Waste Input Limits, revised as follows:
  - Non-hazardous waste in Area C – 500,000t/y
  - [redacted]toration – 500,000t/y

3.4 Operator Details

The landfill operator is FCC Waste Services (UK) Ltd, (parent company FCC Environment) whose registered off[redacted]n addresses are below:

- Ground Floor West 900 Pavilion Drive Northampton Business Park Northampton NN4 7RG

The installati[redacted]is:

- Dogsthorpe Landfill Site, Welland Road, Dogsthorpe, Peterborough, PE1 3TD

3.5 Management System

FCC Waste Services (UK) Ltd operates an independent Environmental Management System that has been developed during the operation of the installation. FCC Environment have chosen to implement the Operator Competence System developed by Energy & Utility Skills (EU Skills) and Environmental Services Associated (ESA) 'Competence Management System' (CMS).

The CMS is approved by DEFRA and the Environment Agency to satisfy the Environmental Permit competency requirement.

3.6 Application Forms and Associated Details

This section of the application report provides details and documentation to address the questions raised in the application forms (Section 2, 3 and 4). Additionally, as noted previously Section 2.1 of this report forms the 'Non-Technical Summary' of the proposal. The completed application forms are parts A, C2, C3 and F1 are attached as Appendix A.

This application is for a substantial variation. Although the changes are deemed to not have negative effects on amenity or the environment, the increase (150,000t/y to 500,000t/y) is above threshold for non-hazardous landfill site, section 3.6.2 of the Agency charging guidance: "*You would need a substantial variation if you want to make changes to an activity carried out by a part A installation that:*

"would make that activity a part A(1) activity in its own right – for example by increasing the volume of tonnes per hour (or per day) being processed so it reaches the threshold for a part A(1) activity may have significant negative effects on human health or the environment".

The increase makes the request a part A(1) activity[1] in its own right (Schedule 1, part 2, chapter 5, section 5.3) at input greater than 10t/day or capacity greater than 25,000t. It should be noted that prior to the determination of Permit EPR/BV3740ID/V015, the accepted input rate for non-hazardous waste disposal was 440,000t/y (EPR/BV3740ID/V014). Not significantly different from the proposed 500,000t/y. The variation fee is for this application is £20,498 (ref 1:17:2 "Substantial variation", Environment Agency fees and charges 2019.

3.7 Application Form A Questions

3.7.1 Question 5C and Appendix 1: Details of the Directors and Date of Birth Information

Vicente Federico Orts-Llopis

Director

Date of Birth: REDACTED

Agustin Serrano Minchan

Director

Date of Birth: REDACTED

Paul Taylor

Director

Date of Birth: REDACTED

[1] https://www.legislation.gov.uk/uksi/2016/1154/schedule/1/part/2/chapter/5/crossheading/disposal-of-waste-by-landfill/made The Environmental Permitting (England and Wales) Regulations 2016

3.8 Application Form C2 Questions

3.8.1 Question 1a – discussions before your application

FCC and the Environment Agency have discussed the content of the application prior to this submission.

3.8.2 Question 2b – Changes to existing activities

See detail provided in Section 2.1 and 3.3. The proposal is to amend the Waste Annual Inputs.

3.8.3 Question 3 – Your ability as an Operator

The Operator Competence Report (Appendix A) submitted as part of this permit variation application contains details of relevant management details and competency certificate of approval. The operator has not been convicted of any relevant offenses. The management certificate for the technically competent manager is also contained in Appendix A.

3.8.4 Question 5 – Supporting Information

Application Form C2, question 5a requires the submission of a site plan to support the application. The location of the Site and site boundary has not changed; drawing K0162.1.001 is provided.

3.8.5 Question 6 – Environmental Risk Assessment

An update to the H1 Environmental Risk Assessment is provided in support of this application, information relating to nuisance and amenity and appropriate receptors is provided (Section 5).

3.9 Application Form C3 Questions

3.9.1 Question 1b – Types of Waste Accepted and Restrictions

The waste types associated with this application are detailed in reports associated with determination of EPR/BV3740ID/V015. There are no changes proposed in this variation application.

3.9.2 Question 2 – Emissions to Air, Water or Land

Emissions to [redacted]ir by virtue of this application are outlined in the supporting Risk Assessment Addendum reports, see Section 6.

3.9.3 Question 3a – Technical Standards

There are no [redacted]echnical Standards at the Site. An ESID Addendum (a summarised form of report 4232/R/003/01) that forms part of permit determination EPR/BV3740ID/V015 is provided in Section 4 for completeness and to avoid further cross-referencing.

3.9.4 Question 3b – General Requirements

Current IMS procedures limit emissions that are not controlled by "limits" within the extant permit, e.g. odour, noise, vibration are discussed further in Section 5 for completeness.

3.9.5 Question 3c – Types and Amounts of Raw Materials

Landfill are excluded from this section.

3.9.6 Question 3d – Information for Specific Sectors

Specific questions for the hazardous and non-hazardous waste recovery and disposal sector are addressed in Appendix 4 of the associated C3 forms.

3.9.7 Question 4 – Monitoring

There are no proposed changes to the environmental monitoring at the installation. Enhanced mitigation monitoring for dust emissions is recommended during adverse weather conditions (see Section 5). The Sites monitoring location plan (4232.1.005) is provided for completeness.

3.9.8 Question 5 – Environmental Impact Assessment

An Environmental Assessment (H1 and Amenity) addendum in relation to the application proposal is provided in Section 5.

Additionally, it is noted that an Environmental Impact Assessment has previously been considered as part of the recent Planning Permission approval (application reference 18/02196/MMFUL, dated 6 March 2020). This information was considered to be comprehensive by Peterborough City Council and met the requirements set out in the Town and Country Planning Environmental Impact Assessment Regulations 2017. Detailed topic areas assessed and considered included noise, dust and air quality impacts and were considered in accordance with policy CS34. Highway and traffic issues, including safety of all road users in the vicinity of the site were considered in compliance with policy CS32. With regards to landscape and visual impacts, the proposal was in compliance with policies CS24, CS33 and CS24. The impact on water resources and the water environment were assessed and the proposal was deemed in compliance with policy CS39. The impacts on ecology, site restoration and provision of biodiversity enhancements were also considered and the proposal was in compliance with policies CS25, CS34 and CS35. Cumulative impacts in accordance with the ongoing restoration works at the adjacent Dogsthorpe landfill site had also been taken into account and were deemed acceptable.

3.9.9 Question 6 – Resource Efficiency and Climate Change

The application does not include reference or changes to Gas Engines.

[redacted]

4 Technical Standards - Environmental Setting and Design Report (ESID) - Addendum

4.1 Landfill Design

The existing landfill design has not changed from those described in 2003. Table 1 provides a concise summ[redacted]ned as part of Hydrogeological Risk Assessment Updates post 2007, the restoration of Area C (Eastern Void) has been consented as part of EPR/BV3740ID/V015.

As outlined in Section 1.4, Area A of the Site has an approximate area of 25 hectares (Ha) and was unlined apart from placement of some overburden material (weathered Oxford Clay, sometimes termed Callow). Area B is around 49 Ha in total area (46 Ha basal area). The landfill cells within Area B have all been engineered using Oxford Clay taken from the borrow pit at the eastern end of the site to varying degrees, information taken from various sources indicate the following:

- Cells 1 to 11 have a 1 m thick basal liner (engineered Oxford Clay) constructed on around a 1 m thickness of in-situ Oxford Clay, a 1-2 m thick side slope liner (engineered Oxford Clay) with cell separation bunds of 3 m height. Herringbone drains have been included in all cells for leachate head control.
- Cells 12 to 14 have a similar design to Cells 1 to 11 described above, with an increased in-situ geological barrier of 2 m of Oxford Clay. Cell 12 has a herringbone drain system, while Cells 13 and 14 have a leachate drainage blanket comprising shredded tyres (thickness around 300 mm).

The increase in tonnages proposed within this application can only have effects on the infilling of Area C (the eastern void / former borrow pit) and adjacent receptors as the disposal operations have ceased in Areas A and B. Additionally, restoration will also be primarily related to Area C, it is recognised however that areas A and B may take minimal restoration materials to meet approved Planning and Permitted schemes.

As such, the following aspects of this Technical Standards / ESID addendum relate specifically to the assessment of effects (as a result of increasing annual input rates) to Area C.

Table 1 Details of Landfill Operations

Installation Variable	Design Comparison			
	2007 Review	2015 HRA Review	2018 HRA Review	2022 ESID & HRA Review
Site Phasing	**14 cells in Area B + Area A** Cell 13 operational	No Change from 2007	No Change from 2007	No Change from 2007
Restoration Specification	1m Restoration	No Change from 2007	No Change from 2007	No Change from 2007
Liner Specification	**Area A:** Replaced Callow. **Area B:** 1 m engineered clay over 1m on in-situ Oxford Clay (cells 1-11) [redacted] clay over 2 m in-situ Oxford [redacted]	No Change from 2007	No Change from 2007	No Change from 2007
Capping Specification	**Area A:** Variable thickness of clay [redacted]	No Change from 2007	No Change from 2007	No Change from 2007
Waste Types Received	Non-hazardous & Inert (inc SNRHW)	No Change from 2007	No Change from 2007	No Change from 2007
Leachate Management	[redacted] Retrofit extraction wells [redacted] Cells 1 to 12, spine drains of coarse gravel surrounding 150mm ID HDPE. Cells 13 & 14, shredded tyres, 1 extraction well + 1-2 monitoring wells	No Change from 2007	No Change from 2007	No Change from 2007
Borrow Pit	**Area C** **Eastern Void:** Open area / water body	N/A	Infill with Qualifying Materials	Infill with Qualifying Materials - **increase rate of infilling only**

The single cell infill scheme for Area C (top area of ~5.5 Ha) includes 1 leachate monitoring chamber with radial spine drains. However, no leachate extraction is proposed within Area C due to the likely high density, low permeability of the waste infill (i.e. predominantly soil type materials) and low leachate generation, although incidental surface water run-off will be managed by way of the proposed surface water lagoon.

- Area C comprises of a geological barrier of re-engineered and compacted in-situ Oxford Clay across the base and sidewalls of the site. The enhanced geological barrier will be constructed, at a minimum thickness of 0.5 m to achieve hydraulic conductivity of no greater than $1x10^{-8}$ m/s.

The proposed increase in annual tonnages does not change the design principles or requirement for a Geological Barrier within the design of Area C.

Capping and Restoration

Area A was restored as per the licence requirements of the time in 1993 / 1994, and Area B has also completed final capping. Both areas have been progressively restored, with some areas requiring further materials to attain the consented profile and landscaping details. A final capping layer will be installed on Area C as filling is completed.

The proposed increase in annual tonnages does not change the design principles or requirement for restoration at the Site.

The Nature of the Infill (Area C))

The wastes consented consist primarily of soil type materials from excavation, construction and demolition activities, it is anticipated that the majority of wastes will be either: excavated soil and stones including clays and silts; or similar materials resulting from the treatment of mixed construction, demolition and excavation wastes. Laboratory test results of four samples from another site p[redacted]cept non-hazardous Qualifying Materials indicated well-graded particle size distributi[redacted]h vertical permeability values reported in the range 1 x 10^{-10} to 3 x 10^{-10} m/s.

The proposed increase in annual tonnages is not anticipated to alter the bulk fill properties of the materials on[redacted]

Requirement[redacted] Balance

Under the conditions of infilling the eastern void (Area C), and previous understanding in regard to accumulation of water in low-permeability waste, a water balance was not required as part the supporting HRA that justified acceptable environmental risk from the infilling scheme. However, there are beneficial aspects relating to the infilling within a shorter timescale. These are expanded upon in the Hydrogeological Risk Assessment Addendum (Section 6).

The proposed increase in annual tonnages has beneficial aspects over those previously considered and consented under determination of EPR/BV3740ID/V015.

Monitoring Within the Landfill

It has been identified within similar applications and associated accompanying Landfill Gas Risk Assessments (including that submitted for Dogsthorpe in 2019) that the production of landfill gas will be negligible due to the non-biodegradable nature of the permitted waste types. Therefore, in accordance with current Agency guidance, and consented permit, no active gas control is required for Area C. Gas monitoring boreholes / probes will be installed within the waste mass based on Environment Agency guidance to further assist in the future Permit Surrender.

One leachate monitoring chamber with radial spine drains is to be installed at the base of Area C. However, no leachate extraction is proposed due to the likely high density, low permeability of the fill and low leachate generation. Incidental surface water run-off (as collected during infilling operations) will be managed as part of the already consented scheme. However, there are beneficial aspects relating to the infilling within a shorter timescale. These are expanded upon in the Hydrogeological Risk Assessment Addendum (Section 6).

The proposed increase in annual tonnages has a negligible effect on Gas generation (see Gas Risk Addendum in Section 6), there are beneficial aspects over those previously considered and consented under determination of EPR/BV3740ID/V015 (i.e. less porewater, therefore less leachate generation).

Monitoring external to the Landfill

Various aspects of current monitoring are undertaken at the site in accordance with current permit requirements. Monitoring locations are provided on drawing 4232.1.005 (May 2019). Air monitoring is already conducted at locations adjacent to the closest receptors to the northeast and southwest, in addition to ground gas and groundwater.

The proposed increase in annual tonnages does not change the monitoring location requirements for at the Site.

4.2 Environmental Aspects

Geological Appraisal

The Site is contained within the Jurassic Oxford Clay, a natural in-situ geological barrier.

Hydrogeolog

The site is not located on or near a groundwater Source Protection Zone (SPZ), the bedrock aquifers are not considered receptors.

Surface Wate

The infilling scheme is primarily “below ground surface” and therefore cannot impact the adjacent surface water course, the Car Dyke. Potential effects from Restoration on Car Dyke have been approved as per the consented scheme EPR/BV3740ID/V015.

Star Pit SSSI

There are no linkages between the Site and the adjacent (north of the A47) Star Pit.

The proposed increase in annual tonnages does not change or alter the environmental aspects at the Site.

4.3 Source – Pathway – Receptor Framework

The conceptual model has been based on the Source - Pathway - Receptor relationship, this is well understood and defined as:

- The Source is the Qualifying Materials used to restore Area C, (eastern void / borrow pit)
- The Pathway is the sidewall engineering and the geological pathway towards a water resource; and
- The Receptor is an underlying or adjacent water resource.

The primary receptors are the underlying Kellaways Sand groundwater (infilling phase) and the surface water in Car Dyke (restoration phase) that flows past the southern periphery of the site (Figure 2). Further information is provided in the accompanying HRA addendum (Section 6).

The proposed increase in annual tonnages does not change or alter the source – pathway – receptor framework.

4.4 Site Report

There is no requirement by virtue of this application to include a site report as the land to be infilled forms a permanent deposit of waste. Hence, the EA H5 template is not included.

5 Environmental Risk Assessment – H1 and Amenity

5.1 Overview and Assessment Scope

This risk assessment has been undertaken using current Environment Agency (the Agency) Guidance issued on www.gov.uk. The guidance referenced identifies a four-step process to risk assessments which can be summarised as:

- Ris[redacted];
- Risk assessment;
- Appropriate control; and
- Presentation of assessment.

The guidance indicates that the following parameters require assessing, odour; noise and vibration; fugitive emissions including dust, mud and debris; and accidents. The guidance also requires that receptors are[redacted] with regard to the proximity of the site. A re-appraisal of Site receptors has been undertaken, Table 2 identifies the most likely sensitive receptors adjacent to site, this has been compiled using information available through internet-based searches. The locations of these receptors are indicated on drawing K0162.1.001. There are no new or additional receptor identified than those detailed in documentation that supported the determination of EPR/BV3740ID/V015.

The Agency guidance requires that everyone applying for a new landfill environmental permit (other than a standard permit) or variation to an existing permit should present information in the form of risk assessment tables, one table each for odour, noise and vibration, fugitive emissions (including dust, and litter) and pests and vermin and global warming potential. Identification of accidents

scenarios and their prevention through operational management should also be detailed. Each table should identify the hazard, the potential receptors and the pathway from the hazard to those receptors.

In addition, the tables should also include the preventative risk management practices to be employed along with an assessment of the mitigated risk.

Table 2 Sensitive Receptor Review

Receptor No.	Receptor	Receptor Type	Approx. Distance from Site Boundary (m)	Direction from Site	Freq (%) Prevailing Wind Direction
1.	Peterborough Road	Residential	190	SE	4
2.	A1139	Road	50	E	7
3.	Eye Road A1139	Road	50	S	6
4.	Services & Petrol Station	Facilities	700	SSW	4
5.	Garden Centre / Retail Park	Public Facility	880	SW	3
6.	Paston Parkway A15	Road	720	SW	3
7.	Works / Welland Road	Industrial / Road	1400	W	2
8.	A47	Road	50	N	10
9.	Chancery Lane	Residential	190	NE	13
10.	Beech Lane	Residential	320	E	7
11.	Dogsthorpe Star Pit	SSSI, LNR	125	NW	5
12.	Hodney Road	Residential	350	NE	13
13.	Nene Washes	SAC, SPA, pSPA, RAMSAR	4400	S	6
14.	[redacted]	SAC	6700	SW	3
15.	Eye Gravel Pit	SSSI	1700	NNE	9
16.	Eye Green	LNR	1700	ENE	14
17.	[redacted]	LWS	160	N	10
18.	Eyebury Farm	Residential	1100	SE	4
19.	[redacted]ravan Park	Residential and Amenity	575	N	10
20.	Wolf Hill House	Residential	655	NNW	10
21.	White Post farm	Residential	790	NNW	10
22.	Hodney Road Allotments	Amenity	675	NE	13
23.	Slate Farm & Leeds Cottage	Residential	1550	WNW	4

Receptor No.	Receptor	Receptor Type	Approx. Distance from Site Boundary (m)	Direction from Site	Freq (%) Prevailing Wind Direction
24.	Eyebury Road Pits & Tanholt farm	LWS & Residential	1800	ESE	5
25.	Car Dyke	SW Course	125	SE	4
26.	Welland Academy, First Steps Children's Centre and Marshfields School	School	1310	SW	2
27.	City College (Mansfield Campus)	School	1710	WSW	2
28.	Newark Hill Primary Academy	School	1850	SSW	4
29.	Lime Trust Parnwell	School	1180	SSW	4
30.	Industrial Estate & Caravan Park	Commercial & Residential	1430	SSE	2.5
31.	Eye C of E Primary School	School	1240	E	7

Distances in accordance with eastern void boundary.
Frequency stats from https://wind.willyweather.co.uk/ee/cambridgeshire/peterborough.html.
LWS – Local Wildlife Site, LNR – Local Nature Reserve, receptor number detailed on drawing K0162.1.001

5.2 Proposed Operation

There are no changes to the operation approved under the determination of EPR/BV3740ID/V015. Only input rates are proposed to increase, as such there can only be an increase in vehicle deliveries per year. Section 4 and Section 6 have not identified any additional Environmental Risk associated with this increase, the aspects of Health and Amenity are considered further in the section below and subsequent risk tables.

5.3 Potential Hazards

5.3.1 Odour

The wastes to be brought for disposal at the site are very unlikely to be a significant source of odour. Experience fr[redacted]mitted installations has shown that the low or negligible organic content results in negligible landfill gas generation and no production of malodorous leachate or smell. The very limited range of wastes to be accepted effectively removes the need to produce an odour manag[redacted]n. Nevertheless, the risks associated with fugitive odour emissions are detailed in T[redacted]will continue to be managed in accordance with the Sites current odour management plan.

Increased annual input tonnages do not alter or increase the risk of odour.

5.3.2 Noise and Vibration

The risk of excessive noise and vibration associated with the proposed activity will be restricted primarily to movement and operation of site plant. The site is located within a relatively isolated location with major road networks on the east, north and south. It is therefore considered that the

disposal/restoration operations at the site are unlikely to generate a noise impact. The majority of the activity (disposal) is below ground surface (within a clay pit / void) hence noise is lessened compared to above ground surface operations. Increased annual input tonnages reduces the longevity of the overall operation, this is beneficial in regard to noise and vibration. Duration of effects reduce from ~8 years to ~2 years. Risks associated with noise and vibration are detailed in Table 4 and will continue to be managed in accordance with the Site's current management plans.

Increased annual input tonnages is unlikely to increase the risk of noise to significant levels, when judged against the current traffic use (significant HGV usage) of the Eye link road (between the Site and residential receptors) and the A47 to the north of the Site.

Noise is an aspect for detailed consideration for the City Council, deemed acceptable as part of Planning Condition C11 of consent 18-02196-MMFUL06-03-2020 (where the inclusion of 3m high noise screens is required as additional mitigation). Potential impact is controlled by the inclusion of noise limits, not to exceed 55dB expressed as an LAeq, 1hr, between the permitted hours of 0700 hours and 1800 hours Mondays to Saturdays and 52dB expressed as an LAeq, 1hr, at any other time as measured, or assessed on the residential property boundary of the following properties:

- 67 Peterborough Road, Eye,
- 101 Peterborough Road, Eye, and
- The boundary of the rear gate at the Eastern Boundary of the landfill site.

5.3.3 Dust

Dust generation, and dispersion are both dependent upon weather conditions. The most important factors are:

- precipitation, rain may suppress dust generation,
- wind direction, which determines direction of dispersion, and
- wind speed, which will affect ground level emissions by increasing the initial dilution of pollutants in the emission; it will also affect the potential for dust entrainment.

Dust generation is not expected to increase materially even though the application proposes an increase to th[redacted]te inputs. As noted above, weather conditions are the driver behind emissions, nevertheless the risks associated with dust emissions are detailed in Table 5 (updated accordingly in line with this proposal) and will continue to be managed in accordance with the Sites current dust management plan[redacted].

Increased annual input tonnages does not alter or increase the risk of dust. For completeness, the approved Dust Management Plan (determined under EPR/BV3740ID/V015) has been included at Appendix B, this includes information relating to community liaison, monitoring, recording and complaints p[redacted]

As the infilling is primarily below ground level, the increased annual input tonnages will not significantly increase the risk of dust emissions, the reduction in the longevity of the overall operation is beneficial in regard to dust generation. The increased rate of filling will allow faster completion and restoration, allowing areas to be vegetated earlier and significantly reducing the potential for dust generation from exposed unvegetated soil deposits.

5.3.4 Mud

Mud can be trailed onto the highway by vehicles leaving the site after picking up mud from unpaved roads or from the point of deposit. Access to the site will be via existing haul roads and wheel wash. A combination of the distance travelled on the internal haul roads and the wheel wash will ensure any accumulated mud will be removed prior to the vehicle leaving site. If a vehicle is observed to be particularly muddy, the driver will be redirected through the wheelwash. The primary receptor to entrained mud will be the adjoining Welland Road (this will not change as a result of increasing the annual input tonnages). The wheel wash will be maintained to ensure efficient operation and the haul roads will be maintained by road sweeper. The access roads and Welland Road will be regularly inspected allowing the operator to deploy additional road sweepers as necessary, as part of the current landfill Site management controls. The risks associated with entrained mud are considered in Table 6.

5.3.5 Litter

Already approved Waste Acceptance Protocols will restrict the waste types to be brought to site. These are very unlikely to contain materials which could present a risk of wind-blown litter and will not be considered further by this assessment.

5.3.6 Pests and Vermin

The deposit of putrescible waste in landfills may attract pests and scavengers and also provide a habitat for the breeding or loafing of pests and vermin. As the materials to be accepted for disposal are unlikely to contain anything to attract pests or vermin, the risk associated with the site is considered to be negligible and will not be considered further by this assessment.

5.3.7 Global Warming

The previously approved Gas Risk Assessment (determined under EPR/BV3740ID/V015) has determined (qualitatively assessed) that negligible volumes of landfill gas will be generated by the deposited wastes. The volumes are significantly lower than the threshold at which conventional control and treatment systems can operate (confirmed within the quantitative addendum update, Section 6). Gas monitoring carried out at similar sites indicates that the actual volume of gas produced will be lower than the surrender criteria detailed in the Environment Agency Surrender Guidance (Re[redacted]erefore expected that the site will present a negligible risk in terms of global warming potential will not be considered further in this assessment.

Increased annual input tonnages does not alter or increase the risk of global warming.

5.4 Hazard Pathway[redacted]

When identifying the receptors, the closest and the most sensitive (if different from the closest) have been considered in each direction from the hazard. Account has been taken of the mechanism of transport to t[redacted] receptor e.g. proximity to highway access / egress points for mud and wind direction for airborne dust. Recent wind direction data has been used to establish hazard pathways to adjacent to the site, this data is consistent with that previously submitted during determination of EPR/BV3740ID/V015.

5.5 Probability of Exposure

Probability of exposure is determined by the distance of the receptor to the site and the likelihood of the hazard reaching the receptor i.e. frequency of prevailing wind in that direction. The probability of exposure is irrespective of the type of hazard presented.

5.6 Hazard Receptors

As stated in Section 5.1, a re-appraisal of Site receptors has been undertaken, Table 2 identifies the most likely sensitive receptors adjacent to site, this has been compiled using information available through internet-based searches. The locations of these receptors are indicated on drawing K0162.1.001.

A review of European Sites and local Site has highlighted the presence of Dogsthorpe Star Pit (SSSI) & Litter Wood (Local Nature reserve) to the northeast of the site, and Eye Gravel Pit (SSSI) to the north northwest. These have been included on the accompanying Sensitive Receptor Location Plan and are also referenced in Table 2 above. The review has also highlighted the presence of Orton Pit (SAC) and Nene Washes (SAC, SPA, pSPA and RAMSAR) which are consistent with those previously identified during determination of EPR/BV3740ID/V015.

5.7 Risk Assessment

The specific risk assessments completed for Odour, Noise, Dust Fugitive Emissions and Mud are detailed in the tables below. In many cases there is an inter-relationship between these specific risk assessments and meteorological conditions and where relevant this has been identified. The pathway is determined by the location of the receptor relative to the site, the distance from the site boundary (m) and the frequency (likelihood) the prevailing wind will blow in the direction of the receptor (%) as determined by windrose data.

5.7.1 Mitigated Risk

The Mitigated Risk is the residual risk presented by the Hazard after control measures have been instigated.

5.7.2 Environmental Accidents

The Environment Agency guidance requires the completion of an Accidents Risk Assessment and Management Plan. This should assess potential hazards associated with the proposed activity not described in the sections above. Potential environmental accidents attributed to gas, leachate and waste mass stability have been previously considered within separate risk assessments that formed part of permit determination EPR/BV3740ID/V015. Stability is considered (in line with increased annual tonnages, as a supplementary letter, provided at Appendix B.

5.8 Conclusions

The operations associated with the proposal have been considered in the tables below, these hazards relate to heath and amenity. It has been concluded that, where necessary, with the use of appropriate mitigating management controls the installation will not present a significant risk to surrounding receptors. In many instances, by increasing the annual tonnages there are longer term effects. In simple terms, any previously considered effects (determined as part of EPR/BV3740ID/V015) are reduced as the longevity of the operation reduces by 75% at the anticipated increased 500tpa which equates to a potential reduction in the operational period from 8 years to 2 years.

By way of further mitigation, additional dust monitoring has been proposed (Table 5) but only in the event of adverse weather conditions. Planning consent 18-02196-MMFUL (Condition C11) also includes the provision of 3m noise screens when operations are within 3m of ground level as further mitigation against noise effects. Additional road sweeping will be utilised as necessary.

Table 3 Odour Risk Assessment and Management Plan

Hazard / Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
Odour through the Air from: fugitive landfill gas emissions, exposed waste and wastes as received as part of Area C infilling – considered low risk based on consented waste types	1.	190	SE	4	Low - Waste types very unlikely to generate odours – this remains relevant even though tonnages increase to 500,000t/y	High – residential receptor	Medium	Waste Acceptance Protocols ensure wastes have low organic content and therefore negligible gas / odour potential Regular olfactory monitoring will be conducted and will take account of meteorological conditions and potential impacts of odour (however unlikely) on receptors. In accordance with Environmental Management System (EMS) procedures, the operator will document all events or complaints received associated with odour, regardless if the site is the likely cause or it is attributed to another source. By recording all such odour events in combination with meteorological conditions, the operator will be in a stronger position to deal with such odour issues effectively. It will be possible to identify the likely source and undertake appropriate remedial action if applicable. In some instances the source may be shown to be off-site and thus beyond the control of the operator.	Low
	2.	50	E	7		Low – highway transient odour annoyance	Low		
	3.	50	S	6		Low – highway transient odour annoyance	Low		
	4.	700	SSW	4		Medium – public use	Medium		
	5.	880	SW	3		Medium – public use	Medium		
	6.	720	SW	3		Low – highway transient odour annoyance	Low		
	7.	1400	W	2		Medium – industrial premises	Medium		
	8.	50	N	10		Low – highway transient odour annoyance	Low		
	9.	190	NE	13		High – residential receptor	Medium		
	10.	320	E	7		High – residential receptor	Medium		
	11.	125	NW	5		Low – woodland, transient odour annoyance	Low		
	12.	350	NE	13		High – residential receptor	Medium		

Hazard / Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
	13.	4400	S	6		Low – open space, transient odour annoyance	Low		
	14.	6700	SW	3		Low – open space, transient odour annoyance	Low		
	15.	1700	NNE	9		Low – open space, transient odour annoyance	Low		
	16.	1700	NNE	14		Low – open land, transient odour annoyance	Low		
	17.	160	NE	13		Low – woodland, transient odour annoyance	Low		
	18.	1100	SE	4		High – residential receptor	Medium		
	19.	575	N	10		High – residential receptor	Medium		
	20.	655	NNE	10		High – residential receptor	Medium		
	21.	790	NNE	10		High – residential receptor	Medium		
	22.	675	NE	13		Low – open land, transient odour annoyance	Low		
	23.	1550	WNW	4		High – residential receptor	Medium		
	24.	1800	SE	5		High – residential receptor	Medium		
	25.	125	SE	4		Low – watercourse transient use	Low		

Hazard / Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
	26.	1310	SW	2		High – school receptor	Medium		
	27.	1710	WSW	2		High – school receptor	Medium		
	28.	1850	SSW	4		High – school receptor	Medium		
	29.	1180	SSW	4		High – school receptor	Medium		
	30.	1430	SSE	0		Medium – public use	Medium		
	31.	1240	E	7		High – school receptor	Medium		

Table 4 Noise and Vibration Risk Assessment and Management Plan

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
Noise through air and Vibration through ground from: Vehicle Movements associated with the delivering and handling of waste on site. Site plant.	1.	190	SE	4	Medium – distance from site	High – residential receptor	Medium	Most site activities will be behind existing perimeter bunds (and be below ground surface, i.e. within the void of Area C) and established tree screening. Landfilling activities are unlikely to generate noise in excess of the previous landfilling activities. Increased annual input rates will reduce the longevity of the operation (a beneficial effect). Noise screens to be utilised when operations are within 3m of ground level.	Low
	2.	50	E	7	High - proximity to site	Low – highway transient odour annoyance	Low		
	3.	50	S	6	High - proximity to site	Low – highway transient odour annoyance	Low		
	4.	700	SSW	4	Low - distance from site	Medium – public use	Medium		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
.	5.	880	SW	3	Low – distance from site	Medium – public use	Medium	On site speed limits will be enforced and internal site roads will be maintained to minimise noise / vibration. Appropriate maintenance of site vehicles in accordance with the manufacturer's or supplier's instructions Where practicable, engines to be switched off when not in use. Silencers will be used on vehicles. Should it prove necessary alternatives to reversing bleepers on site vehicles will also be considered. Tipping will not be made from height to reduce noise / vibration. Planning conditions which set noise limits for the operations will be adhered to at all times.	
	6.	720	SW	3	Low - distance from site	Low – highway transient odour annoyance	Low		
	7.	1400	W	2	High - proximity to site	Medium – industrial premises	Low		
	8.	50	N	10	Low – distance from site	Low – highway transient odour annoyance	Low		
	9.	190	NE	13	Medium – distance from site	High – residential receptor	Medium		
	10.	320	E	7	Medium – distance from site	High – residential receptor	Medium		
	11.	125	NW	5	Medium – distance from site	Low – woodland, transient odour annoyance	Low		
	12.	350	NE	13	Medium – distance from site	High – residential receptor	Medium		
	13.	4400	S	6	Low – distance from site	Low – open space, transient odour annoyance	Low		
	14.	6700	SW	3	Low – distance from site	Low – open space, transient odour annoyance	Low		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
	15.	1700	NNE	9	Low – distance from site	Low – open space, transient odour annoyance	Low		
	16.	1700	NNE	14	Low – distance from site	Medium – open land, transient recreational use	Low		
	17.	160	NE	13	High - proximity to site	Medium – woodland, transient recreational use	Low		
	18.	1100	SE	4	Low – distance from site	High – residential receptor	Low		
	19.	575	N	10	Low – distance from site	High – residential receptor / amenity	Medium		
	20.	655	NNE	10	Low – distance from site	High – residential receptor	Medium		
	21.	790	NNE	10	Low – distance from site	High – residential receptor	Medium		
	22.	675	NE	13	Low – distance from site	High – amenity receptor	Low		
	23.	1550	WNW	4	Low – distance from site	High – residential receptor	Low		
	24.	1800	SE	5	Low – distance from site	High – residential receptor	Low		
	25.	125	SE	4	High - proximity to site	Low – watercourse transient use	Low		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Residual Risk
	No.	Dist.	Direc.	Freq.					
	26.	1310	SW	2	Low – distance from site	High – school receptor	Medium		
	27.	1710	WSW	2	Low – distance from site	High – school receptor	Medium		
	28.	1850	SSW	4	Low – distance from site	High – school receptor	Medium		
	29.	1180	SSW	4	Low – distance from site	High – amenity receptor	Low		
	30.	1430	SSE	0	Low – distance from site	High – amenity receptor	Low		
	31.	1240	E	7	Low – distance from site	High – school receptor	Medium		

Table 5 Dust Fugitive Emission Risk Assessment and Management Plan

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
Dust through air from: vehicle movements or deposit of wastes	1.	190	SE	4	Medium – distance from site, medium prevailing wind	High – residential receptor	Medium	No excessively dusty wastes to be accepted at the site. (Infilling is predominantly below ground surface, i.e. within the void of Area C) which further mitigates against emissions	Low
	2.	50	E	7	High - proximity to site	Low – highway transient use	Medium		
	3.	50	S	6	High - proximity to site	Low – highway transient use	Medium		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
	4.	700	SSW	4	Low – distance from site, low prevailing wind	High – amenity receptor	Low	On site vehicle speed limit enforced to ensure that vehicle movements do not generate excessive dust. Dampening of site roads/surfaces as necessary using a tanker during dry periods. Weighbridge will conduct assessment of waste inputs and impose controls and restriction on potentially dusty waste (e.g. rapid cover following placement, refusal to tip). Daily visual inspection by appropriate site staff at suitable locations taking account of the prevailing wind direction. Twice daily visual inspection recommended in adverse weather conditions at the eastern Site Boundary. All vehicles will use wheel wash to prevent mud / dust being trailed onto adjacent roads and creating a hazard / nuisance. A street sweeper will regularly clean site roads of any mud trailed on from site vehicles, this will limit further dust generation.	
	5.	880	SW	3	Low – distance from site, low prevailing wind	High – amenity receptor	Low		
	6.	720	SW	3	Low – distance from site, low prevailing wind	Low – highway transient use	Low		
	7.	1400	W	2	Low – distance from site, low prevailing wind	Medium –industrial premises	Low		
	8.	50	N	10	High – proximity to site. High prevailing wind	Low – highway transient use	Low		
	9.	190	NE	13	Medium – distance from site, high prevailing wind	High – residential receptor	Medium		
	10.	320	E	7	Medium – distance from site, medium prevailing wind	High – residential receptor	Medium		
	11.	125	NW	5	Medium – distance from site, medium prevailing wind	Medium – open land, transient recreational use	Medium		
	12.	350	NE	13	Medium – distance from site, high prevailing wind	High – residential receptor	Medium		
	13.	4400	S	6	Low – distance from site, medium prevailing wind	Medium – open land, transient recreational use	Low		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
	14.	6700	SW	3	Low – distance from site, low prevailing wind	Medium – open land, transient recreational use	Low	Increased annual input rates will reduce the longevity of the operation (a beneficial effect).	
	15.	1700	NNE	9	Low – distance from site, medium prevailing wind	Medium – open land, transient recreational use	Low		
	16.	1700	NNE	14	Low – distance from site, medium prevailing wind	Medium – open land, transient recreational use	Low		
	17.	160	NE	13	Medium – proximity to site. High prevailing wind	Medium – woodland, transient recreational use	Medium		
	18.	1100	SE	4	Low – distance from site, medium prevailing wind	High – residential receptor	Low		
	19.	575	N	10	Low – distance from site, medium prevailing wind	High – residential receptor	Low		
	20.	655	NNE	10	Low – distance from site, medium prevailing wind	High – residential receptor	Medium		
	21.	790	NNE	10	Low – distance from site, medium prevailing wind	High – residential receptor	Medium		
	22.	675	NE	13	Low – distance from site, high prevailing wind	High – amenity receptor	Medium		
	23.	1550	WNW	4	Low – distance from site, low prevailing wind	High – residential receptor	Low		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
	24.	1800	SE	5	Low – distance from site, low prevailing wind	High – residential receptor	Low		
	25.	125	SE	4	Medium – proximity to site. low prevailing wind	Low – watercourse transient use	Low		
	26.	1310	SW	2	Low – distance from site, low prevailing wind	High – school receptor	Medium		
	27.	1710	WSW	2	Low – distance from site, low prevailing wind	High – school receptor	Medium		
	28.	1850	SSW	4	Low – distance from site, low prevailing wind	High – school receptor	Medium		
	29.	1180	SSW	4	Low – distance from site, low prevailing wind	High – school receptor	Medium		
	30.	143[redacted]			Low – distance from site, low prevailing wind	High – amenity receptor	Medium		
	31.	1240	[redacted]	7	Low – distance from site, low prevailing wind	High – school receptor	Medium		

[redacted]

Table 6 Mud Fugitive Emission Risk Assessment and Management Plan

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
Mud tracked from site onto public roads by associated site vehicles	1.	190	SE	4	Low – distance from site access	High – residential receptor	Medium	All vehicles will use wheel wash to prevent mud / dust being trailed onto adjacent roads and creating a hazard / nuisance. Site staff at the weighbridge and at the tipping face will be vigilant to excessive mud tracked from the site by visiting HGV's and site plant. Any vehicles observed to be carrying mud in their tyres will be directed back through the wheelwash until the wheels are clean before leaving site. A street sweeper will regularly clean the site haul roads and the adjacent shared access and public highway as necessary. Drivers will be reminded of their responsibility to maintain clean vehicles and not to track mud onto the public highway.	Low
	2.	50	E	7	High – proximity to site access	Medium – highway, transient use	High		
	3.	50	S	6	High – proximity to site access	Medium – highway, transient use	High		
	4.	700	SSW	4	Low - distance from site access	High – public use receptor	Medium		
	5.	880	SW	3	Low – distance from site access	High – public use receptor	Medium		
	6.	720	SW	3	Medium - distance from site, linked to access route	Medium – highway transient use	Medium		
	7.	1400	W	2	Medium - distance from site, linked to access route	Medium – industrial premises	Medium		
	8.	50	N	10	High – proximity to site access	High – highway, transient use	High		
	9.	190	NE	13	Low – distance from site access	High – residential receptor	Medium		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
	10.	320	E	7	Low – distance from site access	High – residential receptor	Medium	Monitoring of shared access and appropriate maintenance will form part of the EMS for the site. Increased annual input rates will reduce the longevity of the operation (a beneficial effect). Existing mitigation will minimise effects for mud entrainment to the public carriageway.	
	11.	125	NW	5	Low – no link to site access	Low – woodland, transient recreational use	Low		
	12.	350	NE	13	Low – distance from site access	High – residential receptor	Medium		
	13.	4400	S	6	Low – no link to site access	Low – woodland, transient recreational use	Low		
	14.	6700	SW	3	Low – no link to site access	Low – woodland, transient recreational use	Low		
	15.	1700	NNE	9	Low – no link to site access	Low – open land, transient recreational use	Low		
	16.	1700	NNE	14	Low – no link to site access	Low – open land, transient recreational use	Low		
	17.	160	NE	13	Low – no link to site access	Low – woodland, transient recreational use	Low		
	18.	1100	SE	4	Low – distance from site access	High – residential receptor	Medium		
	19.	575	N	10	Low – distance from site access	High – residential receptor	Medium		
	20.	655	NNE	10	Low – distance from site access	High – residential receptor	Medium		

Hazard and Pathway	Receptor				Probability	Consequence	Overall Risk	Risk Management	Overall Risk
	No.	Dist.	Direc.	Freq.					
	21.	790	NNE	10	Low – distance from site access	High – residential receptor	Medium		
	22.	675	NE	13	Low – distance from site access	Medium – amenity receptor	Medium		
	23.	1550	WNW	4	Low – distance from site access	High – residential receptor	Medium		
	24.	1800	SE	5	Low – no link to site access	Low – woodland, transient recreational use	Low		
	25.	125	SE	4	Low - distance from site access	High – watercourse transient use, silting	Medium		
	26.	1310	SW	2	Low - distance from site access	High – school receptor	Medium		
	27.	1710	WSW	2	Low - distance from site access	High – school receptor	Medium		
	28.	1850	SSW	4	Low - distance from site access	High – school receptor	Medium		
	29.	1180	SSW	4	Low - distance from site access	High – school receptor	Medium		
	30.	1430	SSE	0	Low - distance from site access	Medium – amenity receptor	Medium		
	31.	1240	E	7	Low - distance from site access	High – school receptor	Medium		

Table 7 Accident Management Plan

Hazard	Receptor	Pathway	Probability	Consequence	Overall Risk	Risk Management	Mitigated Risk
Fuel / engine oil Leak or damage to portable fuel bowser, static fuel storage tank or site vehicles	Groundwater	Base of excavation	Low	High - pollution of groundwater	Medium	Fuel and engine oils stored away from proposed installation with appropriate secondary containment and spillage contingencies; Site vehicles will not be refuelled within installation area; Site vehicles and plant subject to regular preventative maintenance in accordance with EMS procedures.	Low No additional or adverse effects as a result of increased annual tonnages
	Surface Water	Lateral	Low	High - pollution of surface water	Medium		
Fire Uncontrolled burning of residual wastes or site vehicles.	Groundwater	Base of excavation	Low	High - pollution of groundwater through firewater run-off or leaks from damaged equipment	Medium	Wastes to be accepted at site will effectively be inert, have a low organic content and inherently non-combustible in nature, or through production of landfill gas; Site vehicles and plant subject to regular preventative maintenance in line with site EMS procedures; Fire control equipment will be on hand, with major incidents to be dealt with by the Fire Brigade in accordance with site EMS Procedures.	Low No additional or adverse effects as a result of increased annual tonnages
	Receptors listed in Table 2 above	Airborne	Low	Medium - smoke / odour annoyance	Medium		
Explosion Compressed gas cylinders, combustion of landfill gas or fuel storage tank	Site staff	Airborne	Low	High - danger of serious injury	Medium	Fuel is stored in separate installation with appropriate controls to prevent fire or explosion (i.e. no smoking on site); Compressed gases not required and therefore present for operation of installation. Low organic content of waste will generate negligible volumes of landfill gas and will not present an explosion risk.	Low No additional or adverse effects as a result of increased annual tonnages
	Groundwater	Base of excavation	Low	High - pollution of groundwater through leaks from damaged equipment	Medium		

Wastes deposited Chemical reaction of incompatible wastes	Receptors listed in Table 2 above	Airborne	Low	Medium - odour annoyance or smoke from oxidising agents	Medium	Waste acceptance protocols will exclude the deposit of chemically reactive wastes. Those accepted will be of an inert/non-hazardous nature and will not generate noxious gases or contaminating leachate.	Low No additional or adverse effects as a result of increased annual tonnages
Vandalism Damage to site vehicles, fuel bowsers, gas or leachate extraction pipework	Groundwater	Base of excavation	Low	High - pollution of groundwater through leaks from damaged equipment	Medium	Existing site security will prevent access by unauthorised persons. Vehicles will be kept overnight in a secure area with appropriate security measures; Wastes not expected to require exposed active gas or leachate control infrastructure which could be subject to damage.	Low No additional or adverse effects as a result of increased annual tonnages
	Receptors listed in Table 2 above	Airborne	Low	Medium - odour annoyance	Medium		
Leachate Accidental damage to leachate monitoring chamber	Groundwater	Base of excavation	Low	High - pollution of groundwater through leaks from damaged well	Medium	Wastes not expected to require active gas or leachate control infrastructure which could be exposed to damage; CQA supervision will prevent damage to basal drainage pipework with the deposit of waste.	Low No additional or adverse effects as a result of increased annual tonnages

6 Assessment Updates

6.1 Hydrogeological Risk Assessment Addendum

The previously submitted HRA (report 4232/R/007/02, March 2019) detailed further the source - pathway - receptor framework and established that the groundwater system was not at risk from the infilling of Area C. This addendum report addresses the associated effects by infilling the void in a shorter duration. The source - pathway - receptor framework is produced in summary form for completeness.

6.1.1 Source Term

6.1.1.1 Site Engineering

There is not a risk-based requirement to engineer the in-situ surrounding / underlying Oxford Clay, as it naturally achieves the Landfill Directive requirement of a geological barrier equivalent to 1m at a hydraulic conductivity at $<1x10^{-7}$m/s. Previously developed parts of the site (Area B) typically comprise of a 1 m (minimum) thickness of reworked Clay from site. Investigations have demonstrated that the underlying (upper surface contact) between the Kellaways Sand and Oxford Clay falls in elevation from west to east, with a contact boundary at -3mOD under the footprint of the eastern void.

There is circa 2m of in-situ Oxford Clay overlying the Kellaways Sand, over the majority of the void footprint there is between 3 and 8m of in-situ Oxford Clay and around the periphery there is between 8-13m of Oxford Clay. Notwithstanding the above, the basal engineering will utilise re-worked Oxford Clay to the specification of 500 mm of engineered clay to a maximum permeability of 1×10^{-8} m/s.

The purpose of an artificial sealing liner on the base of a landfill is to control leachate leakage and enable its collection. In this instance it has been demonstrated that by controlling the nature of the waste inputs, leachate collection will not be necessary. Consequently, no artificial sealing liner is proposed. The site's base is proposed at -1 mOD and the final profile will range from circa 11.5mAOD at the point where it joins the terminal containment bund of Area B, Cells 14 (to the west) to an outer edge of the site at circa 10mAOD to the north and east and circa 8mAOD to the south. Disposal operations w[redacted]ound level for the entire period of the operational lifespan apart from the final stages and capping / development of the surface water attenuation lagoon.

6.1.1.2 Waste Types

The eastern v[redacted]5) has a projected capacity of 375,000m^3, and comprises an area of approximately 2.2ha, top area ~5.5Ha. The consented design is to restore the eastern void using "qualifying materials". Qualifying materials are a list of waste types in which Her Majesty's Revenue and Customs (HMRC) has made specific allowance for quarry restoration identifying a very limited list of suitable[redacted]ccordance with The Landfill Tax (Qualifying Material) Order. The qualifying materials order lists a series of wastes with limited to negligible pollution potential with respect to the production of landfill gas or leachates.

The qualifying materials include wastes in the following groups:

- Group 1 Rocks and soils
- Group 2 Ceramics or concrete materials
- Group 3 Minerals, processed or prepared

- Group 4 Furnace slags
- Group 5 Ash

6.1.1.3 Leachate Chemistry

Any leachate generated from the Qualifying Materials will differ significantly from a typical Municipal Solid Waste (MSW) leachate as there is not a putrescible component to the waste stream. Consequently, the significant ammoniacal-N and dissolved organic matter (as represented by the COD) as well as other soluble salts will not be present as readily degradable organic matter and soluble salts are specifically excluded from the list of wastes described as Qualifying Materials. Given that the proposed waste types are unlikely to contain a degradable organic content, elevated ammoniacal-N and BOD is not expected to be associated with site.

6.1.2 Pathway

6.1.2.1 Geological Succession

The British Geological Survey (BGS) describes the Jurassic succession in the Peterborough area as forming under marine conditions which continued throughout the period of deposition of the Lias. The geological succession is as follows:

- Fluvioglacial sand and gravel
- Oxford Clay
- Kellaways Sand (3.4m)
- Kellaways Clay (2.1m)
- Cornbrash Limestone (2.18m)
- Blisworth Clay (3.92m)
- Blisworth Limestone (2.24m)
- Upper Estuarine Series / Rutland Formation (>6.4m)

( ) - Stratum thickness at WB09 at east of site

The infilled waste materials are contained by the in-situ Oxford Clay, the underlying Kellaways Beds (also termed [redacted]ome literature sources) comprise the Kellaways Sand and the Kellaways Clay.

6.1.2.2 Pathway properties and Hydrogeology

Hydraulic co[redacted]e Oxford Clay were estimated within the previous HRA's as $1x10^{-10}$ - $2.5x10^{-10}$m/s, whilst CQA test data for the engineered clay demonstrated that the compacted clay liner was constructed to a hydraulic conductivity of $1.6x10^{-11}$ - $3.6x10^{-10}$m/s.

Significant Si[redacted]as been undertaken on the Kellways Sand regionally, recent data would imply an interquartile range of $2.2x10^{-11}$m/s to $1.4x10^{-9}$m/s.

6.1.3 Receptors

6.1.3.1 Aquifers

Both the Kellways Sand and Blisworth Limestone are classified as Secondary A aquifers (at outcrop, upgradient of the site). The host rock Oxford Clay is non-productive strata. The superficial strata are classified as Secondary A aquifers however there is no direct linkage from Area C to these deposits.

6.1.3.2 Surface Water

The adjacent Car Dyke (to the south of the site) forms the closest receptor to Area C.

6.1.3.3 Groundwater Flow and Water Quality

Piezometric levels are consistent with those presented in previous applications, the observed groundwater level in the Kellaways Sand across the site as a whole (i.e. west to east) is indicative of a local hydraulic gradient in the Kellaways Sand aquifer of around 0.0046. Levels fall from ~12mAOD in the west to ~4mAOD in the east.

Previously submitted time series plots indicate the Kellaways Sand groundwaters are of a constant relative bicarbonate concentration and consistent sulphate concentration across the monitoring network, with an increase of sodium chloride towards the east. This type of profile is consistent with the dissolution of $CaSO_4$ and $CaCO_3$ minerals, a process that is dominated by equilibrium with the host rock, whilst the increasing sodium chloride is a legacy of connate water chemistry. The water is non-potable.

The surface water is also primarily a calcium sulphate-based solution with secondary bicarbonate.

6.1.4 Conceptual Site Model

A conceptual hydrogeological model has been developed for the site previously, based on the proposed infilling scheme. The conceptual model is based on the Source - Pathway - Receptor relationship where the:

- Source is the Qualifying Materials used to restore Area C,
- The Pathway is the sidewall engineering and the geological pathway towards a water resource, and
- The Receptor is an underlying or adjacent water resource.

6.1.5 Risk Assessment

A set of complex assessment were undertaken as part of determination to permit EPR/BV3740ID/V015. The first was to consider the site as a hydraulically contained landfill, in which the water lev[redacted]e site are below the external groundwater level. This followed the Environment Agency model calculation programme to assess contaminant fluxes from hydraulically contained landfills[2], which is supported by a technical review[3]. The second approach was to use LandSim model[4] was to addresses the potential impacts if leachate levels in Area C raised above adjace[redacted]vels of the Kellaways Sand.

The assessment demonstrated that leachate level control is not necessary and that any substances exiting the Oxford Clay either under a concentration gradient (i.e. chemical diffusion) or a mass flux under a hydra[redacted]nt would not lead to a change in groundwater quality. Lateral migration to surface water was also considered.

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[2] Environment Agency (2004) Contaminant fluxes from hydraulic containment landfills spreadsheet v1.0 User Manual. Science Report SC0310/SR

[3] Environment Agency (2004) Contaminant fluxes from hydraulic containment landfills spreadsheet - a review. Science Report SC0310/SR

[4] Golder Associates (UK) Ltd (2003) LandSim. Landfill Performance Simulation by Monte Carlo Method. *Environment Agency R&D Publication 120*

6.1.6 Requirement for Risk Assessment Update

Although an increase in annual tonnages is proposed, this aspect does not alter the source – pathway – receptor framework. Aa such, the infilling rate does not alter the chemical composition of the waste types (hence the source term does not change) and there are no peripheral effects such as changes to water tables or engineering design.

In this regard, there are no requirements for quantitative assessment update.

It has previously been established and reported (during the determination of EPR/BV3740ID/V015) that water entering Area C will be dominated by water derived from rainfall during wet weather. Due to the nature of the waste materials, it is expected that the majority of the water falling onto the waste during placement will become run-off and, subject to water quality, will be pumped away as part of surface water management. Over the operational period of the Site very little water is anticipated to soak into the waste and contribute to 'leachate', or more accurately referred to as a "porewater".

What can be stated however, is that the volume of water available will be significantly minimised by reducing the operation from circa 6 years to potentially circa 2 years. Over an area of 5.5Ha, and effective rainfall figure for the Peterborough area of 574mm[5] (agroclimatic area 28), this would equate to 31,570m^3/y of potential water generation. This figure will be reduced by 66% at the anticipated rates of input at 500tpa. Irrespective of evaporation, or evapotranspiration rates, the reduction will remain and hence the potential for leachate (porewater) generation is significantly reduced through filling the void faster.

Surface water risk (from restoration) was deemed acceptable within the reports that supported the determination of EPR/BV3740ID/V015. The infilling of Area C at an increased rate does not alter the conclusions of the previously submitted report (5153/R/001/2, May 2021) and hence is not considered further.

6.2 Gas Risk Assessment Addendum

This technical addendum updates the report "Gas Generation and Risk Assessment" (4232/R/008/02 - May 2019) determined as part of EPR/BV3740ID/V015. This report is provided at Appendix B for completeness [redacted] quirements of the Landfill Directive, landfill gas must be collected from all landfills receiving biodegradable waste. The gas must be treated and if possible, used. The Directive also requires that landfill gas that cannot be used to produce energy must be flared. In accordance with th[redacted]eport, Area A and B will not be considered as part of this assessment update.

6.2.1 Source Term

The infilling of the Area C will utilise ~375,000 m^3 of void. Based on a conversion of 1.8 tonnes / m^3 the eastern v[redacted]ated that it will receive 675,000 tonnes in total for the infilling, the proposal is for an input of 500,000 tonnes per annum, hence the operation will be completed within a 2-year period (approximately 18 months to attain the approved contours).

[5] MAFF (1976) Climate and Drainage HMSO, Reference 434 (Ministry of Agriculture, Fisheries and Food) ISBN 0112408958

6.2.2 Pathway

The pathways are defined as the environmental transport processes by which the pollutants move from the source to the receptors. In the case of landfill gas there are two transport processes that should be considered: atmospheric dispersion and lateral migration.

Atmospheric dispersion of landfill gas emitted from the site is influenced by the prevailing wind direction and speed. Fugitive landfill gas emissions from uncapped wastes, exposed flanks or failures in an active landfill gas management system (pipework, gas wells, flare or gas engines) are most likely to be conveyed to receptors along this pathway. Surface emissions are considered highly unlikely due to the negligible volume of gas predicted to be produced as a result of the low gas generation potential of the wastes to be accepted.

Lateral migration describes the transverse migration of landfill gas through an unsaturated subsurface by advection and diffusion. The wastes to be deposited will be of low permeability and low gas generation potential therefore lateral mitigation is not considered likely to occur. Area C will have an engineered basal and sidewall liner of low permeability clays which will prevent any potential lateral gas migration however it is not considered likely due to low gas generation potential of the wastes to be accepted. Groundwater levels in the surrounding drift deposits at ~2 m below ground level reducing the available pathway.

6.2.3 Receptors

A number of potential receptors need to be considered with respect to landfill gas. The generic categories are listed below:

- Domestic dwellings,
- Other occupied buildings (offices, public buildings, schools etc.),
- Sensitive habitats and environmental areas e.g. SSSIs,
- Public footpaths or bridleways,
- Major highways and minor roads,
- Open spaces, parks and farmland (crop damage),
- Air [redacted]ement zones.

Locally identified receptors have been tabulated in Table 2.

6.2.4 Risk Assessment

The previous [redacted] took a qualitative approach to assess the impact of the Site on sensitive receptors. The review estimated qualitatively that a production of $8m^3\ hr^{-1}$ which is considerably less than the lowest indicative threshold level of 50 $m^3\ hr^{-1}$ suggested in Environment Agency document LFTGN03 'Guidance on the Management of Landfill Gas' (September 2004) below which active [redacted] and treatment is not required. Based on data obtained from similar sites it is likely that volume of gas produced will be significantly lower than this.

6.2.5 Risk Assessment Update

GasSim2.5 has been used to quantify the emissions from the proposed landfill site as a result of the proposed increase in annual tonnage. The results indicate that landfill gas production will be very low and peak at the end of landfilling activities in 2024.

Peak gas production occurs in 2024 with the 50%ile predicting the total volume of gas to be produced at 16 $m^3 hr^{-1}$. However, experience of similar landfill sites would indicate even these low gas volumes to be a conservative representation of the likely gas production at Dogsthorpe.

The Tier 1 modelling exercise predicted likely concentrations of surface emissions at the site boundary to be negligible and as a result, further Tier 2 quantitative assessment of atmospheric migration and lateral migration from the site has not been carried out.

It is concluded that landfill gas is not expected to be generated in significant volumes in Area C and does not pose a significant risk to the surrounding environment, at the proposed increased rate of input (there are no changes to the waste types).

6.2.5.1 Risk To Human Health

The closest domestic dwellings to the site are located along Peterborough Road approximately 190 m to the southeast of the site. The A1139 runs between the domestic dwellings and the site. Based on the negligible amount of gas production and supported by experience of similar soil sites it is considered the predicted likely concentrations of surface emissions at the site boundary to be negligible. It is concluded that landfill gas does not pose a significant risk to the surrounding environment specifically the receptors identified in Section 5.1.

6.2.5.2 Atmospheric Dispersion and Odour

The negligible volumes of landfill gas produced are not considered to give rise to any significant contribution to the effects of global warming or ozone depletion. Assessment of the potential for an odour nuisance is more subjective. Due to the nature of the waste types to be deposited comprising non-hazardous soils and construction and demolition wastes with low biodegradable content odour generation will be negligible as they will not contain materials or compounds that are likely to give risk to odour.

6.2.5.3 Sub-Surface Lateral Migration and Vegetation Stress

Sub-surface landfill gas migration beyond the boundary of the Site can give rise to a number of potential risks, including explosion, asphyxiation, toxicity, and vegetation damage. Should the fugitive gas then be liberated to atmosphere, there are the additional risks of odour nuisance and contributions [redacted]ming. Lateral migration has not been considered due to the negligible gas production estimated for Area C. In addition, the Area C will have an engineered basal and sidewall liner of low permeability clays which will prevent any potential lateral gas migration however it is not considered likely due to low gas generation potential of the wastes to be accepted.

6.2.5.4 Landfill Gas Completion Criteria

Gas production rates in Area C will be insufficient to support any active extraction or treatment. Active extraction and treatment is undertaken for all landfill gas from Area A and Area B.

6.2.5.5 Residual Gas Potential

A site's potential for future gas generation can be assessed via an analysis of the solid wastes remaining in the landform, with the results expressed as the biological methane potential (BMP). However due to the type of waste to be deposited in Area C the biological methane potential is negligible.

6.2.5.6 Gas Concentrations and Flow Rates

Environment Agency guidance document 'Landfill (EPR 5.02) and other permanent deposits of waste; How to surrender your environmental permit (version 2, 13th December 2012) provides criteria for assessing landfill completion based upon the results of monitoring of gas concentrations or flow rates. This gives three scenarios when the landfill gas surrender criteria for landfill can be met.

- Scenario 1:

in-waste gas methane concentration of ≤1.5 % v/v and carbon dioxide of ≤5 % v/v (minimum 12 data sets over 2 consecutive years)

- Scenario 2:

in-waste gas methane concentration of ≤5 % v/v and carbon dioxide of ≤10 % v/v (minimum 12 data sets over 2 consecutive years) and Qhgs* is <0.7 l/hr and the flow in any borehole is ≤ 70 l/hr

- Scenario 3:

in-waste gas methane concentration of ≥5 % v/v and carbon dioxide of ≥10 % v/v (minimum 24 data sets over 2 consecutive years) and Qhgs* is <0.7 l/hr and the flow in any borehole is ≤ 70 l/hr

*Qhgs: Site Characteristic hazardous gas flow rates as defined by BS 8485:2015.

In accordance with the previously accepted report (4232/R/008/02 - May 2019), It is proposed that such assessment criteria are considered in a site-specific context within a Completion Risk Assessment for the site which will be submitted to the Agency at an appropriate point in the site's lifecycle. It is likely that Area C will be surrendered prior to Area A and B.

6.2.6 Landfill Gas Management Plan

The predicted volume of landfill gas produced by the site is likely to be significantly lower than the indicative benchmark level of 50-100 m^3hr^{-1} suggested by EA guidance where active gas control and treatment (flaring and utilisation) would be required. The nature of the waste deposits (low permeability soils and clays) will also make it very difficult to extract gas from the site.

The main con[redacted]duction on gas is by ensuring that the waste received at the site contains low proportions of biodegradable materials. Additional controls on the deposit of wastes that contain odorous substances will prevent an odour nuisance. These would include exclusion of such wastes or rapid covering during placement.

[redacted]

Notwithstanding this, measures will be implemented to ensure that the landfill gas production is monitored to confirm the basis of the quantitative risk model. As a precautionary measure, the site design provides for the installation of in-waste gas monitoring points and additional gas monitoring boreholes ar[redacted]rimeter of the site. The monitoring and sampling plan, contingency action plan including maintenance of infrastructure is detailed in report 4232/R/008/02 - May 2019 (Appendix B) and hence is not reproduced herein.

GasSim2.5 has been used to provide a quantitative assessment of the likely volumes of landfill gas that may be produced at the site. The waste will contain low levels of biodegradable waste and as such the expected volumes of landfill gas are small. The increase in the proposed annual tonnage has little impact on the predicted gas production over those qualitatively estimated previously. The calculated peak production for bulk landfill gas is comparable with the benchmark which indicates

that active management of landfill gas is not required, however data from similar sites suggests that gas production will be much lower.

6.3 Stability Assessment

A letter report is provided in Appendix B (WR7537/JD/01) that addressed the change to input rates. The modelling has assumed that the cell shall be brought up in layers horizontally to the approved contours and there shall be no temporary waste flanks present within the waste mass.

This assessment reports that the stability of the proposed infill to Area C for an input rate of 500,000 tonnes per annum, with the given infill profile shall remain stable and achieve factors of safety in excess of 1.3.

7 Variation Summary and Conclusions

The variation application increases the Operators ability to import the necessary disposal and restoration materials associated with the delivery of materials generated through the HS2 project and diverted from other sites due to HS2 closing reception sidings at other sites which were previously accepting these waste materials.

The Environmental Risk Assessment Update (H1) and assessment addendum updates have not identified any adverse effects by increasing the annual input rates. The differences identified are beneficial, reducing the completion of the operation significantly (providing positive effects in regard to amenity) and additionally the water management control required is significantly reduced.

[redacted]

[redacted]

[redacted]

Appendix A – Application Forms & Operator Competence

[redacted]

[redacted]

[redacted]

Appendix B – Dust and Emissions Plan (4232/R/04/01/App.A – October 2019), Landfill Gas Generation and Risk Assessment (4232/R/008/02 - May 2019) and Stability Appraisal (WR7537/JD/01 – December 2021)

[redacted]

[redacted]

[redacted]

Appendix C – Drawings

[redacted]

[redacted]

[redacted]

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