



Rainham Landfill

Environmental Statement

Prepared for



Veolia ES Cleanaway (UK)

December 2024
3462-01-ES-01



Document Control

Revision	Date	Prepared By	Reviewed / Approved By
3462-01-ES-01	December 2024	SH	AH

© AXIS P.E.D. Ltd 2023. All rights reserved.

This document and its accompanying documents contain information which is confidential and is intended only for the use of the client. If you are not one of the intended recipients any disclosure, copying, distribution or action taken in reliance on the contents of the information is strictly prohibited.

Unless expressly agreed, any reproduction of material from this document must be requested and authorised in writing from AXIS P.E.D. Ltd. Authorised reproduction of material must include all copyright and proprietary notices in the same form and manner as the original and must not be modified in any way. Acknowledgement of the source of the material must also be included in all references.



Well House Barns, Chester Road, Bretton, Chester, CH4 0DH

Camelia House, 76 Water Lane, Wilmslow, Cheshire, SK9 5BB

T: 0344 8700 007
enquiries@axis.co.uk
www.axis.co.uk

CONTENTS

FOREWORD	III
1.0 INTRODUCTION AND BACKGROUND	1
1.1 Introduction	1
1.2 Background to the Proposed Development	1
1.3 Proposed Development	2
1.4 The Site and its Surroundings	2
1.5 The Applicant	3
1.6 This Document	3
1.7 Assessment Team	3
2.0 APPROACH TO THE ENVIRONMENTAL STATEMENT	5
2.1 Introduction	5
2.2 Need for EIA	5
2.3 Scope of the Environmental Statement	6
2.4 Relationship with Other Regulatory Regimes	11
2.5 EIA Methodology	12
2.6 Indirect Effects	18
2.7 Project Vulnerability to Major Accidents / Disasters	18
2.8 Climate Change	20
2.9 Structure of the Environmental Statement	21
3.0 SCHEME DESCRIPTION	22
3.1 Introduction	22
3.2 Proposed Development	22
3.3 Alternatives Considered	27

FIGURES

Figure 1.1	Site Location
Figure 1.2	Site Context
Figure 3.1	Application Boundary
Figure 3.2	Phasing
Figure 3.3	Site Access and Compound Layout
Figure 3.4	Composting Layout
Figure 3.5	Indicative Restoration Scheme
Figure 3.6	Pre-Settlement Contours
Figure 3.7	Post-Settlement Contours



Figure 3.8 Sections

Figure 3.9 Leachate Controls and Water Monitoring Locations



FOREWORD

This Environmental Statement (ES) is submitted in support of a planning application made by Veolia ES Cleanaway (UK) (referred to as 'the Applicant') to extend the operational life of Rainham landfill and composting facilities.

The ES has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 and comprises the following documents:

- i) The Environmental Statement (ES) Main Report (Volume 1) contains the detailed project description; an evaluation of the current environment in the area of the Proposed Development; the likely significant environmental effects of the scheme; and details of the proposed mitigation measures which would alleviate, compensate for, or remove adverse impacts identified in the study. Volume 1 also includes a summary of the overall likely significant environmental effects of the Proposed Development, and a summary of additional mitigation, monitoring and/or enhancement measures, along with the residual effects following their assumed implementation;
- ii) Illustrative Figures (Volume 2) which contains all relevant schematics, diagrams and illustrative figures;
- i) Technical Appendices (Volume 3) which include details of the methodology and information used in the assessment, detailed technical schedules and, where appropriate, raw data;
- ii) A Non-Technical Summary (Volume 4) containing a brief description of the Proposed Development and a summary of the ES, expressed in non-technical language.

Hard copies of the Environmental Statement, as a four-volume set, are available at a cost of £200 by writing to Axis, Well House Barns, Chester Road, Chester, CH4 0DH. Alternatively, the Non-Technical Summary (NTS) can be purchased on its own from the same point of contact for £15, with the entire Environmental Statement available for purchase on a CD for £10.

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

1.1.1 This Environmental Statement (ES) has been prepared in support of a planning application made by Veolia ES Cleanaway (UK) (referred to as ‘the Applicant’) in support of a planning application to extend the operational life of the landfill and composting facilities at Rainham Landfill (the Site). The Site location is shown on Figure 1.1.

1.1.2 This introductory chapter provides the background to the Proposed Development, describes the Site and its context, defines the structure of the Environmental Statement (ES) and identifies the experts / organisations that have undertaken the Environmental Impact Assessment (EIA).

1.2 Background to the Proposed Development

1.2.1 Planning permission P1566.12 provided for the import of waste materials to, and operation of, a number of waste management facilities at the Site including landfill; material recycling facility; waste transfer station; open air composting; and an associated soil plant. The permission also provided for the gas engines; leachate treatment plant; and for incinerator bottom ash processing. The permission limited the life of all of these operations until December 2024.

1.2.2 Subsequent to the grant of permission P1566.12 bespoke stand-alone applications have been submitted for the materials recycling facility (permission reference P0070.23) and for specific leachate and landfill gas infrastructure (permission reference P0718.23) and are awaiting determination. The materials recycling facility application was heard at the Strategic Planning Committee in January 2024. The Committee resolved to grant planning permission subject to the conditions as set out in the committee report. The decision will be issued once the section 106 agreement is signed.

1.2.3 This planning application seeks to extend the life of the landfill and the open windrow composting facilities.



1.3 Proposed Development

- 1.3.1 Veolia is seeking consent to amend the timescale for waste disposal and open windrow composting and the date by which restoration of the Site is required to be completed.
- 1.3.2 A detailed Scheme Description is provided at Chapter 3.0, but to summarise, the Proposed Development would likely consist of the following key elements:
- i) Extension to waste disposal and open windrow composting operations to continue until 31 December 2029, with restoration to be completed by 31 December 2031
 - ii) Regularisation of existing site levels
 - iii) Retention of all landfill buildings and infrastructure whilst essentially required for the operation of the landfill and composting facilities.

1.4 The Site and its Surroundings

- 1.4.1 The Rainham Landfill Site comprises an area of approximately 159 hectares. The Site is located on the eastern side of Greater London, and on the northern bank of the River Thames. The key features of the Site and adjoining built waste management facilities are shown on Figure 1.2.
- 1.4.2 The landfill site is defined by Coldharbour Lane to the north, north-east and south-east. To the south of the landfill are the open windrow composting facility, the materials recycling facilities and the new Freightmaster employment development. A public footpath runs along the riverbank to the south and west. The Easter Industrial Park is located to the north-west of the landfill. A concrete pad, formerly used for the treatment of soil, is located to the north of the landfill.
- 1.4.3 The Inner Thames Marshes Site of Special Scientific Interest (SSSI) and Rainham Marshes Local Nature Reserve (LNR) are located directly to the north and north-west of the Site. The eastern section is run by the RSPB. The closest heritage asset to the Site is the Grade II listed '28 and 30 Erith High Street', located circa 1km south of the Site.
- 1.4.4 The nearest residential properties are located in Erith, approximately 870m to the south-east, on the opposite bank of the River Thames.



1.5 The Applicant

1.5.1 The Applicant is Veolia ES Cleanaway (UK).

1.6 This Document

1.6.1 As set out above, this document is the Environmental Statement (ES), which has been prepared to support the planning application for the Proposed Development.

1.6.2 In brief, Chapter 2.0 of the ES outlines the approach to the assessment describing the scope and structure of the ES, whilst Chapter 3.0 provides a detailed scheme description. Chapters 4.0 to 8.0 assess the potential for the Proposed Development to result in likely significant environmental effects.

1.7 Assessment Team

1.7.1 In accordance with Regulation 18(5) of the EIA Regulations 2017, the Applicant has engaged competent experts to prepare the ES.

1.7.2 The ES was compiled and coordinated by Axis, a multi-disciplinary planning, environmental and transportation consultancy. Axis is an established planning and environmental consultancy specialising in providing multidisciplinary planning support on major infrastructure development projects. Axis' project team includes: Chartered Town Planners; Members of the Chartered Institute of Ecology and Environmental Management; Members of the Chartered Institute of Highways and Transportation; Chartered Engineers; and Chartered Landscape Architects.

1.7.3 Axis has worked with in-house landscape and transport specialists and external consultants, to ensure that the each of the impacts have been suitably assessed by an appropriate expert, in accordance with Regulation 18(5) of the EIA Regulations 2017. Only the 'main' or 'significant' effects of the development should be subject to full environmental assessment within the ES. The experts and their roles in the EIA are outlined in the **Table 1.1** below:

Table 1.1 – Consultants and Roles

Consultant Name	Role / Responsibility
Axis	EIA Consultant

Consultant Name	Role / Responsibility
	Landscape and Visual Impact
	Transport
NVC	Noise
SLR	Ecology
Smith Grant	Air Quality



2.0 APPROACH TO THE ENVIRONMENTAL STATEMENT

2.1 Introduction

2.1.1 This Chapter of the Environmental Statement (ES) describes the overarching Environmental Impact Assessment (EIA) methodology used in the production of the ES. This chapter sets out the following:

- i) the legislative requirement for the Proposed Development planning application to be accompanied by an ES;
- ii) how the ES complies with the requirements of the EIA Regulations;
- iii) the scoping process undertaken; and
- iv) the broad assessment approach that has been undertaken in relation to the topics that have been identified as being likely to result in significant environmental effects.

2.1.2 EIA is the process of identifying, evaluating, and mitigating the likely significant environmental effects of a development. Early identification of significant effects enables appropriate mitigation to be incorporated into the design of development to avoid, reduce, or offset those effects.

2.1.3 The EIA of the Proposed Development has been undertaken in parallel with the design process, thereby maximising opportunities to mitigate likely significant effects as they were identified. This approach ensures mitigation is embedded in the design of the Proposed Development, wherever possible, and forms an integral component of it.

2.1.4 The results of the EIA, of which are published in this ES, allows Havering Borough Council, statutory consultees such as Environmental Agency and Natural England, other interested parties, and the public, to be made aware of the environmental effects of the Proposed Development prior to determination of the application.

2.1.5 This ES has been prepared to satisfy the requirements of The Town and Country Planning (Environmental Impact Assessment) (England) Regulations 2017 (hereafter referred to as 'the EIA Regulations').

2.2 Need for EIA



- 2.2.1 The requirement for EIA was prescribed by European law under Council Directive 85/337/EEC. This Directive has been amended four times, with the latest amendment, the Environmental Impact Assessment (EIA) Directive (2014/52/EU) entering into force on 15th May 2014.
- 2.2.2 In England, the Directive has been transposed most recently into law by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [SI 2017 No. 571] – referred to hereafter as ‘the EIA Regulations’. These regulations came into force on the 16th May 2017.
- 2.2.3 Schedule 1 of the EIA Regulations 2017 lists categories of developments for which EIA is mandatory, whilst Schedule 2 lists categories of development for which EIA may be required depending upon, inter alia, whether the development is likely to have significant environmental effects.
- 2.2.4 As is the case here, where an Applicant volunteers an ES for the purposes of the EIA Regulations, the development is deemed to be EIA development.

2.3 Scope of the Environmental Statement

- 2.3.1 The information and knowledge required to produce this ES was acquired from a number of varied sources to ensure that all effects, whether explicit from the outset, or coming to light during the project’s development, were assessed. These sources included:
- i) Review of public files and records.
 - ii) Review of historical mapping and aerial photography.
 - iii) Site surveys undertaken by the Applicant.
 - iv) Surveys and assessments undertaken previously on the Site.
 - v) Specialist studies.
 - vi) Expert knowledge from the consultancy team.
- 2.3.2 The information to be included in an ES is set out in Schedule 4 of the EIA Regulations. References to chapters in the ES where information relevant to the requirements of Schedule 4 can be found are listed withing Table 2.1 below.



Table 2.1 – Review of Schedule 4 Requirements

Para	Requirement	Where Addressed Within the ES
1.	A description of the development, including in particular: (a) a description of the location of the development; (b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.	(a) Chapter 1.0 (b & c) Chapter 3.0. (d) Chapter 3.0 as it relates to the scheme description and within Chapter 4 in relation to Air Quality and Chapter 6.0 in relation to noise.
2.	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapter 3.0
3.	A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.	Chapters 4.0 to 8.0 as it relates to individual topic areas
4.	A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	Chapters 4.0 to 8.0 as they relate to individual topic areas. As set out previously the only factors deemed likely to have the potential to be significantly affected by the development were in respect of noise, landscape & visual impacts, ecology and biodiversity, traffic and transport and air quality.
5.	A description of the likely significant effects of the development on the environment resulting from, inter alia: (a) the construction and existence of the development, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resource (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;	Chapter 3.0 as it relates to the scheme description and within Chapters 4.0 to 8.0 as it relates to individual topic areas. As well as providing a detailed scheme description, Chapter 2.0 also sets out the impact of the project on the climate and the vulnerability of the project to climate change.

Para	Requirement	Where Addressed Within the ES
	(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC and Directive 2009/147/EC	
6.	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	The overall EIA methodology and approach to assessment is described in Chapter 2.0. The specific technical methodologies used to identify and assess effects are fully described (or referenced) within Chapters 4.0 to 8.0 as they relate to individual topic areas.
7.	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.	'Incorporated Mitigation' which forms part of the scheme design is described in the detailed scheme description provided in Chapter 3.0. Mitigation measures, as they apply to individual environmental topic areas, are described in Chapters 4.0 to 8.0 as they relate to each topic.
8.	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this	The vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project is considered in Chapter 2.0.

Para	Requirement	Where Addressed Within the ES
	description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	
9.	A non-technical summary of the information provided under paragraphs 1 to 8.	A separate Non-Technical Summary is contained as ES Volume 4.
10.	A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.	References are provided as footnotes and / or reference document lists within, or at the end of each ES Chapter, as appropriate.

2.3.3 In addition to this ES, supporting technical assessments have been provided as appendices to the Planning Statement, which accompanies the planning application. These assessments provide information to the planning authority on matters which were not deemed likely to result in significant effects on the environment, but which could be material planning considerations. These assessments include:

- i) Flood Risk Assessment
- ii) Landfill and Circular Economy Statement
- iii) Technical and Regulatory Considerations for Restoration and Environmental Protection
- iv) Energy Statement

Scoped Out Topics

2.3.4 In accordance with the EIA Regulations, only the 'main' or 'significant' effects of the development need to be subject to an EIA. In this context, the following section sets out the topics which have been scoped out of the ES along with a justification for this.

Flood Risk, Drainage and Water Quality

2.3.5 Based on a review of the Environment Agencies flood maps, the Application Site is understood to fall entirely within Flood Zone 1.

2.3.6 There would be no change to the existing drainage arrangements and controls at the Site which are discussed within Section 3.0 of this ES. The 2012 ES for the last extension application confirmed that provided that the mitigation set out is provided

and followed, all risks for the operational and post-restoration phases of the landfill will remain as a low or very low risk. The existing controls would remain in place.

2.3.7 On the basis of the above, effects on hydrology would not be significant. As such it is proposed to scope impacts of water quality and flooding out of the ES.

2.3.8 A Flood Risk Assessment is submitted with the planning application.

Heritage and Archaeology

2.3.9 There are no scheduled monuments; listed buildings; conservation areas; registered parks or gardens; or historic battlefields on or immediately adjacent to the Application Site. The nearest heritage assets are located over 1km to the south of the river. Furthermore, given the use of the Site as a landfill, the likelihood of the Proposed Development impacting on any archaeological remains is very low.

2.3.10 Overall, it is considered that the Proposed Development would not have any significant effects on cultural heritage or archaeology, and therefore it is proposed to scope Cultural Heritage and Archaeology out of the ES.

Ground Conditions

2.3.11 As outlined above, the Site comprises a landfill site. The Proposed Development is not anticipated to have any adverse impact on the ground conditions of the Site or the surrounding area.

2.3.12 It is considered that the Proposed Development would not have any significant effects on ground conditions, and therefore this topic is scoped out of the ES.

Major Incidents and Disasters

2.3.13 The Application Site is not within an area susceptible to any form of natural disaster.

2.3.14 The Proposed Development is designed and maintained to adhere to health and safety standards and would be operated under the control of an Environmental Permit.

2.3.15 Overall, it is unlikely that the Proposed Development would give rise to any significant effects in relation to major accidents and disasters and so this topic is scoped out of the ES.



Population, Human Health and Climate Change

- 2.3.16 The Proposed Development would not result in any direct emissions of greenhouse gases. However, as with most new development there will be indirect emissions associated with importation of material to the Site. Once complete there would be no emissions associated with the Proposed Development.
- 2.3.17 Overall, it is considered that the Proposed Development would not give rise to significant effects with regards to population, human health and climate. Therefore, this topic has been scoped out of the ES.
- 2.3.18 Where appropriate, effects would be considered within the technical reports which will support the application.

2.4 Relationship with Other Regulatory Regimes

- 2.4.1 In addition to obtaining planning permission, a series of other regulatory consents and approvals would be required to undertake the Proposed Development. This includes an Environmental Permit.
- 2.4.2 The legislation that governs the environmental permitting regime is in place to protect human health and the environment. In order to obtain an Environmental Permit sufficient information must be provided to the EA to satisfy them that the Proposed Development can be operated within the regulatory requirements established by UK and European legislation. As such, likely significant environmental effects would not occur as a result of emissions to air and water, due to this regulatory control.
- 2.4.3 The Site already operates under an Environmental Permit, no changes are required to this to allow the Proposed Development to operate. The Proposed Development would continue to operate within the limits and conditions set out in the Permit.
- 2.4.4 Paragraph 194 of the National Planning Policy Framework (NPPF) sets out that:

“The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues



should not be revisited through the permitting regimes operated by pollution control authorities”.

2.5 EIA Methodology

2.5.1 The approach to environmental impact assessment is not standardised, but there are established and recognised approaches set out by professional institutions as to methods to be used for the assessment of environmental effects. Where appropriate, the environmental effects of the Proposed Development have been assessed using definitive standards, legislation, and guidance applicable to each of the technical areas covered within this ES.

2.5.2 In order to provide a clear and robust assessment each of the technical chapters presented within the ES follows the structure set out in the subsequent paragraphs.

Introduction

2.5.3 A brief summary of the approach to the topic is provided outlining any key issues relevant to the subject area being assessed.

Methodology

2.5.4 This section provides details of the assessment method followed and provides the following information:

- i) a description of any relevant legislation, policy or guidance which has been taken into account in the assessment;
- ii) the findings from any consultations undertaken when compiling the assessment;
- iii) the approach taken to gathering of any desk based or field data. When specific surveys have been undertaken an outline of the assessment methodology is provided;
- iv) the approach to the impacts assessment is defined. This includes how the particular topic has defined impact magnitude, receptor sensitivity and how these relate to the overall level effect / significance; and
- v) any limitations or assumptions made in the assessment.

Baseline

2.5.5 This section of the chapter provides a description of the baseline conditions of the Site relevant to the topic being assessed. The baseline conditions have been



established through consultation, collation and analysis of existing datasets and reports, and gathering of site-specific field data. The baseline assessment identifies any particular sensitive receptors that will need to be evaluated in the effects assessment.

- 2.5.6 Where relevant, and in accordance with Paragraph 3 of Schedule 4 of the EIA Regulations an outline of the likely evolution of the environment is set out by predicting future natural change in the baseline conditions in the absence of the Proposed Development. The future baseline is then considered when assessing the likely effects of the project over its operational lifetime.

Assessment of Effects

- 2.5.7 This section of the chapter describes the likely significant environmental effects of the Proposed Development on the baseline condition of the Site and the surrounding area relevant to the assessment topic. The assessment includes a description of the nature, extent and significance of these effects. The assessment takes into account any mitigation measures that have been specifically incorporated into the Proposed Development to reduce environmental effects of the project.
- 2.5.8 The EIA Regulations do not provide definitive methods for the assessment of significance and a variety of methods are employed within Environmental Statements. The method used to assess the effects is specific to each discipline. Where available and appropriate, the assessments follow impact assessment criteria and methodology set out by relevant professional institutions, British Standards or non-statutory guidance e.g. Landscape Institute, Historic England, BS4142: Methods for rating and assessing industrial and commercial sound. Where such guidance is not available, or prescriptive methods are not set out by the relevant professional body, then assessment criteria have been developed by the technical specialists to enable a clear and structured assessment to be undertaken.
- 2.5.9 The level of the effect of the Proposed Development is, in general, derived by considering the magnitude of the impact and the sensitivity of the receptor to a change resulting from the Proposed Development.
- 2.5.10 Depending on the discipline there are a number of factors that need to be taken into account when establishing the type and magnitude of an impact, including:



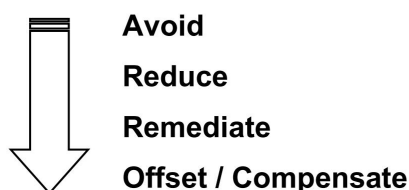
-
- i) whether the impact is adverse or beneficial;
 - ii) whether it is temporary or permanent;
 - iii) extent or spatial scale of the impact;
 - iv) duration of the impact;
 - v) whether the impact is reversible; and
 - vi) probability / likelihood of the impact.
- 2.5.11 Similarly, the sensitivity of a receptor is the function of a number of elements dependent on the discipline and effect being assessed, these could include;
- i) designation and legal status;
 - ii) quality;
 - iii) rarity; and
 - iv) ability to adapt to change.
- 2.5.12 Having established the magnitude of the impact and the sensitivity of the receptor, the level of the effect is then defined. For some disciplines a matrix is used to classify the level of effect by correlating magnitude of impact and sensitivity.
- 2.5.13 Where a matrix is not used the magnitude of impact and the sensitivity of the receptor is described and these factors are used to make a reasoned professional judgement to establish the level of the effect and whether it is considered to be significant or not significant.
- 2.5.14 There is no statutory definition of what level of effect is to be regarded as significant and there is often not a single, definitive, correct answer as to whether an effect is significant or not. A significant effect does not necessarily mean that such an effect is unacceptable to decision-makers nor necessarily results in a breach of any particular planning policy. This is a matter to be weighed in the planning judgement / balance alongside other material considerations. What is important is that the likely significant environmental effects of any proposal are transparently assessed and described in sufficient detail to enable the determining authority to make a balanced and well-informed judgement as part of the decision-making process.
- 2.5.15 Where the findings of an assessment are set out as different levels of effect (e.g. major, moderate, minor, etc) the assessment clearly sets out where an effect is considered to be significant. This may vary between disciplines and the threshold is defined within each chapter. This approach is used to assist the decision maker,

consultees and other interested parties in establishing the most important environmental effects of the Proposed Development.

- 2.5.16 In all instances the assessment sets out the basis of the judgements made so that the readers of the ES can see the weight attached to the different factors and can understand the rationale of the assessment. In this sense the ES clearly explains how the significance of effects has been derived.

Mitigation

- 2.5.17 It is a requirement of the EIA Regulations to describe the measures envisaged to prevent, reduce and where possible offset any significant effects on the environment. Mitigation measures can be used to reduce or avoid any adverse effect, whether or not that effect is deemed to be 'significant'. Mitigation can be achieved in a number of ways as listed below; this approach is often referred to as the mitigation hierarchy with mitigation being selected as high up the hierarchy as possible.



- 2.5.18 Many of the mitigation measures within the Proposed Development have been incorporated as a result of decisions undertaken during the design of the scheme. Key 'incorporated' mitigation measures relevant to the technical assessments are described in each technical chapter. On the basis that these mitigation measures are considered to be embedded into the project they have been taken into account when coming to a judgement of the significance of the effects of the Proposed Development.
- 2.5.19 Where additional mitigation, compensation or enhancement measures are proposed to prevent, reduce or offset adverse effects unavoidable through design, or to provide benefits to the scheme/ local environment these are described separately within the mitigation section of each chapter. Where such measures have been defined an explanation is provided of how these measures will mitigate / reduce the identified effects of the Proposed Development.

Cumulative Effects

2.5.20 The EIA Regulations require that a description of the likely significant effects of the development on the environment should be included in the Environmental Statement, including cumulative effects. On this basis each technical chapter provides an assessment of likely significant cumulative environmental effects with other projects in the area.

2.5.21 The EIA Regulations do not define cumulative effects; however, a commonly accepted description is:

“Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project” (European Commission, 1999)

2.5.22 There is no defined methodology in the UK as to how cumulative effects should be assessed. In determining the approach to be adopted to this element of the assessment reference is made to the following guidance:

- i) Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission 1999);
- ii) Cumulative Effects Assessment Practitioners Guide (Canadian Environmental Assessment Agency 1999);
- iii) Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment 2006);
- iv) The State of the Environmental Impact Assessment Practice in the UK (Institute of Environmental Management and Assessment 2011); and
- v) Assessing the Cumulative Landscape and Visual Impact of Onshore Wind Energy Developments (Scottish Natural Heritage 2018).

2.5.23 Paragraph 5(e) of Schedule 4 of the EIA Regulations require a *“description of the likely significant effects of the development on the environment resulting from the culmination of effects with other existing and/or approved projects”*. In this regard the regulations are specific about the projects that should be considered to result in cumulative effects i.e. existing and/or approved projects. However, it is proposed to also include projects that are currently awaiting determination within the cumulative assessment as there is a possibility that these projects could be approved whilst the application for the Proposed Development is being determined. Accordingly, the assessment of cumulative impacts will encompass the effects of the Proposed Development in combination with:



- i) approved development under construction;
 - ii) approved development, awaiting implementation; and
 - iii) proposals awaiting determination within the planning process with design information in the public domain.
- 2.5.24 The presence of existing operational schemes (and for some disciplines, schemes that are under construction, but not yet operational) is an established influence upon the environment, that will be taken into account when determining the baseline for the non-cumulative assessment for each discipline chapter. The assessment of effects section of each chapter has had full regard to the presence of such schemes when arriving at any conclusions.
- 2.5.25 As such, the additional schemes that would form part of the assessment of cumulative effects will be major projects subject to EIA that have either been granted planning consent but have not yet been constructed and major projects subject to EIA for which a planning application is awaiting determination. Projects that fall outside the above criteria will only be included in the assessment if specifically identified by the Planning Authority or other statutory consultees.
- 2.5.26 The Zone of Influence (Zol) will vary depending on discipline. However, it is considered unlikely that there would be any significant cumulative effects beyond 2 km for any discipline. As such this is the distance at which the initial screening of projects for potential cumulative effects will be undertaken. The potential cumulative effects arising from this development will be considered within each technical chapter of the ES.
- 2.5.27 Planning application P0070.23 for the 'Continued operation, redevelopment and expansion of the existing Plastics Recycling/Recovery Facility, Materials Recycling Facility buildings with vehicle depot and associated landscaping and parking' located to the west of the Site would be considered.

Residual Effects and Conclusions

- 2.5.28 This section of each technical chapter provides a description of the likely residual effects of the Proposed Development following the implementation of any additional mitigation or enhancement measures.



- 2.5.29 The conclusions summarise the key elements of the assessment and include a statement on whether the Proposed Development is likely to result in any significant environmental effects.

2.6 Indirect Effects

- 2.6.1 In order to comply with Regulation 5(2) and Schedule 4 of the EIA Regulations, specifically in relation to the provision of a description of the likely significant direct and 'indirect' effects, the EIA process must consider the likely upstream and downstream effects of the Scheme. Upstream and downstream environmental impacts have been considered where:

- i) the impact would be an inevitable causation of the Scheme; and
- ii) the impact would give rise to likely significant effects that are capable of evidence-based meaningful assessment.

- 2.6.2 It is not considered likely that the Proposed Development would result in any such indirect upstream or downstream impacts that are an inevitable result of the Proposed Development and could give rise to significant effects.

2.7 Project Vulnerability to Major Accidents / Disasters

- 2.7.1 Schedule 4 paragraph 8 of the EIA Regulations requires that the ES includes a description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters which are relevant to the project concerned. Further, that where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events and the approach to managing emergencies.

- 2.7.2 The reference to disasters is interpreted to relate to natural events, as indicated by the preamble to the 2014 Directive (2014/52/EU) which states at paragraph 15:

"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment".



- 2.7.3 Nonetheless, it is recognised that disasters can occur as a result of human intervention e.g., conflict and war, political influences etc.
- 2.7.4 In relation to major accidents the EIA Regulations refer to Directive 2012/18/EU (the control of major-accident hazards involving dangerous substances). This directive defines major accidents as:
- “an occurrence such as a major emission, fire, or explosion resulting from uncontrolled developments in the course of the operation of any establishment covered by this Directive, and leading to serious danger to human health or the environment, immediate or delayed, inside or outside the establishment, and involving one or more dangerous substances.”*
- 2.7.5 The Proposed Development is located within a politically, geologically, and meteorologically stable part of Europe. Accordingly, the Proposed Development is not at material risk from, for example, civil unrest, war, earthquakes, or extreme weather conditions (hurricanes etc.).
- 2.7.6 In terms of any vulnerabilities specific in this location (i.e., on the Site) parts of the Site does lie in an area prone to river or tidal flooding, however the Site is protected by flood defences. The Proposed Development is not considered to be vulnerable to any potential ‘natural’ events that could result in significant environmental effects.
- 2.7.7 With regard to major accidents the 2014 Directive describes that:
- “it is important to consider their [i.e., the Proposed Development] vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment.”*
- 2.7.8 The focus here, as it is within the EIA Regulations, is on the vulnerability of the Proposed Development to major accidents and/or disasters and the likelihood of significant adverse effects occurring.
- 2.7.9 The continued operation of the landfill and composting would not lead to any major risk of emission, fire, or explosion.
- 2.7.10 Based upon the foregoing, the Proposed Development would not give rise to significant adverse effects on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters.



2.8 Climate Change

- 2.8.1 Schedule 4 paragraph 5(f) of the EIA Regulations requires that applicants provide a description of the likely significant effects of development on the environment resulting from the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.
- 2.8.2 The effects of climate change and increased global warming are already being witnessed around the world. The result is increased sea levels, warmer and wetter winters, hotter and drier summers, and more frequent and intense weather extremes. In the UK this means that areas prone to flood risk are more likely to be inundated by extreme flood events, and consequently development is required to be designed cognisant of these effects.
- 2.8.3 In June 2019 the UK Government became the first major economy in the world to pass laws to end its contribution to global warming by 2050. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (the Climate Change Act) requires the UK to bring all greenhouse gas emissions to net zero by 2050, compared with the previous target of at least 80% reduction from 1990 levels. On 20 April 2021, the UK Government announced that it would set in law a more ambitious target of cutting carbon emissions by 78% by 2035 compared to 1990 levels.
- 2.8.4 The Flood Risk Assessment (Appendix B to the Planning Statement) provided in support of the application has been undertaken with regard to the provisions in the NPPF and local planning policy. The Site is unlikely to flood except in extreme conditions. The majority of the Site is located within Flood Zone 1 with a less than 1 in 1000 annual probability of river or sea flooring in any year. A small portion of the Site is located within Flood Zone 3a and therefore has a high probability of flooding. The flood defence measures are expected to afford the Site significant protection from tidal flooding. The flood defences provide a 1 in 1000 year standard of protection.
- 2.8.5 Therefore, the Proposed Development is unlikely to be significantly impacted by the future impacts of climate change on flooding. As such, the proposals would not be expected to impact flood risk elsewhere and no compensatory flood storage would need to be provided on site.



2.9 Structure of the Environmental Statement

2.9.1 **Volume 1 (Main Report)** provides an introduction to the project, scope of the assessment, summary of alternatives considered, a description of the Proposed Development and details the technical assessments that have been undertaken to determine the likely impacts of the project. The chapters of the Main Report are as follows:

Chapter 1.0	Introduction and Background
Chapter 2.0	Approach to the Environmental Impact Assessment
Chapter 3.0	Scheme Description and Alternatives
Chapter 4.0	Air Quality
Chapter 5.0	Landscape and Visual
Chapter 6.0	Noise and Vibration
Chapter 7.0	Ecology
Chapter 8.0	Traffic

2.9.2 The Illustrative Figures that support the Main Report are contained within **Volume 2**.

2.9.3 A series of **Technical Appendices (Volume 3)** are provided where appropriate to provide additional background information to the technical chapters.

2.9.4 All the chapters of the Main Report are summarised in a **Non-Technical Summary (Volume 4)** to provide a review of the development proposals, and the possible environmental implications, in concise lay terms.

3.0 SCHEME DESCRIPTION

3.1 Introduction

3.1.1 This Chapter of the ES provides a description of the Proposed Development at Rainham Landfill.

3.1.2 The Proposed Development comprises:

- i) Continuation of waste inputs to the landfill until 2029
- ii) Continuation of composting
- iii) Regularisation of existing site levels
- iv) Restoration complete by 2031

3.2 Proposed Development

Landfill Operations

3.2.1 Planning Permission was granted in 1998 to deposit waste until December 2012, and then restore the Site by 2018 (ref. P1275.96). Planning permission was subsequently granted to extend the life of the Site until 31 December 2024 (ref. P1566.12).

3.2.2 The landfill is still operational in the central part of the Site, as currently permitted resettlement levels have not yet been reached. The landfilling operations around the majority of the periphery have been completed, with these areas now being both capped and restored.

3.2.3 The Site is presently in an obviously unfinished state which will necessarily require the importation of additional material to create a satisfactory final landform that can then be engineered to create a successfully restored site.

3.2.4 In November 2024 there remained an estimated 1.085 million cubic metres (m³) of landfill void at the Site principally as a result of increased rates of recycling across the industrial, commercial, and domestic sectors. This increase in the rate of recycling, combined with a general reduction in waste generated per capita, has been driven primarily by fiscal incentives (escalating increase in landfill tax) and political initiatives (improved recycling opportunities at both the local and national level). These leaving factors have consequently reduced the volume of residual



waste sent to landfill. As a direct result, it is not possible for Veolia to achieve the approved restoration profiles (as agreed under planning permission P1566.12) by the current approved cessation date of 31 December 2024.

- 3.2.5 Based on current and projected inputs, it is anticipated that an additional 5 years will be required to fully complete the remaining landfill void and to achieve the approved contours, no change is proposed to the approved pre and post contours which are shown on Figures 3.1 and 3.2. A further two years are required to complete the restoration of the Site.
- 3.2.6 The Environmental Permit (EP) for the landfill (note that other operations are operated under different EPs) limits annual waste inputs to the landfill site to 1,700,000 tonnes per annum (tpa) (1Mtpa of non-hazardous waste and 700,000tpa of inert waste). The Site receives approximately 420,000 of tpa of non hazardous municipal solid waste (MSW) and commercial and industrial (C&I) waste. The waste that is landfilled is brought directly from the weighbridge to the operational cell for disposal. In accordance with the EP the waste is inspected as it is placed in the cell to ensure that it does not contain any prohibited waste and that the information on the waste transfer note is accurate.
- 3.2.7 The Site receives waste from 0700-1600 Monday to Friday and 0700-1200 on Saturdays.

Access

- 3.2.8 Access by Ferry Lane and Coldharbour Lane connects The Site with London and the surrounding regions via the A13. The Site is also accessible from the River Thames via a jetty (not part of this application) on the south west boundary.

Restoration

- 3.2.9 The Site will be progressively restored in phases to return The Site to beneficial uses at the earliest opportunity. The restoration phases will follow the completion of landfilling phases. There will be a minimum period of five years' aftercare management of the restored landform following closure.
- 3.2.10 The Site will be restored for use as amenity and public open space to be integrated with the London Riverside Conservation Park ('Wildspace'). As safeguarded by the extant planning permission, the restoration proposals for the Site would be



developed in consultation with agreed stakeholders to provide an evolving restoration scheme for the landfill site at Rainham. The proposals presented (see Figure 3.5) incorporate two core themes:

- i) The provision of visitor facilities; and
- ii) Habitat creation and enhancement to deliver a 10% Biodiversity Net Gain.

3.2.11 The design solution will integrate these in a way that recognises the different objectives that stakeholders have for the Site. Given the overall site area (approximately 159ha), it is feasible to incorporate a range of different elements in the final scheme. The restoration proposals set out below describe the overall outline design solution for the Site as well as justifying the proposed location of the various elements proposed.

3.2.12 The overall strategy for The Site is to create an attractive site for visitors to enjoy, while providing habitat diversity that complements the objectives of the wider Wildspace Strategy.

Visitor Facilities

3.2.13 Veolia remains committed to restoring the Site for use as amenity and public open space to be integrated into the London Riverside Conservation Park (as envisaged by the extant planning permission).

3.2.14 At this stage flexibility is required as to the precise detail of the various visitor attractions as these would evolve in collaboration with the various Wildspace partners. At this stage, only the principles for the incorporation of various visitor facilities within the Site have been included in this development description. It is envisaged that the detail of these would evolve over time through stakeholder consultation and certain elements are likely to be the subject of future planning applications. Assessment of their environmental effects would be provided, as appropriate, with their associated planning applications following detailed design.

Habitat Creation

3.2.15 Following soil placement, the surface soils will be cultivated, left fallow for six months, with further cultivations during the fallow period, and again just prior to sowing. During cultivations, any extraneous objects will be removed.



Woodland

- 3.2.16 Tree areas will be cultivated and seeded with a low competition grass seed mixture to provide a groundcover that will resist erosion, assist with controlling rainwater infiltration through the soils to the capping system, and create an attractive appearance in the tree areas until the tree canopy closes and a true woodland flora can develop. These will give food and shelter for birds, insects and small mammals and result in a mixed canopy height and flowers and berries for increased visual interest.
- 3.2.17 A key benefit of woodland planting in the parts of the Site where it is proposed is that it would reduce the visibility of the Freightmaster Estate (particularly low level elements) for users of the restored landfill.

Ancillary Infrastructure and Plant and Equipment

- 3.2.18 This application seeks consent for the retention of the existing landfill cabins, weighbridge and wheelwash facilities shown on Figure 3.3.

Landfill Gas

- 3.2.19 Landfill gas is collected by a gas extraction system which is aided by a low permeability membrane liner that caps restored parts of The Site. The gas extraction system operates in all areas of the landfill to prevent migration of landfill gas and to control emissions of landfill gas to the atmosphere. The collected gas is converted into energy through a number of generators, operated by a third party (EDL) in the south of the application Site. To demonstrate that the extraction system is working effectively, perimeter monitoring wells are located beyond the edge of the waste and outside the landfill.
- 3.2.20 The landfill gas extraction compound is currently equipped with 13 spark ignition engines, each of which is running at a rating of just over 1MW with the total capacity of the plant being in the region of 17MW. The equipment is operated under an Environmental Permit separate to that of the landfill.

Surface Water

- 3.2.21 Surface water on the site is managed to mitigate the risk of pollution from suspended solids, chemicals, hydrocarbons and waste breakdown products. The mitigation includes employing good environmental management techniques, such as the



capping the landfill with a low permeability layer (to prevent rainwater permeating into the waste) and collecting all drainage from the open working areas for disposal to sewer. Contaminated water from the wider site (such as the recycling area) is collected and treated within the leachate collection and treatment system summarised below. All fuel and chemical storage areas are suitably contained or bunded.

- 3.2.22 The main drainage features surrounding the Site are the River Thames to the south and west and the Common Watercourse on the northern boundary of The Site. The Common Watercourse flows to the north westernmost part of The Site prior to flowing through a sluice and into the River Thames.

Groundwater and Leachate

- 3.2.23 Groundwater beneath the Site is protected by the presence of a thick sequence of alluvial clay that, owing to consolidation by the waste, effectively acts as a low permeability liner. The more recently developed phases of the Site also benefit from the provision of an additional engineered clay liner. Leachate accumulating on the liner gravitates into a drainage system. From the eastern part of the Site, the leachate is more heavily contaminated and has historically been pumped to a leachate treatment plant. The leachate treated at this plant, and the raw leachate from the drainage system in the rest of the Site, are discharged to foul sewer under the terms of a consent to discharge issued by Thames Water, which is subject to a Notice of Determination from the Environment Agency. The leachate treatment plant is controlled within the existing landfill Environmental Permit (EP) issued by Environment Agency.

Drainage

- 3.2.24 The drainage system is comprised of a geo-composite drainage layer incorporated above the liner prior to soil placement. No additional drainage or permanent irrigation system would be installed over and above that required under the existing EP. The granular nature of the restoration soils and the finished gradients should ensure adequate surface water retention and runoff without water logging or erosion. Some local variations in soil and moisture are preferred to maintain floral diversity.

Composting Facility



- 3.2.25 It is also proposed to continue the open windrow composting operations throughout the extended period of landfilling operations (i.e. until 31 December 2031) in part to help assist with generating the high-quality restoration material required to restore the Site. The layout of the composting facility is shown on Figure 3.4. The composting facility includes composting and wood waste storage and processing

3.3 Alternatives Considered

- 3.3.1 Schedule 4 of the EIA Regulations identifies the information for inclusion in Environmental Statements. Paragraph 2 requires the following:

“A description of the reasonable alternatives (for example in terms of design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including comparison of the environmental effects”.

- 3.3.2 It should be noted that the EIA Regulations place no specific obligation on a developer to study alternatives, but simply to describe them in the manner specified, where they have been considered.

Reasonable Alternatives

- 3.3.3 There is no definition within the EIA Regulations as to what constitutes a “reasonable” alternative. The Cambridge English Dictionary defines “reasonable” as being; “Based on or using good judgement and therefore fair and practical.”
- 3.3.4 There are considered to be three alternatives to the Proposed Development, these are identified and assessed within the Ayesa Technical Report and summarised below. As concluded below, none of the identified alternatives are reasonable.

No New Development Scenario

- 3.3.5 This Scenario assumes that landfilling ceases on 31st December 2024 and in accordance with the 2016 planning permission capping and restoration works are to be completed by 31st December 2026. Considerable areas of the landfill will be at levels well below those allowed for in the 2016 permission and an attempt to cap and restore these would have to be undertaken.



- 3.3.6 In this Scenario it would be necessary to secure a planning permission to regularise a different landform and restoration scheme. It would also be necessary to provide the Environment Agency with a revised methodology for capping and pollution control at the site, including updated environmental risk assessments and to secure their approval for the works. It may be necessary to apply for a variation of the Environmental Permit for the revised scheme.
- 3.3.7 In the central eastern area of the site there would be a large, elongated amphitheatre like depression in the landfill. The sides of this feature are steep sided which would mean they are unsuitable for capping and restoration. Whilst recently deposited wastes can be temporarily placed at steep angles, over time they become unstable and slippages can occur. Further, landfill caps can't be constructed at steep angles as the restoration soils covering them would be unstable and slip off. It would therefore not be possible to cap and restore large areas of the amphitheatre feature.
- 3.3.8 The bowl shape of the amphitheatre feature would also result in surface water accumulating on top the wastes instead of shedding off into the external surface water management system. The accumulation of surface water on top of a landfill is likely to lead to environmental pollution as a result of water ingress into the waste, generation of excess leachate and interference with the control of landfill gas. Accumulation of water on the cap can also increase the risk of instability on restored slopes.
- 3.3.9 The following significant issues would arise in the case of a no new development scenario:
- Sections of the landfill including the amphitheatre feature would be more susceptible to localised settlement, ponding of surface water and increased risk of water ingress into the landfill;
 - Any ingress of water into the landfill would increase the risk of pollution of groundwater and surface water;
 - There would be adverse effects on the efficiency of the landfill gas management system, increasing the risk of odourous and polluting emissions to the atmosphere, with attendant nuisance to the public;
 - The retained amphitheatre feature would 'lock-in' a more active, costly and disruptive maintenance regime for many decades compared to that which would be required for the planned landform scheme. The ongoing risks and need for

maintenance would likely increase the period of time this part of the restored landfill is not available for public access;

- The maintenance works would result in periodic works to remediate the landfill surface, adversely affect ecological habitats and amenity use of the restored landfill;
- The timescale for securing the necessary planning and environmental permits and to carry out the work for a no new development scheme could be up to 32 months (>2.6 years).

3.3.10 Compared to the application scheme, the no new development option will result in a less sustainable landform, impose a long term environmental risk and a financial burden on future generations.

3.3.11 The immediate abandonment of operations would clearly give rise to adverse environmental effects; and significantly impact on the restoration and future beneficial use of the Site. As such, this is not considered to be a reasonable alternative.

Soils Only Scenario

3.3.12 In this scenario it is assumed that a subsequent planning permission is granted to allow the proposed application restoration scheme to be achieved but using only imported soils to complete the landform. It would also be necessary to secure a variation to the Environmental Permit from the EA.

3.3.13 The quantity of soils required would be different to that required if non-hazardous wastes were used. This is because the landform settlement behaviour would be slightly less if soils were used. The soils themselves would not degrade and would only settle through consolidation by a few %, however they would be placed over a thickness of 16 – 30 metres of existing biodegradable, wastes. These wastes would continue to settle albeit with a greater weight of overlying soils compressing them (compared to if it were infilled with non-hazardous wastes).

3.3.14 It is estimated the volume of soils required to achieve the restoration landform would be around 10% less than if the currently permitted non-hazardous wastes were deposited. For the application scheme landform this would amount to approximately 0.98 Mm³ of soils (1.76 million tonnes at a density of 1.8 t/m³)

3.3.15 The technical and regulatory issues that would need to be addressed for the 'soils only' scenario are summarised as follows:

- Placement of the soils within the non-hazardous landfill area would result in differential settlements across the restored landform; i.e. some parts of the landfill would settle more than others leading to unplanned changes in the landform gradients. This in turn would result in an increased regime of maintenance on the restored landform in terms of periodic earthworks to ensure that surface water could continue to runoff the landfill.
- The existing and installed pollution control and protection systems would have to be reevaluated and modified. The gas wells performance and the management of condensate in the gas collection pipes could be adversely affected by the effects of differential settlements. Any degradation of the performance of the gas control system in this way could lead to adverse emissions of odorous gases and those with a high greenhouse gas potential.
- Differential settlements can also affect the integrity of the leachate control systems, though damage to any vertical extraction wells in the locality.
- The increased weight of the soil wastes (compared to less dense non-hazardous wastes) could also affect the integrity of the basal lining system by exceeding the design criteria for the liner protection geotextile and the crush strength of the leachate drainage pipes. Damage to the containment lining system could result in groundwater and / or surface water pollution.
- The permit may need to be varied and risk assessments (i.e. stability, landfill gas, hydrogeological risk assessment) prepared to allow for only importation of soil waste within the void.

3.3.16 Overall, there are increased environmental risks which would likely arise from the placement of imported soil wastes, as such, this is not considered to be a reasonable alternative.

Alternative Landform Scenario

3.3.17 This Scenario would involve re-profiling the already placed wastes into a landform that attempts to overcome the deficiencies identified with the No New Development Scenario. No new deposits of non-hazardous wastes would be made.



- 3.3.18 The majority of the reprofiling works would have to take place around the amphitheatre area to locally change the landform from a depression shape into a valley that allowed surface water to shed off the site. Alternatively, larger scale excavations could be undertaken to reform the area on around the amphitheatre into a domed landform.
- 3.3.19 In the Phase 2 area, the works would involve removing the cap and reprofiling by excavation and translocation of the existing wastes to form a domed landform, albeit with shallower and more settlement susceptible gradients than the application design.
- 3.3.20 Designs for these alternative landform options have not been undertaken so the exact quantities of materials that would require excavation and translocation are not known. However, given the uncapped and unrestored areas of the site are around 25 Ha in size (250,000m²), it can be assumed the waste translocation quantities involved are likely to be well in the hundreds of thousands of cubic metres range.
- 3.3.21 Regulatory permissions would be required from both the Planning Authority and EA for such a change to the 2016 permission scheme and 2022 permit.
- 3.3.22 The odour arising from excavations into previously deposited wastes is particularly intense and unpleasant and it is likely that even with enhanced gas management it would not be possible to prevent the escape of large quantities of highly odorous landfill gases. Given the scale of the works required, these emissions would occur on multiple occasions, over long periods. Similar waste translocation operations attempted on other sites in the UK has often led to long term public nuisance crises, with those affected also expressing concerns about potential health impacts. In our experience the Environment Agency would have grave reservations about any proposals for significant waste translocation operations and it is likely they would not give approval for such activities.
- 3.3.23 In summary, the alternative landform option gives rise to significant timescale, technical, pollution risk, amenity impacts and sustainability issues, as follows:
- Given that settlements and differential settlements of many metres will be occurring, any shallow valley features created would be very susceptible to changes in the base profile of the valley, causing water to pond in the base rather than flow off the landfill;

- The creation of a valley features to channel surface water off the landfill will result in concentrated flows in the valley bases, which would give rise to an increase of risk of erosion, particularly during storm events;
- As well as affecting the restoration of the base of the landfill, the potential for erosion would increase the risk of instability of the restoration soils on top of the capping system and on the sidewalls of the void feature;
- It would be necessary to provide for the installation of erosion control systems in the base of the valleys and to manage higher flow rates into the external surface water management system;
- Sections of the base of the void feature would be more susceptible to localised settlement, attendant ponding of water and increased risk of water ingress into the landfill;
- The adoption of valley features would 'lock-in' a more active and costly maintenance regime for many decades compared to that which would be required for the planned domed landform scheme. The ongoing risks and need for maintenance would likely increase the period of time this part of the site being available for public access;
- The risk of a significant emissions of highly odorous landfill gases is very high with an associated impact on public amenity. Similarly, the emissions would be polluting and contribute to the greenhouse gas effect;
- The timescales for securing the necessary permits for these works and to undertake them is likely to be similar to those in the application scheme;
- It is uncertain whether the Environment Agency would approve an application to reprofile the landfill by large scale excavation and translocation of wastes.

3.3.24 In light of the above, this is not considered to be a reasonable alternative.