TABLE OF CONTENTS

TABLES

PLATES

21.0 MATERIALS AND WASTE

21.1 Introduction

21.1.1 This chapter of the Preliminary Environmental Information (PEI) Report provides a preliminary assessment of the potential impacts and effects as a result of the construction, operation (including maintenance) and decommissioning of the Proposed Development on materials and waste.

21.1.2 The assessment has been undertaken in accordance with current best practice guidance and follows the methodology set out in the Institute of Environmental Management and Assessment (IEMA) Guide to Materials and Waste in Environment Assessment, Guidance for a Proportionate Approach (referred from herein as the 'IEMA Guidance') (IEMA, 2020).

21.1.3 This chapter is supported by Figure 21-1: Historic and Authorised Landfills and Waste and Mineral Sites (PEI Report, Volume II).

21.2 Legislation and Planning Policy Context

21.2.1 This preliminary assessment has been undertaken taking into account relevant legislation, planning policy and guidance as set out in national, regional and local planning policy as summarised below.

Legislative Background

21.2.2 The assessment has taken account of relevant waste management legislation, including, but not limited to:

- Waste Framework Directive (EU, 2008);
- The Environmental Protection Act (1990) (Her Majesty's Stationary Office (HSMO), 1990);
- The Hazardous Waste (England and Wales) Regulations (2005) as amended (HMSO, 2005);
- The Waste (England and Wales) Regulations (2011) as amended (HMSO, 2011);
- The Environmental Permitting (England and Wales) Regulations (2016) (HMSO, 2016); and
- The Environment Act 2021 (HMSO, 2021).

21.2.3 The Waste (England and Wales) Regulations 2011 (as amended) (HMSO, 2011) transpose the requirements of the Waste Framework Directive (Waste FD) (EU, 2008) in England and Wales and require the Secretary of State to establish waste prevention programmes and waste management plans that apply the waste hierarchy. The waste hierarchy is defined in the Waste FD and prioritises waste prevention, followed by preparing for reuse, recycling, recovery and finally disposal as means of managing waste.

21.2.4 The Waste (England and Wales) Regulations 2011 (as amended) (HMSO, 2011) require businesses to apply the waste hierarchy when managing waste, and require

that measures are taken to ensure that, by the year 2020 and beyond, at least 70% by weight of non-hazardous construction and demolition waste is subjected to material recovery. The target specifically excludes naturally occurring materials with European Waste Catalogue (EWC) Code 17 05 04 (17 05 04 soil and stones other than those mentioned in 17 05 03* (soils and stone containing dangerous substances)).

21.2.5 A departure from the waste hierarchy can be undertaken to achieve the best overall environmental outcome where this is justified by lifecycle thinking on the overall impacts of the generation and management of the waste. However, the following considerations must also be taken into account:

- environmental protection principles of precaution and sustainability;
- proximity principle for treatment and disposal of waste to be as close to its source as possible;
- technical feasibility and economic viability;
- protection of resources; and
- overall environmental, human health, economic and social impacts.

Planning Policy Context

National Planning Policy

21.2.6 The Proposed Development materials and waste assessment will take into consideration national policy that concerns the use of material and waste generation and its management. The following national policies are relevant to the Proposed Development.

Overarching National Policy Statement (NPS) for Energy (EN-1) (2011)

21.2.7 The National Policy Statements (NPSs) for energy infrastructure set out the Government's policy for delivery of major energy infrastructure (Department of Energy and Climate Change (DECC), 2011). The Overarching NPS for Energy (EN-1) published in 2011 is of relevance to the materials and waste assessment (refer to Section 5.14 Waste Management).

21.2.8 A further update was published in March 2023 by the Department for Energy Security and Net Zero (DESNEZ). This document outlines what is required for an applicant's materials and waste assessment, including (refer to Section 5.15 Resource and Waste Management):

- 5.15.6 Applicants must demonstrate that development proposals are in line with Defra's policy position on the role of energy from waste in treating municipal waste.
- 5.15.8 The applicant should set out the arrangements that are proposed for managing any waste produced and prepare a report that sets out the sustainable management of waste and use of resources throughout any relevant demolition, excavation and construction activities.

- 5.15.9 The arrangements described and a report setting out the sustainable management of waste and use of resources should include information on how re-use and recycling will be maximised in addition to the proposed waste recovery and disposal system for all waste generated by the development. They should also include an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation.
- 5.15.10 The applicant is encouraged to refer to the 'Waste Prevention Programme for England' and should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome.
- 5.15.11 If the applicant's assessment includes dredged material, the assessment should include other uses of such material before disposal to sea, for example through reuse in the construction process.
- 5.15.12 The UK is committed to moving towards a more '*circular economy*'. Where possible, applicants are encouraged to source materials from recycled or reused sources and use low carbon materials, sustainable sources and local suppliers. Construction best practices should be used to ensure that material is reused or recycled onsite where possible.
- 5.15.13 Applicants are encouraged to use construction best practices in relation to storing materials in an adequate and protected place on site to prevent waste, for example, from damage or vandalism. The use of Building Information Management tools (or similar) to record the materials used in construction can help to reduce waste in future decommissioning of facilities, by identifying materials that can be recycled or reused.

National Policy Statement (NPS) for Gas and Oil Pipelines (EN-4) (2011))

21.2.9 NPS EN-4 does not seek to repeat the material set out in EN-1, which applies to all applications covered by this NPS unless stated otherwise.

National Policy Statement (NPS) for Electrical Networks Infrastructure (EN-5) (2011)

21.2.10 NPS EN-5 does not seek to repeat the material set out in EN-1, which applies to all applications covered by this NPS unless stated otherwise.

Draft National Policy Statements

21.2.11 The Government is currently reviewing and updating the Energy NPSs to reflect its policies and strategic approach that is set out in the Energy White Paper (December 2020), and to ensure that the planning policy framework enables the delivery of the infrastructure required for the country's transition to net zero carbon emissions. As part of the review process, the Government published Draft Energy NPSs for consultation on 30th March 2023. The details of these provisions are subject to consultation. However, these emerging documents and any subsequent formal adoption of new NSPs for energy infrastructure have been considered where relevant

during the production of this PEI Report. A summary of the relevant draft NPSs is below.

Draft Overarching NPS for Energy (EN-1) (2023)

21.2.12 Section 5.15 of the Draft NPS (EN-1) relates to the resources and waste management. The Draft NPS states:

- 5.15.2 Sustainable waste management is implemented through the waste hierarchy, which sets out the priorities that must be applied when managing waste.
- 5.15.3 Disposal of waste should only be considered where other waste management options are not available or where it is the best overall environmental outcome.
- 5.15.4 All large infrastructure projects are likely to generate some hazardous and non-hazardous waste. The EA's EP regime incorporates operational waste management requirements for certain activities. When an applicant applies to the EA for an EP, the EA will require the application to demonstrate that processes are in place to meet all relevant EP requirements.

Draft NPS for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (2023)

21.2.13 NPS EN-4 does not seek to repeat the material set out in EN-1, which applies to all applications covered by this NPS unless stated otherwise.

21.2.14 The Draft NPS EN-4 states:

- 2.13.26 Due to risk of contamination, dredged spoil should not only be deposited responsibly using the waste disposal hierarchy, but also the applicant should seek beneficial use of dredged spoil wherever possible in accordance with policy commitments within the Marine Plans (see Section 4.4 of EN-1).

Draft NPS for Electricity Networks Infrastructure (EN-5) (2023)

21.2.15 NPS EN-5 does not seek to repeat the material set out in EN-1, which applies to all applications covered by this NPS unless stated otherwise.

National Planning Policy Framework (2021) (Ministry of Housing, Communities & Local Government (MHCLG), 2021)

21.2.16 The National Planning Policy Framework (NPPF) does not contain specific waste policies as these are detailed within the revised Waste Management Plan for England (2021) and the National Planning Policy for Waste (2014b), however the following overarching policies are relevant to waste and resources:

- The environmental objective set out at paragraph 8 of the NPPF is '*to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy'.*

- The environmental objective set out in paragraph 210 of the NPPF is to *'so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously'.*

National Planning Policy Guidance (NPPG) for Minerals (2014) (MHCLG, 2014a) and NPPG for Waste (2015) (MHCLG, 2015)

21.2.17 The NPPG for Minerals and Waste were published to provide more in-depth guidance than the NPPF. It aims to make planning guidance more accessible and ensures that it is kept up to date.

National Planning Policy for Waste (2014) (MHCLG, 2014b)

21.2.18 The National Planning Policy for Waste sets out detailed waste planning policies to be applied in conjunction with the NPPF. It states that '*when determining planning applications for non-waste development, local planning authorities should, to the extent appropriate to their responsibilities, ensure that:*

- *the likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities;*
- *new, non-waste development makes sufficient provision for waste management and promotes good design to secure the integration of waste management facilities with the rest of the development…; and*
- *the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal'.*

The Waste Management Plan for England (2021) (Department for Environment, Food and Rural Affairs (Defra), 2021a)

21.2.19 The Waste Management Plan for England provides an overview of waste management in England and reiterates the requirement for all waste producers and waste management providers to implement the waste hierarchy. It also highlights the need for waste to be managed using the proximity principle and confirms England's commitment to recovering at least 70% by weight of non-hazardous construction and demolition waste by 2020 (excluding soils and stones). Recovery is assumed in the context of this policy to include reuse, recycling and incineration with energy recovery.

A Green Future: Our 25 Year Plan to Improve the Environment (2018) (Defra, 2018a)

21.2.20 A Green Future: Our 25 Year Plan to Improve the Environment (2018) '*sets out goals for improving the environment within a generation and leaving it in a better state than we found it'*. It details how the government will work with communities and businesses to do this. The following policies are of note:

- make sure that resources are used more efficiently and kept in use for longer to minimise waste and reduce its environmental impacts by promoting reuse, remanufacturing and recycling;
- work towards eliminating all avoidable waste by 2050 and all avoidable plastic waste by the end of 2042;
- reducing food supply chain emissions and waste;
- reducing litter and littering; and
- improving management of residual waste.

Our Waste, Our Resources: A Strategy for England (Resources and Waste Strategy for England) (2018) (Defra, 2018b)

21.2.21 The Strategy for England (2018) aims to help the government to meet the commitments outlined in the 25 Year Plan and '*sets out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. At the same time we will minimise the damage caused to our natural environment by reducing and managing waste safely and carefully, and by tackling waste crime'.*

21.2.22 The strategy combines actions to be taken now and commitments for the coming years. Key targets and milestones which could be relevant to the Proposed Development include:

- roll out of a deposit return scheme (subject to consultation) – 2023;
- legislation for mandatory separate food waste collections (subject to consultation) – 2023;
- 75% recycling rate for packaging (subject to consultation) – 2023;
- 65% recycling rate for municipal solid waste – 2035; and
- municipal waste to landfill 10% or less – 2035.

Local Planning Policy

21.2.23 The Proposed Development materials and waste assessment will take into consideration local policy that concerns the use of material and waste generation and management. Details of local planning policy relevant to the Proposed Development are presented below.

Tees Valley Joint Minerals and Waste Development Plan Documents (DPDs) Core Strategy DPD (Tees Valley, 2011a).

21.2.24 The Tees Valley Joint Minerals and Waste DPDs are prepared jointly by the boroughs of Darlington, Hartlepool, Middlesborough, Redcar and Cleveland and Stockton-on-Tees, bringing together the planning issues which arise from minerals and waste within the sub-region. The Minerals and Waste Core Strategy contains the long-term spatial vision and the strategic policies needed to achieve the key objectives for minerals and waste developments in the Tees Valley. Relevant policies include:

- Policy MWC11: Safeguarding of Port and Rail Facilities;
- Policy MWC4: Safeguarding of Minerals and Resources from Sterilisation; and
- Policy MWC8: General Locations for Waste Management Sites.

Tees Valley Joint Minerals and Waste DPDs: Policies and Sites DPD (Tees Valley, 2011b)

21.2.25 The Policies and Sites DPD, which conforms with the Core Strategy DPD, identifies specific sites for minerals and waste development and sets out policies which will be used to assess minerals and waste planning applications. Relevant policies include:

- Policy MWP5: Haverton Hill (Stockton-on-Tees);
- Policy MWP6: New Road, Billingham (Stockton-on-Tees);
- Policy MWP8: South Tees Eco-Park (Redcar and Cleveland); and
- Policy MWP10: Construction and Demolition Waste Recycling.

Other Relevant Policy, Standards and Guidance

21.2.26 Additional guidance documents relevant to the materials and waste assessment which have been considered include:

- Waste and Resources Action Programme (WRAP) Designing Out Waste: A Design Team Guide for Civil Engineering (WRAP, undated a); and
- WRAP Designing Out Waste: A Design Team Guide for Buildings (WRAP, undated b).

21.3 Assessment Methodology and Significance CriteriaFor this PEI Report, materials and waste comprise:

- the consumption of materials (key construction materials only); and
- the generation and management of waste during construction, operation and decommissioning.

21.3.2 Materials are defined in the IEMA Guidance (IEMA, 2020) as '*physical resources that are used across the lifecycle of a development. Examples include key construction materials such as concrete, aggregate, asphalt and steel'*.

21.3.3 Other material assets considered include built assets such as landfill void capacity and allocated/safeguarded mineral sites (e.g., quarries, wharves, rail depots concrete plants) and waste sites.

21.3.4 Waste is defined as per the Waste FD (2008/98/EC) (European Union (EU), 2008) as '*any substance or object which the holder discards or intends or is required to discard'*.

21.3.5 Impacts upon Mineral Safeguarding Areas (MSAs) are not assessed in the materials and waste assessment in accordance with the IEMA Guidance (IEMA, 2020). MSAs are included for context in the baseline since MSAs are a planning consideration and would be considered further in the Planning Statement submitted with the DCO Application.

21.3.6 This section outlines the methodology that will be employed for assessing the likely significant effects associated with materials and waste. The IEMA Guidance (IEMA, 2020) offers two methods for the assessment of waste. Method W1 '*void capacity*' has been selected as this is a more detailed methodology and is appropriate for larger and more complex projects.

21.3.7 Some of the operational hazardous wastes likely to be generated by the Proposed Development may not be suitable for landfill disposal e.g., liquid waste. Therefore, in addition to Method W1 – void capacity, hazardous operational waste will be compared to national hazardous waste management facility waste inputs.

Study Areas

21.3.8 The study areas for the assessment of impacts related to materials and waste have been defined in line with the IEMA Guidance. Two study areas are defined: a Proposed Development Study Area (within which waste associated with the Proposed Development is generated, construction materials are used and allocated/safeguarded mineral and waste sites and MSAs are present), and an Expansive Study Area (within which landfills and other waste facilities that manage waste generated by the Proposed Development are likely to be located and constructional materials are available). Together the Proposed Development Study Area and Expansive Study Area are referred to in this Chapter as '*the Study Areas*'.

Proposed Development Study Area

21.3.9 The Proposed Development Study Area for construction and operational waste generation, and for use of construction materials (key construction materials only), comprises the Proposed Development Site (i.e., the footprint of the proposed works, together with any temporary land requirements during construction). This includes temporary offices, compounds and storage areas.

21.3.10 The Proposed Development Study Area for impacts on allocated/safeguard mineral and waste sites and MSAs is also the Proposed Development Site. Impacts on allocated/safeguarded waste sites are not included in the IEMA Guidance, however, they are included in this chapter for completeness.

Expansive Study Area

21.3.11 The Expansive Study Area for non-hazardous and inert waste management comprises the Yorkshire and Humber and North East regions. Both regions are included since the Proposed Development Site is close to the border between them, and waste could be managed in either. The Expansive Study Area includes the following sub-regions as outlined in the Environment Agency's (EA) 2021 Waste Summary Tables for England - Version 3 (EA, 2023a):

- former Humberside, North Yorkshire, South Yorkshire, West Yorkshire; and
- County Durham, Northumberland, Tees Valley Unitary Authorities and Tyne & Wear.

21.3.12 The Expansive Study Area for hazardous waste management is England.

21.3.13 The Study Area for hazardous waste management is defined based on professional judgement and informed by consideration of the proximity principle. The proximity principle for hazardous waste in England is outlined in 'Principle 2 - Infrastructure Provision in the Strategy for Hazardous Waste Management in England', and states '*We look to the market for the development of hazardous waste infrastructure, which implements the hierarchy for the management of hazardous waste and meets the needs of the UK to ensure that the country as a whole is self sufficient in hazardous waste disposal, facilities are put in place for hazardous waste recovery in England, and the proximity principle is met'* (Defra, 2010). Planning for hazardous waste management is also undertaken at a national level.

21.3.14 The Expansive Study Areas for the availability of key construction materials (aggregates, asphalt, concrete and steel) are national (United Kingdom (UK) or Great Britain (GB), dependent upon baseline information availability) and Yorkshire and the Humber and the North East regions.

Impact Assessment Methodology

Scope of Assessment

21.3.15 The assessment of materials and waste considers the following:

- waste producers have a legal duty of care to manage their waste in accordance with regulations and to ensure that any waste leaving the site where it is generated is transferred to a suitably licensed facility for further treatment or disposal;
- facilities transferring, treating or disposing of waste must be either licensed or apply for an exemption from a license, and impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for these facilities themselves;
- as part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that sufficient land is available to accommodate facilities for the treatment of all waste arising in the area, either within the WPA area, or through export to suitable facilities in other areas; and
- Mineral Planning Authorities (MPAs) are similarly required to ensure an adequate supply of minerals, sufficient to meet the needs of national and regional supply policies, and local development needs.

21.3.16 The following matters are not considered in the assessment of materials and waste:

- Waste arising from extraction, processing and manufacture of construction components and products. This is based on the assumption that these products and materials are being developed in a manufacturing environment with their own waste management plans, facilities, and supply chain, which are potentially in different regions of the UK or the world and therefore outside of the geographical scope of this study. Such matters cannot be accurately predicted and assessed as they relate to procurement decisions that cannot be assured. Waste arising from extraction, processing and manufacture of construction

components and products are scoped out of the assessment as agreed by the Planning Inspectorate (the Inspectorate) as outlined in Table 21-10.

- Other environmental impacts associated with the management of waste from the Proposed Development (e.g., on water resources, air quality, noise or traffic resulting from the generation, handling, on-site temporary storage or off-site transport of materials and waste) are not included in this assessment, as they are addressed separately in other relevant chapters of this PEI Report. Other environmental impacts associated with the management of waste from the Proposed Development are scoped out of the assessment as agreed by the Inspectorate as outlined in Table 21 10.
- Direct impacts on MSAs. The Proposed Development Site lies within MSAs for salt and gypsum (anhydrite), however, impacts on MSAs are not assessed in the materials and waste assessment in accordance with IEMA Guidance (IEMA, 2020). MSAs are included for context in the baseline since MSAs are a planning consideration. The Proposed Development uses previously developed industrial land and where possible. The Connection Corridors including the pipeline routes have been selected to avoid environmentally sensitive areas and utilise existing, established pipeline routes. The Proposed Development is unlikely to sterilise or prejudice the future extraction of the mineral resource, because the anhydrite and salt resources occur at depth and can be extracted by alternative means (e.g., mining or brine solution). Part of the anhydrite has already been removed by mining by Imperial Chemical Industries (ICI) prior to the 1970s (Mindat, 2023). Gypsum (anhydrite) is scoped out of the assessment as agreed by the Inspectorate as outlined in Table 21-10.
- Effects associated with decommissioning of the Proposed Development. The Proposed Development has a long design life and as such it is not considered possible to reliably forecast decommissioning requirements and infrastructure far in the future. A Decommissioning Environmental Management Plan (DEMP) will be prepared which would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated. Effects associated with the decommissioning phase would be no worse than those experienced during the construction of the Proposed Development as agreed by the Inspectorate as outlined in Table 21-10.
- Effects on the availability of materials during the operation of the Proposed Development. Forecast material and waste effects are (using professional judgement) considered negligible in relation to the scale and nature of the Proposed Development as agreed by the Inspectorate as outlined in Table 21-10.

21.3.17 Table 21-1: provides the outline scope of the material and waste assessment.

Table 21-1: Outline Scope of the Material and Waste Assessment

PROPOSED DEVELOPMENT PHASE	POTENTIAL EFFECTS	SCOPE IN/ OUT
Construction	Changes in demand for materials	Scoped in
	Changes in available landfill void capacity	Scoped in
	Changes to allocated/safeguarded mineral site	Scoped in
	Changes to allocated/safeguarded waste site	Scoped in
Operation	Changes in availability of materials	Scoped out
	Changes in available landfill void capacity	Scoped in
	Changes in available hazardous waste management facility capacity	Scoped in
Decommissioning	Changes in demand for materials	Scoped out
	Changes in available landfill capacity	Scoped out
	Changes to allocated/safeguarded mineral site	Scoped out
	Changes to allocated/safeguarded waste site	Scoped out

Sensitive Receptors

21.3.18 The sensitive receptors for the assessment of the construction phase material and waste impacts are:

- Landfill void capacity in the Expansive Study Area of Yorkshire and the Humber and North East (non-hazardous and inert landfill void capacity), and England (hazardous landfill void capacity) – as defined in the IEMA Guidance (IEMA, 2020) '*landfill is a finite resource, and hence – through the ongoing disposal of waste – there is a continued need to expand existing and develop new facilities, This requires the depletion of natural and other resources which, in turn, adversely impacts the environment'*; and
- Materials, national and regional availability of key construction materials – as outlined in the IEMA Guidance (IEMA, 2020) '*materials are, in their own right, sensitive receptors. Consuming materials impacts upon their immediate and (in the case of primary material) long-term availability; this results in the depletion of natural resources and adversely impacts the environment'.*

21.3.19 The sensitive receptors for the assessment of operational phase material and waste impacts are:

- Landfill void capacity in the Expansive Study Area of Yorkshire and the Humber and the North East (non-hazardous and inert landfill void capacity), and England (hazardous landfill void capacity).

21.3.20 The IEMA Guidance (IEMA, 2020) '*does not consider waste processing and recovery facilities as sensitive receptors, rather: they are part of a system that has the potential to reduce the magnitude of adverse impacts associated with waste generation and disposal. Waste processing and recovery facilities are, hence, different to landfills, in that the latter are finite resources'.* However, since some of the operational hazardous wastes likely to be generated by the Proposed Development may not be suitable for landfill disposal (e.g. liquid waste), hazardous operational waste is compared to national hazardous waste management facility capacity in this assessment.

Baseline Conditions

21.3.21 A baseline has been developed in accordance with IEMA Guidance (IEMA, 2020) and consists of:

- national (UK or GB) and regional (consumption/sales) data for key construction materials (steel, aggregates, asphalt and concrete);
- MSAs and allocated/safeguarded mineral and waste sites;
- landfill void capacity in Yorkshire and the Humber and the North East (non-hazardous and inert landfill void capacity), and England (hazardous landfill void capacity); and
- waste received at relevant hazardous waste management facilities nationally.

Methodology for Determining Construction Effects

21.3.22 Materials will be used during the construction of the Proposed Development - the key construction materials expected to be used are steel, aggregates, asphalt and concrete.

21.3.23 Waste will be generated during construction of the Proposed Development. A large proportion of this waste will be recycled, with the remainder disposed off-site by a licensed waste contractor.

Materials

21.3.24 Effects upon materials during construction of the Proposed Development will be assessed by:

- establishing the baseline for national consumption of key construction materials by weight;
- assessing the sensitivity of materials as related to the availability and types of materials to be consumed by the Proposed Development in construction;
- establishing the quantities of key construction materials required for the construction of the Proposed Development; and
- comparing the total quantities of key construction materials with the most recent national demand (utilising a percentage approach).

Waste

21.3.25 Effects upon waste during construction of the Proposed Development will be assessed by:

- establishing the baseline landfill void capacity in the Expansive Study Areas;
- assessing the sensitivity of landfill void capacity;
- establishing the quantities of construction, demolition and excavation waste to be generated during the construction of the Proposed Development;
- comparing the total waste arising from the construction of the Proposed Development against the landfill void capacity (using a percentage approach) assuming a worst case that waste goes to landfill.

Methodology for Determining Operational Effects

21.3.26 As described in Chapter 4: The Proposed Development (PEI Report, Volume I), operational waste will predominantly comprise of process waste, which will be managed in accordance with the relevant environmental regulations using licensed waste contractors. The estimated volumes and waste management methods for these operational wastes are considered in this assessment.

21.3.27 Effects upon waste during operation of the Proposed Development will be assessed by:

- establishing the baseline landfill void capacity in the Expansive Study Areas;
- assessing the sensitivity of landfill void capacity;
- establishing the quantities of operational waste to be generated during the operation of the Proposed Development;
- comparing the total waste arising from the operation of the Proposed Development against the landfill void capacity (using a percentage approach); and
- comparing operational hazardous waste arising from the operation of the Proposed Development against national hazardous waste management facility waste inputs (using a percentage approach).

Significance Criteria

Sensitivity

Materials

21.3.28 The sensitivity of materials relates to the availability and type of construction material to be consumed by the Proposed Development. The IEMA Guidance (IEMA, 2020) criteria described within Table 21-2: is used to determine the sensitivity of materials.

Table 21-2: Materials Receptor Sensitivity

EFFECTS	CRITERIA FOR MATERIALS RECEPTOR SENSITIVITY
Negligible	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock. *And/or* are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials.*
Low	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock. *And/or* are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.
Medium	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock. *And/or* are available comprising some sustainable features and benefits compared to industry-standard materials.
High	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock. *And/or* comprise little or no sustainable features and benefits compared to industry-standard materials.
Very High	On balance, the key materials required for the construction of the Proposed Development are forecast are known to be insufficient in terms of production, supply and/or stock. *And/or* comprise no sustainable features and benefits compared to industry-standard materials.
** Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that: comprise reused, secondary or recycled content (including excavated and other arisings); support the drive to a circular economy; or in some other way reduce lifetime environmental impacts.*	

Waste

21.3.29 The sensitivity of waste relates to availability of landfill capacity in the absence of the Proposed Development as outlined in the IEMA Guidance (IEMA, 2020) *"landfill capacity is recognised as an unsustainable and increasingly scarce option for managing waste"*. The sensitivity of landfill capacity is assessed based on a review of historic landfill void capacity trends where available and information from relevant policy documents.

21.3.30 The criteria described within Tables 21-3 and 21-4 will be used to determine the sensitivity of landfill capacity.

Table 21-3: Inert and Non-hazardous Landfill Capacity Sensitivity

EFFECTS	CRITERIA FOR INERT AND NON-HAZARDOUS LANDFILL CAPACITY SENSITIVITY
Negligible	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Proposed Development) of regional inert and non-hazardous landfill capacity expected to remain unchanged, or is expected to increase through a committed change in capacity.
Low	Across construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to reduce minimally by <1% as a result of wastes forecast.
Medium	Across construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to reduce noticeably by 1-5% as a result of wastes forecast.
High	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to reduce considerably by 6-10% as a result of wastes forecast.
Very High	Across construction and/or operation phases, the baseline/future baseline (i.e. without the Proposed Development) of regional inert and non-hazardous landfill capacity is: • expected to reduce very considerably (by >10%); • end during construction or operation; • is already known to be unavailable; or • would require new capacity or infrastructure to be put in place to meet forecast demand.

Table 21-4: Hazardous Landfill Capacity Sensitivity

EFFECTS	CRITERIA FOR HAZARDOUS LANDFILL CAPACITY SENSITIVITY
Negligible	Across the construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to remain unchanged or is expected to increase through a committed change in capacity.
Low	Across the construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to reduce minimally by <0.1% as a result of wastes forecast.
Medium	Across the construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to reduce noticeably by 0.1-0.5% as a result of wastes forecast.
High	Across the construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to reduce considerably by 0.5-1% as a result of wastes forecast.
Very High	Across the construction and/or operation phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is: • expected to reduce very considerably (by >1%); • end during construction or operation: • is already known to be unavailable; or, • would require new capacity or infrastructure to be put in place to meet forecast demand.

Magnitude of Impact

21.3.31 The magnitude of impact describes the degree of variation from the baseline conditions as a result of the Proposed Development. The IEMA guidance (IEMA, 2020) for assessing the magnitude of impact from materials comprises a percentage-based approach that determines the influence of construction materials use on the baseline national demand from the construction of the Proposed Development. The criteria used to assess the magnitude of impact for materials are provided in Table 21-5.

Table 21-5: Materials Magnitude of Impacts

	CRITERIA FOR MATERIALS MAGNITUDE OF IMPACTS
No change	Consumption of no materials is required.
Negligible	Consumption of no individual material type is equal to or greater than 1% by volume of the national* baseline availability.
Minor	Consumption of one or more materials is between 1-5% by volume of the national* baseline availability; and The development has the potential to adversely and substantially** impact access to one or more allocated mineral site (in their entirety), placing their future use at risk.
Moderate	Consumption of one or more materials is between 6-10% by volume of the national* baseline availability; and One allocated mineral site is substantially** sterilised by the development rendering it inaccessible for future use.
Major	Consumption of one or more materials is >10% by volume of the national* baseline availability; and More than one allocated mineral site is substantially** sterilised by the development rendering it inaccessible for future use.
*a national baseline is used in the absence of regional construction material consumption data. **justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed.	

21.3.32 The IEMA Guidance (IEMA, 2020) methodology for assessing the magnitude of impact for waste comprises a percentage-based approach that determines the influence of waste generation from the construction of the Proposed Development on the baseline landfill capacity. The criteria used to assess the magnitude of impact for resources and waste are provided within Table 21-6 and Table 21-7.

Table 21-6: Inert and Non-hazardous Waste - Magnitude of Impact

	CRITERIA FOR WASTE MAGNITUDE OF IMPACTS
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by <1%.
Minor	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by 1-5%.
Moderate	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by 6-10%.

	CRITERIA FOR WASTE MAGNITUDE OF IMPACTS
Major	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by >10%.
# forecast as the worst-case scenario, during a defined construction and/or operational phase.	

Table 21-7: Hazardous Waste - Magnitude of Impact

	CRITERIA FOR WASTE MAGNITUDE OF IMPACTS
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by <0.1%.
Minor	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by <0.1-0.5%.
Moderate	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by <0.5-1%.
Major	Waste generated by the development will reduce Expansive Study Area landfill capacity baseline# by >1%.
# forecast as the worst-case scenario, during a defined construction and/or operational phase.	

Significance of Effect

21.3.33 Table 21-8 describes the effect thresholds used in determining the significance of potential effects, whilst Table 21-9 indicates which effects are deemed to be significant. Materials and waste have specific IEMA Guidance (IEMA, 2020) and does not use the thresholds outlined in Chapter 2: Assessment Methodology (PEI Report, Volume I).

Table 21-8: Effect Thresholds

		MAGNITUDE OF IMPACT				
		NO CHANGE	NEGLIGIBLE	MINOR	MODERATE	MAJOR
SENSITIVITY	VERY HIGH	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	HIGH	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large

		MAGNITUDE OF IMPACT				
		NO CHANGE	NEGLIGIBLE	MINOR	MODERATE	MAJOR
	MEDIUM	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	LOW	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	NEGLIGIBLE	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 21-9: Significance of Effect

EFFECT	MATERIALS	WASTE
Neutral	Not Significant	Not Significant
Slight		
Moderate	Significant	Significant
Large		
Very large		

Sources of Information/Data

21.3.34 The following sources of information have been reviewed and have informed the materials and waste assessment:

- Tees Valley Joint Minerals and Waste DPD[1]: Core Strategy and Polices and Sites (Tees Valley, 2011a and Tees Valley, 2011b);
- EA's 2021 Waste Summary Tables for England - Version 3 (EA, 2023a) including remaining land capacity;
- EA's 2021 Waste Data Interrogator (EA, 2023b);
- EA's Permitted Waste Sites - Authorised Landfill Site Boundaries (EA, 2022a);
- EA's Historic Landfill Sites (EA, 2022b);
- EA's Environmental Permitting Regulations - Waste Sites (EA, 2022c);
- Make UK's A New Deal for Steel: Laying the Foundations for a Vibrant UK steel industry, 2018 data (Make UK, 2019);
- MPA's Minerals and mineral products sales in Great Britain, 2018 data (MPA, 2020); and

[1] Covers Redcar, Stockton-on-Tees and Hartlepool local authority areas together with Darlington and Middlesborough.

- Relevant legislation and national policy.

Consultation

21.3.35 An EIA Scoping Opinion was requested from the Inspectorate in April 2023. A response was received on 17th May 2023. A high-level summary of responses to the Scoping Opinion relevant to material and waste is provided in Table 21-10.

Table 21-10: Responses to Scoping Comments

CONSULTEE	DATE AND METHOD OF CONSULTATION	SUMMARY OF CONSULTEE COMMENTS	SUMMARY OF RESPONSE/ HOW COMMENTS HAVE BEEN ADDRESSED
The Inspectorate	17th May 2023 Scoping Opinion	The following can be scoped out of the materials and waste assessment: • Waste arising from extraction, processing and manufacture of construction components and products. • Environmental impacts associated with the management of waste (adequate cross referencing is to be made to where it is addressed elsewhere in the ES). • Effects associated with decommissioning (providing the commitment to producing a Decommissioning Environmental Management Plan (DEMP) is secured within the dDCO. • Operation – changes in availability of materials • Effects on MSAs (gypsum (anhydrite))	Noted
The Inspectorate	17th May 2023 Scoping Opinion	Effects on MSAs (salt) should be assessed. Potential impacts on sterilisation of salt resource should be assessed within the Socio-economics and Land-use ES	The Proposed Development is unlikely to sterilise or prejudice the future extraction of the mineral resource, because the anhydrite and salt resources occur at depth

CONSULTEE	DATE AND METHOD OF CONSULTATION	SUMMARY OF CONSULTEE COMMENTS	SUMMARY OF RESPONSE/ HOW COMMENTS HAVE BEEN ADDRESSED
		Chapter or further information should be presented to demonstrate that significant effects are not likely to occur.	and can be extracted by alternative means (e.g., mining or brine solution). Existing salt caverns (from previous mining) will be subject to a separate application (by others) for use for hydrogen storage.
Environment Agency	17th May 2023 Scoping Opinion	Reuse of the made ground on this development is unlikely to be suitable for use under the CL:AIRE Definition of Waste Code of Practice (DoW CoP).	Noted.

Use of the Rochdale Envelope

21.3.36 In order to ensure a robust assessment of the likely significant environmental effects of the Proposed Development Site, the EIA is being undertaken adopting the principles of the 'Rochdale Envelope' approach where appropriate in line with the Inspectorate's Advice Note 9: Rochdale Envelope (The Planning Inspectorate, 2018). This involves assessing the maximum (or where relevant, minimum)/worst case parameters for the elements of the Proposed Development where flexibility needs to be retained (building dimensions or operational modes for example).

21.4 Baseline Conditions

Existing Baseline

Regional and National Availability of Key Construction Materials

21.4.1 UK and GB data has been used to establish a quantitative national baseline of the consumption of key constructional materials.

21.4.2 Table 21-11 summarises national consumption and sales (providing an indication of availability) in 2018 for steel, aggregates, asphalt and concrete (the most recent years for which data is available), which are the key construction materials expected to be used during Proposed Development construction.

21.4.3 Regional data is presented in Table 21-12. Construction material sales by region are provided for the regions surrounding the Proposed Development. It is assumed that the majority of key construction materials (aggregates, asphalt and concrete) will be sourced locally (e.g., within the region), taking into account the proximity principle. Other materials may be sourced from the rest of the UK or imported into the UK.

Table 21-11: National Consumption and Sales for Key Construction Materials

MATERIAL	NATIONAL CONSUMPTION (MILLION TONNES, YEAR)	BASELINE DATA YEAR	DATA DESCRIPTION
Steel	17	2018	UK total consumption (Make UK, 2019)
Aggregates of which:	251	2018	Minerals and mineral products sales in Great Britain (MPA, 2020)
• Crushed rock	117.3		
• Sand and gravel - land won	48.9		
• Sand and gravel - marine	13.7		

MATERIAL	NATIONAL CONSUMPTION (MILLION TONNES, YEAR)	BASELINE DATA YEAR	DATA DESCRIPTION
• Recycled and secondary	71		
Asphalt	25.4		
Concrete of which:	86.2		
• Ready-mixed concrete	54.2		
• Concrete products	32		

Table 21-12: Construction Material Sales by Region (MPA, 2020)

CONSTRUCTION MATERIAL	YORKSHIRE AND THE HUMBER	NORTH EAST	TOTAL
Crushed rock (million tonnes)	11.5	5.3	16.8
Sand and gravel (million tonnes)	2.3	2.0	4.3
Ready-mixed concrete (million m^3)	1.2	0.6	1.8
Asphalt (million tonnes)	2.1	0.8	2.9

21.4.4 Potential recycled contents for the main construction materials are outlined in Table 21-13. These *'good practice'* rates are derived from WRAP's Designing Out Waste Tool for Civil Engineering (WRAP, undated c).

Table 21-13: Potential Recycled Content (Percentage by Weight)

MATERIAL TYPE	POTENTIAL RECYCLED CONTENT (% BY WEIGHT)
Concrete	16
Asphalt	25
Aggregates	50
Steel reinforcement	100
Structural steel	60

Mineral Safeguarding Areas, Allocated/Safeguarded Mineral and Waste Sites

21.4.5 The Proposed Development Site lies within MSAs for:

- marine dredged sand and gravel at Tees Dock;

- gypsum (anhydrite) across the whole of the Tees Valley Plan area (Tees Valley, 2011a); and
- salt, across the whole of the Redcar and Cleveland Local Plan area (Redcar and Cleveland Borough Council, 2018).

21.4.6 MSAs are scoped out of the assessment.

21.4.7 As outlined in Figure 21- Historic and Authorised Landfills and Waste and Mineral Sites (PEI Report, Volume II), the Proposed Development Site lies within:

- a safeguarded wharf at Tees Dock (Redcar and Cleveland) and a safeguarded wharf at Billingham Reach Industrial Estate (Stockton-on-Tees) (Tees Valley, 2011a);
- a General Location for Large Waste Management Facilities, covering industrial areas to the north and south of the River Tees (Tees Valley, 2011a); and
- safeguarded waste sites at Haverton Hill (Stockton-on-Tees, construction and demolition waste recycling) and South Tees Eco-Park (Redcar and Cleveland).

21.4.8 The Proposed Development Site is also adjacent to New Road, Billingham (Stockton-on-Tees, construction and demolition waste recycling) (Tees Valley, 2011b).

Landfill Capacity

21.4.9 The EA's Waste Management Information includes information about waste sent to landfills and remaining landfill capacity. Remaining landfill capacities at the end of 2021 as outlined on the EA's 2021 Waste Summary Tables for England – Version 3 (EA, 2023a) for the non-hazardous and inert waste Expansive Study Area (Yorkshire and the Humber and the North East) and the hazardous waste Expansive Study Area (England) are shown in Table 21-14.

21.4.10 Merchant landfills are operated for commercial purposes accepting waste from construction projects and operating businesses. Merchant landfills are therefore considered to form the baseline. In contrast, restricted landfills are sites that deal with their own produced waste (i.e., not operating for commercial purposes). Therefore, additional capacity is excluded from the baseline. Some non-hazardous landfills have a Stable Non-Reactive Hazardous Waste (SNHRW) Cell (e.g., for asbestos). SNHRW cells usually form only a small fraction of the overall capacity. Therefore, for assessment purposes non-hazardous landfills with SNRHW cells are considered in the same way as non-hazardous landfills.

Table 21-14: Landfill Capacity (end of 2021) in Yorkshire and the Humber, the North East and England

LANDFILL TYPE	SUB-REGION			
	YORKSHIRE AND THE HUMBER	NORTH EAST	TOTAL IN YORKSHIRE AND THE HUMBER AND THE NORTH EAST	ENGLAND
	LANDFILL CAPACITY ('000s m^3)			
Hazardous merchant	700	4,486	5,186	12,107
Non-hazardous with SNRHW cell	1,243	1,486	2,729	52,006
Non-hazardous	45,196	7,959	53,155	162,369
Inert	25,283	8,171	33,454	129,078

21.4.11 The EA has published landfill capacity data each year since 2005. The historic capacity trend for 2005-2021 for inert and non-hazardous waste in the Yorkshire and Humber and North East regions, and for hazardous waste in England, are presented in Plate 21-1, Plate 21-2 and Plate 21-3.

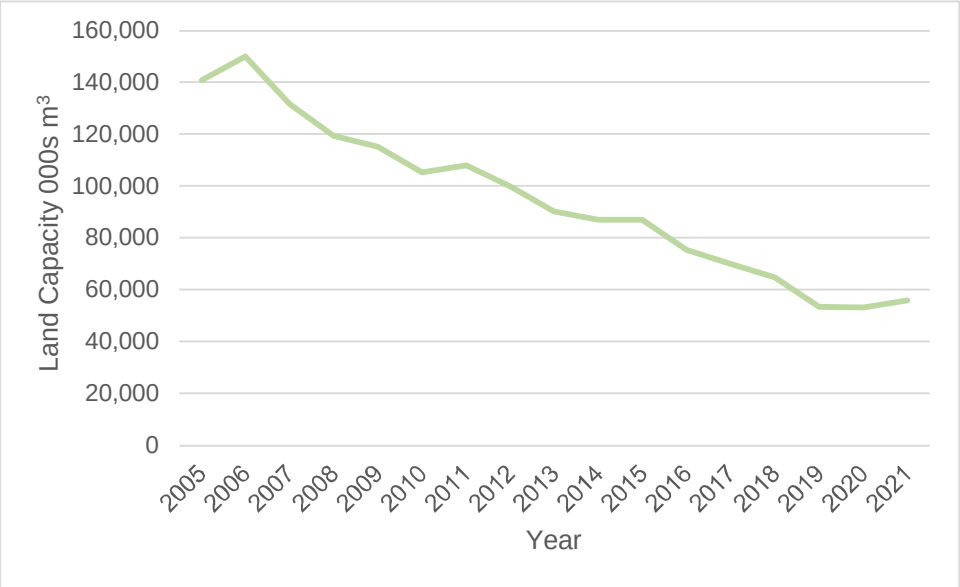

Plate 21-1: Historic Landfill Capacity Trend (2005-2021) for Non-hazardous Waste in the Yorkshire and Humber and North East Regions ('000s m^3)

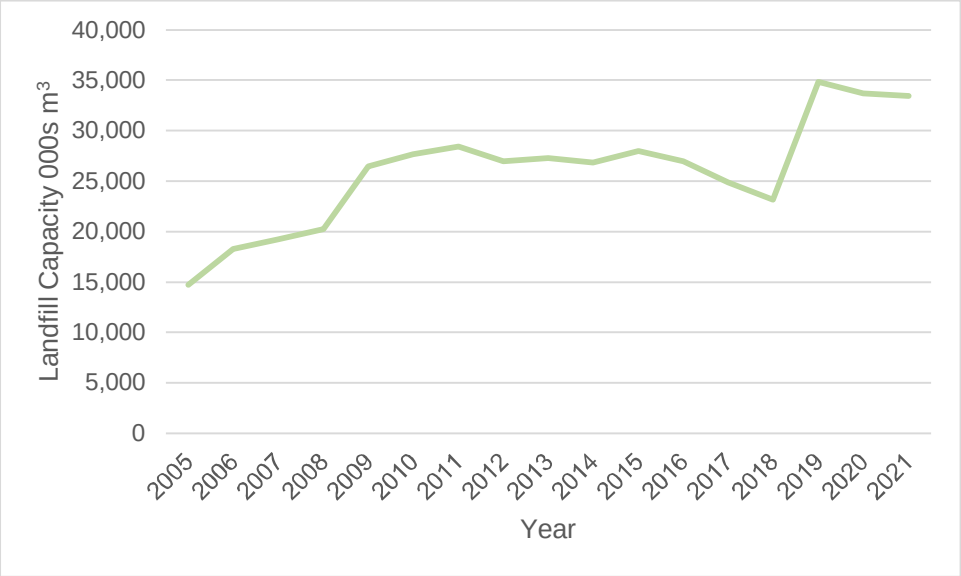

Plate 21-2: Historic landfill Capacity Trend 2005-2021 for Inert Waste in Yorkshire and the Humber and North East ('000s m^3)

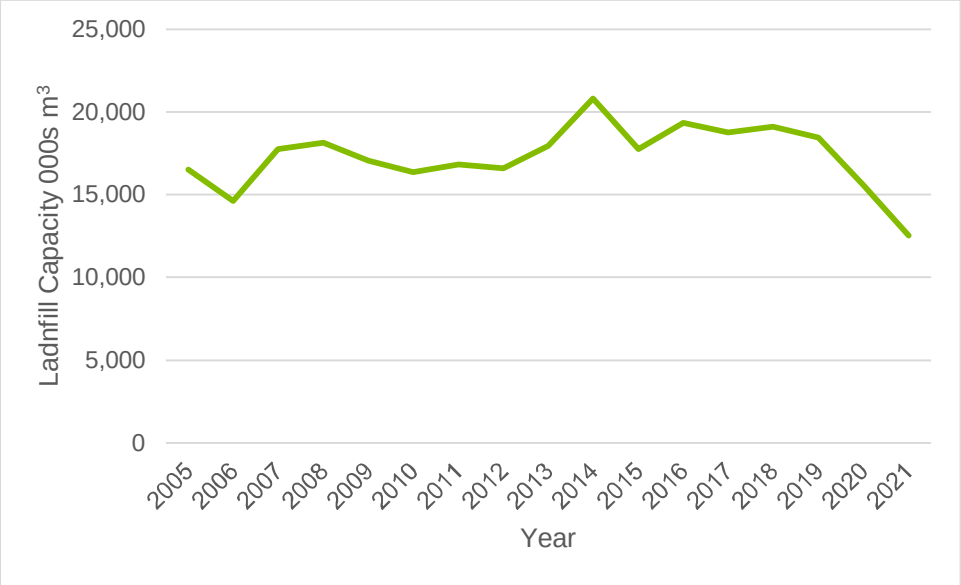

Plate 21-3: Historic Landfill Capacity Trend 2005-2021 for Hazardous Waste in England ('000s m^3)

Waste Management Infrastructure

21.4.12 There are a number of permitted waste sites and waste applications within the Proposed Development Site as shown in Figure 21-1: Historic and Authorised Landfills and Waste and Mineral Sites (PEI Report, Volume II) (licence numbers provided). These sites are listed in the EA's Environmental Permitting Regulations - Waste Sites dataset (EA, 2022c).

21.4.13 Capacity data for other types of waste infrastructure is publicly available (e.g., Environmental Permitting Regulations - Waste Sites (EA, 2022c). However, the permitted capacity is not necessarily representative of the actual operational

capacity of the infrastructure. Therefore, inputs data are collated from the EA's Waste Data Interrogator for 2021 – Waste Received (Excel) – Version 2 (EA, 2022b) and presented in Table 21-15 for the Yorkshire and Humber and North East regions. Inputs are not totalled since the double counting of waste moving between the site types listed in the Waste Data Interrogator cannot be discounted.

Table 21-15: Summary of Waste Inputs by Facility, for the Yorkshire and Humber and North East Regions

FACILITY TYPE	YORKSHIRE AND THE HUMBER (TONNES RECEIVED)	NORTH EAST (TONNES RECEIVED)
Landfill	4,501,192	2,917,864
Metal Recycling Site (MRS)	1,817,180	961,482
On/in land	1,397,745	575,817
Transfer	5,394,163	2,753,718
Treatment	14,703,527	3,582,850
Combustion	71,810	-
Incineration	2,908,832	1,307,642
Mobile plant	-	-
Mining	752	-
Storage	315,692	157,719
Processing	534,065	125,167

National Hazardous Waste Management Facilities

21.4.14 Since some of the operational hazardous wastes likely to be generated by the Proposed Development will not be suitable for landfill disposal (e.g., liquid waste), hazardous operational waste is compared to national hazardous waste management facility capacity in this assessment.

21.4.15 Liquid hazardous waste from the Proposed Development operation may be managed by high-temperature incineration or by physical-chemical treatment.

21.4.16 Due to the specialised nature of hazardous waste management, hazardous waste facilities typically receive wastes from a wide region, and therefore this assessment considers the national capacity for managing hazardous wastes.

21.4.17 The EA's 2021 Waste Summary Tables for England – Version 3 (EA, 2022a) reported that the remaining merchant (non-restricted) hazardous landfill capacity in England was 12.1 million m^3 in 2021.

21.4.18 There are a number of high-temperature hazardous waste incinerators in England (excluding facilities which manage only clinical waste and received less than 500 tonnes), as well as cement kilns which are permitted to accept hazardous waste.

These facilities as reported in the EA's Waste Data Interrogator for 2021 (EA, 2022b), and are shown in Table 21-16.

Table 21-16: Hazardous Waste Incineration Facilities and Cement Kilns Accepting Hazardous Waste

FACILITY	LOCATION	2021 WASTE RECEIVED (TONNES OF HAZARDOUS WASTE)
Hazardous Waste Incinerators		
Avonmouth Treatment Centre	Bristol	6,318
East Kent Waste Recovery Facility	Kent	4,615
Ellesmere Port Incinerator	Cheshire	56,488
Fawley HT Incinerator	Hampshire	30,287
Kirk Sandall Thermal Treatment Plant	Doncaster	5,304
Fine Environmental Services – Seal Sands	Tees Valley	19,018
Twinwoods Co-incinerator	Bedford	3,583
Cement Kilns accepting Hazardous Waste		
Cauldon Cement Plant	Staffordshire	117,323
Ketton Works	Rutland	26,195
Tunstead Cement and Lime Works	Derbyshire	14,881
Rugby Cement Plant	Rugby	19,480
Ribblesdale Cement Works	Ribble Valley	23,968
Whitwell Quarry Lime Works	Derbyshire	31,730
Total	359,190	

21.4.19 The EA's Waste Data Interrogator for 2021 (EA, 2022b) shows that the following quantities of liquid hazardous waste were treated by permitted facilities in England (excluding waste in EWC Code Chapter 13 'Oil Wastes and Wastes of Liquid Fuels') – refer to Table 21-17. Inputs are totalled, however, double counting of waste in the Waste Data Interrogator cannot be discounted.

Table 21-17: Hazardous Liquid Waste Treatment Facilities in England

FACILITY PERMIT TYPE	2021 WASTE RECEIVED (TONNES)
T05: Physico-chemical treatment installation	290,279
T06: Chemical treatment installation	143,314
T10: Haz waste treatment installation	178,591
T11: Haz waste transfer/treatment installation	32,651
Total	644,835

Historic and Authorised Landfills

21.4.20 The EA's Permitted Waste Sites - Authorised Landfill Site Boundaries spatial data (EA, 2022a) identifies authorised landfills within the Proposed Development Site as shown in Figure 21-1: Historic and Authorised Landfills and Waste and Mineral Sites (PEI Report, Volume II):

- Cowpen Bewley Landfill Site;
- Bran Sands Landfill;
- Warrenby Landfill; and
- Wilton, Perimeter Mounds.

21.4.21 Historic landfills are potentially relevant to this assessment since excavations in historic landfill can give rise to waste that require appropriate management. The EA's Historic Landfill Sites spatial data (EA, 2022b) identifies a number of historic landfill sites both within the Proposed Development Site, as detailed in Table 21-18: and shown in Figure 21-1: Historic and Authorised Landfills and Waste and Mineral Sites (PEI Report, Volume II).

Table 21-18: Historic Landfill Sites within the Proposed Development Site

HOLDER REFERENCE	SITE REFERENCE	SITE NAME	SITE ADDRESS	LICENCE HOLDER	FIRST INPUT	LAST INPUT	TYPES OF WASTE
EAHLD05492	0700/R20, CLE/R20	To the West of the Wolviston to Seal Sands Link Road	Saltholme Mounting, Billingham, Cleveland	Cleveland County Council	1981/11/03	1982/12/31	Inert, Industrial
EAHLD05490	CLE/R4/1, 0700/R4, CLE/170/1	South of the Seal Sands Road	Adjacent to the Monsanto site	Cleveland County Council	1973/12/31	1978/12/31	Inert, Industrial, Commercial
EAHLD05489	0700/CLE/019	Seal Sands	Agricultural Division, Billingham, Stockton-on-Tees	ICI Limited	-	-	Commercial
EAHLD05488	0700/CLE/032	Seal Sands	North Bank, Middlesborough, Cleveland	Tees and Hartlepool Port Authority	1978/02/01	1989/10/30	Inert, Industrial
EAHLD05497	0700/CLE/061	Seabanks Lagoon Site No.4	Seal Sands, North Bank, Middlesborough, Cleveland	ICI Limited	1978/03/06	1979/01/19	Inert, Industrial
EAHLD36066	-	B S Redcar Works	Steel House, Redcar, Cleveland	Corus Construction & Industrial (British Steel Plc)	-	-	Industrial
EAHLD05592	0700/CLE/255	West Coatham Lane	Dormanstown, Redcar, Cleveland	Chief Economic and Development Officer	1993/01/25	1993/02/01	Inert

HOLDER REFERENCE	SITE REFERENCE	SITE NAME	SITE ADDRESS	LICENCE HOLDER	FIRST INPUT	LAST INPUT	TYPES OF WASTE
EAHLD05591	0700/CLE/051	Redcar Trunk Road Landscaping	Redcar, Cleveland	British Steel Corporation	1977/09/14	1979/08/10	Inert and Industrial
EAHLD05578	0700/CLE/029/3	Teesport Eston Tip	Redcar, Cleveland	Tees and Hartlepool Port Authority	1977/12/31	1993/09/17	Inert, Industrial, Commercial and Household
EAHLD05579	0700/CLE/102	Bells Containers	Sludge Farm Teesport Refinery, Redcar, Cleveland	Shell (UK) Limited	-	1987/09/01	Liquid Sludge
EAHLD05589	0700/CLE/028/2	Bells Containers	Redcar, Cleveland	Tees and Hartlepool Port Authority	1977/07/29	1989/09/30	Inert, Industrial
EAHLD05586	0700/CLE/ST14	Mushroom Grove Allotments	Grangetown	Borough Engineer, Langbaurgh Borough Council	1984/04/14	1985/04/22	Inert, Commercial
EAHLD05662	0700/CLE/047	Perimeter Mounds / Perimeter of Wilton Works	Wilton, Middlesbrough	Imperial Chemicals and Polymers Limited	N/A	N/A	-
EAHLD05682	IPC 68, 0700/CLE/068, BRI002	Blast Furnace Plant	Redcar Complex, Cleveland	British Steel Corporation	N/A	N/A	Industrial

21.4.22 Further information regarding historic landfill sites within the Proposed Development Site is presented in Chapter 10: Geology, Hydrogeology and Land Contamination (PEI Report, Volume I).

Waste Targets

21.4.23 The national target for recovery of Construction and Demolition (C&D) waste is 70% by weight, as set out in the Waste FD (EU, 2008) and the Waste Management Plan for England (Defra, 2021a). The target specifically excludes naturally occurring materials with EWC Code 17 05 04 (17 05 04 soil and stones other than those mentioned in 17 05 03* (soils and stone containing dangerous substances)). Recovery is deemed to include reuse, recycling, and other recovery (e.g., energy recovery).

21.4.24 A good practice landfill diversion target of 90% has been achieved and exceeded by major UK developments as outlined in the IEMA Guidance (IEMA, 2020). In 2018, the UK generated 67.8 million tonnes of non-hazardous C&D waste, of which 62.6 million tonnes was recovered. This represents a recovery rate of 92.3% (Defra, 2021b).

21.4.25 Standard, good and best practice recovery rates by material are provided by WRAP (WRAP, 2007). Recovery rates for key construction materials and other construction wastes relevant to the Proposed Development are provided in Table 21-19.

Table 21-19: Standard, Good and Best Practice Recovery Rates by Material

MATERIAL	STANDARD PRACTICE RECOVERY (%)	GOOD PRACTICE RECOVERY (%)	BEST PRACTICE RECOVERY (%)
Metals	95	100	100
Packaging	60	85	95
Concrete	75	95	100
Inert	75	95	100
Plastics	60	80	95
Miscellaneous	12	50	75
Electrical equipment	Limited information	70	95
Cement	Limited information	75	95
Liquids and oils	100	100	100
Hazardous	50	Limited information, cannot be 100% since some hazardous waste (e.g. asbestos) must be landfilled.	

Future Baseline

21.4.26 There is no publicly available information on any potential changes to national or regional material availability by the time of the construction of the Proposed Development. Construction material demand such as ready mixed concrete is closely aligned to both the quantity of construction taking place and the general economy. It is deemed inappropriate to forecast future demand as the demand is unlikely to be linear and it is not possible to set a future baseline for material resources. As such, future consumption is assumed to remain the same as the current baseline as outlined in Table 21-11 and Table 21-12.

21.4.27 There is no publicly available information regarding any potential changes to landfill capacity by the time of Proposed Development construction.

21.4.28 Due to the cyclic nature of inert and hazardous landfill capacity (e.g., landfill capacity decreasing, and then new sites or landfill cells being opened with landfill capacity increasing), it is not realistic to forecast future landfill capacity. Therefore, inert and hazardous landfill capacity is assumed to remain the same as the current baseline as outlined in Table 21-14.

21.4.29 For non-hazardous waste, using the current rate of decline of landfill capacity and forecasting into the future would lead to the inevitable conclusion that there would be no void space remaining. However, this is not a credible scenario as if there is still a need for landfill, then the WPA will need to consent new landfill capacity to replace that which has been used up. Therefore, non-hazardous landfill capacity is assumed to remain the same as the current baseline as outlined in Table 21-14.

Receptor Sensitivity

Material Receptor Sensitivity

21.4.30 Material receptor sensitivity is determined as '*low*'. On balance, the key construction materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock. Key materials required for construction and operation are likely to be available comprising a high proportion of sustainable features and benefits (e.g., recycled content).

21.4.31 Potential recycled content for the main construction materials is outlined in Table 21-13.

Waste Receptor Sensitivity

21.4.32 Waste receptor sensitivity is determined as '*very high*'. Since there is no publicly available information on any potential changes to landfill capacity by the time of the construction and operation of the Proposed Development, a worst-case scenario is considered (e.g., a very considerable reduction in capacity cannot be excluded).

21.5 Proposed Development Design and Impact Avoidance

21.5.1 The EIA process aims to avoid, prevent, reduce or offset potential environmental effects through design and/or management measures. These are measures that are

inherent in the design and construction of the Proposed Development (also known as '*embedded measures*'). Some embedded measures are required as a result of legislative requirements and/or standard sectoral practices. Some of these embedded mitigation measures as applicable to the material and waste assessment are described below.

21.5.2 Embedded measures are taken into account prior to the assessment of effects to avoid considering assessment scenarios that are unrealistic (i.e., effects do not take account of measures even though they are likely to be standard practice and/or form part of the design of the Proposed Development). These have then been followed through the assessment to ensure that realistic likely environmental effects are identified.

Construction

21.5.3 The Proposed Development will aim to prioritise waste prevention, followed by preparing for re-use, recycling and recovery and lastly disposal to landfill as per the waste hierarchy as illustrated in Plate 21-4.

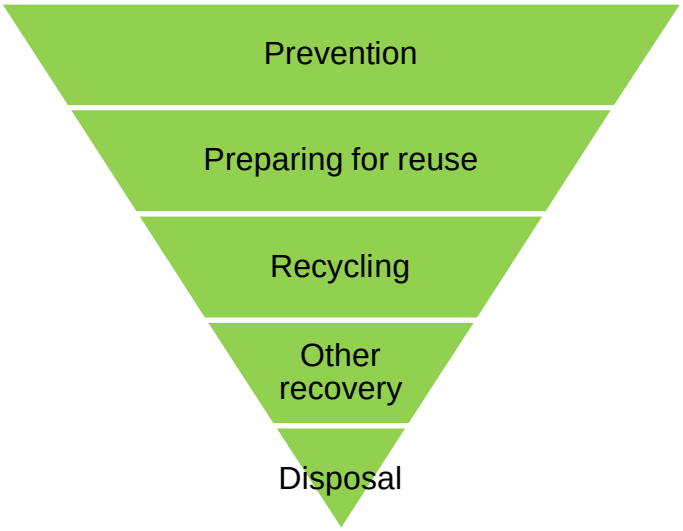

Plate 21-4: The waste hierarchy, from Defra's Guidance on Applying the Waste Hierarchy, recreated by AECOM (Defra, 2011)

21.5.4 The following mitigation measures will be implemented where practicable during the design and construction of the Proposed Development:

- design for reuse and recovery: identifying, securing and using materials that already exist on-site, or can be sourced from other projects (e.g., re-use of excavated soil for landscaping);
- design for materials optimisation: simplifying layout and form to minimise material use, using standard design parameters, balancing cut and fill, maximising the use of renewable materials and materials with recycled content;
- design for off-site construction: maximising the use of pre-fabricated structure and components, encouraging a process of assembly rather than construction;

- design for the future (deconstruction and flexibility): identify how materials can be designed to be more easily adapted over an asset lifetime and how de-constructability and de-mountability of elements can be maximised at end of first life;
- design for waste and material asset efficient procurement;
- identify and specify materials that can be acquired responsibly, in accordance with a recognised industry standard;
- implementation of a '*just-in-time*' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
- attention to material quantity requirements to avoid over-ordering and generation of waste materials; and
- segregation of waste at source where practical.

21.5.5 A Framework Construction Environmental Management Plan (CEMP) will be included within the ES which will accompany the DCO Application. It will set out the key measures to be employed during the Proposed Development construction phase to control and minimise the impacts on the environment. The CEMP will set out how waste will be managed during construction, and opportunities to prevention, reuse materials and recycle waste will be explored in accordance with the waste hierarchy.

21.5.6 A Final CEMP will be prepared by the construction contractor in accordance with the Framework CEMP prior to construction. The submission, approval, and implementation of the Final CEMP will be secured by a Requirement of the DCO.

21.5.7 To manage and monitor waste generated on the Site during the construction of the Proposed Development, a Framework Site Waste Management Plan (SWMP) will be developed as part of the Framework CEMP which will allow for waste streams to be estimated and monitored. The Framework SWMP will require that the construction contractor segregates waste streams on-site, prior to them being taken to a waste facility for recycling or disposal. All waste removal from the Site will be undertaken by fully licensed waste carriers and taken to permitted waste facilities.

Operation

21.5.8 The Production Facility will require an environmental permit and will comply with this under the Environmental Permitting (England and Wales) Regulations 2016. The permit will include procedures for the management of materials and waste in accordance with relevant legislation.

The Proposed Development will be operated in line with appropriate standards, whilst the operator will implement and maintain an Environment Management System (EMS) which will be certified to International Standards Organisation 14001. The EMS will outline requirements and procedures required to ensure that the Proposed Development Site is operating to the appropriate standard.

Decommissioning

21.5.9 A DEMP would be prepared which would consider potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated. The submission, approval, and implementation of a DEMP will be secured by a Requirement of the DCO.

21.6 Likely Impacts and Effects

21.6.1 This section identifies the likely impacts and effects resulting from the Proposed Development as described in Chapter 4: Proposed Development (PEI Report, Volume I). The magnitude of impacts is defined with reference to relevant baseline conditions, and effects determined in accordance with the identified methodology.

21.6.2 The prediction of impacts and the assessment of effects (and their significance) in relation to materials and waste associated with the Proposed Development takes into account the effectiveness of the mitigation measures as summarised in Section 21.5.

21.6.3 Where applicable, the assessment reports the temporary and permanent effects on materials and waste that would be directly or indirectly affected by the Proposed Development by virtue of their proximity to the Proposed Development Site, or through a shared relationship or inter-dependency.

Construction

21.6.4 Table 21-20: summarises the likely types of materials that will be used, and wastes that are likely to be generated, during the Proposed Development construction phase.

Table 21-20: Construction Material Use and Waste Types Arising from the Construction of the Proposed Development

CONSTRUCTION ACTIVITY	MATERIALS USED	WASTE TYPES GENERATED
Site preparation/ earthworks	• fill material for construction purposes; • primary/secondary/ recycled aggregates for ground stabilisation; • topsoil and subsoil for landscaping and restoration.	• surplus excavated materials; • surplus topsoil and subsoil; • unsuitable and contaminated soils and excavated materials; • vegetation from site clearance; • clearance of other materials; • construction worker wastes from offices and welfare areas/canteens.
Demolition	• materials are not required for demolition works.	• waste arisings from the required demolition of existing buildings and assets.

CONSTRUCTION ACTIVITY	MATERIALS USED	WASTE TYPES GENERATED
Site construction	• aggregates; • asphalt and bituminous materials; • in-situ cast concrete; • precast concrete products (structural components, kerbs, drainage pipes, shaft and tunnel lining, chambers and channels); • structural steel; • cabling; • drilling fluids.	• excess, offcuts and broken/damaged construction materials; • existing infrastructure removed during works; • packaging from materials delivered to site; • construction worker wastes from offices and welfare areas/canteens; • waste oils from construction plant; • drilling fluids; • waste from dewatering and testing (hydrotesting); and • paints and coatings.

Construction Materials

21.6.5 The estimated main types and quantities of materials to be used during Proposed Development construction are presented in Table 21-21. The table also includes estimates of potential material wastage. There is assumed to be no wastage from some of the construction materials as these will be delivered to specified sizes, therefore piling, piping, structural steel and major equipment are not included in the waste assessment.

21.6.6 It is not anticipated that excavation works will require a large quantity of construction material use.

21.6.7 The following data is sourced from the WRAP's Designing Out Waste Tool for Civil Engineering (WRAP, undated c):

- data on the bulk density of materials has been used to convert quantities between volume (m^3) and weight (tonnes) where required; and
- the estimated wastage rates for each material are based on the '*good practice*' rates.

Table 21-21: Construction Material Estimates for the Proposed Development

ACTIVITY	MATERIAL TYPE	MATERIAL DENSITY (T/M^3)	QUANTITY (M^3)	QUANTITY (TONNES)	WASTAGE RATE (%)	WASTAGE (M^3)	WASTAGE (TONNES)
Temporary construction facilities – backfill import	Aggregate	1.9	51,160	97,204	5	2,558	4,860
Early works – backfill import	Aggregate	1.9	117,600	223,440	5	5,880	11,172
Backfill import - other	Aggregates	2.4	66,570	126,483	5	3,329	6,324
Concrete – foundations	Steel	7.85	19,550	46,920	5	978	2,346
Rebar – foundations	Steel	7.85	517	4,060	5	26	203
Piping	Steel	7.85	6,307	49,510	0	-	-
Structural steel	Steel	7.85	280	2,200	0	-	-
Concrete - paving	Concrete	2.4	11,100	26,640	5	555	1,332
Sub-base course – roads	Aggregate	1.9	13,030	24,757	5	652	1,238
Base course – roads	Aggregate	1.9	9,775	18,573	5	489	929
Binder course - roads	Asphalt	2.4	3,265	7,836	5	163	163
Wearing course – roads	Asphalt	2.4	3,265	7,836	5	163	392
Total construction material wastage						14,792	29,187

21.6.8 For the construction of the Proposed Development, no individual construction material is equal to or greater than 1% by weight of the UK/GB baseline consumption (aggregates 0.2%, concrete 0.09%, steel 0.33% and asphalt 0.06%). The sensitivity of the receptor is classified as 'low' (as per Table 21-2:) whilst the magnitude of impact is considered to be 'negligible' (as per Table 21-5), resulting in a Neutral/Slight Adverse (Not Significant) effect.

21.6.9 Individual construction materials expected to be used for the construction of the Proposed Development equate to between 1-5% by weight (concrete measured in volume) of the regional baseline consumption (aggregates 2.3%, concrete 1.7% and asphalt 0.5%). The sensitivity of the receptor is classified as 'low' (as per Table 21-2) whilst the magnitude of impact is considered to be 'minor' (as per Table 21-5), resulting in a Neutral/Slight Adverse (Not Significant) effect.

Construction Waste

21.6.10 Since material quantities for all construction materials are not yet available, the estimates based on total wastage from construction material are likely to be an underestimation. Therefore, construction waste arisings have also been estimated based on the construction value of the Proposed Development.

21.6.11 This high-level estimate of construction waste (excluding demolition and excavation) has been calculated based on the construction value for the Proposed Development and a published benchmark based on average m^3 of waste per £100,000 (WRAP, undated d). The best practice benchmark for industrial buildings is 5.5 m^3 of waste per £100,000. A conversion factor of 1.497 tonnes/m^3 (Construction Resources and Waste Platform, 2010) has been used to convert m^3 into tonnes. The best practice benchmark has been used since waste generation is expected to be at the lower end of the scale, since much of the capital expenditure will be associated with modular process engineering components which will be manufactured off-site, hence the on-site waste generation from assembly of these components is expected to be relatively small.

21.6.12 The estimated construction waste volume associated with the Proposed Development is 35,750 m^3 (53,518 tonnes) based on a capital expenditure of £650 million. This volume is used in the assessment.

Excavated Material

21.6.13 At this stage, it is assumed that any remediation works required to create a suitable development platform would be undertaken by the landowner before the commencement of the construction of the Proposed Development on the Main Site, with the landowner obtaining all necessary consents and permits.

21.6.14 Remediation by the landowner will be subject to further review following assessment of ground condition information and permitting strategy. If a requirement for remedial measures to be undertaken during the construction phase of the Proposed Development is identified, for example based on the facility design, efficiency, or sustainability, the scope of those will be assessed by the Applicant.

21.6.15 Estimates of waste from the Proposed Development Site, conservatively, assume that some hazardous and non-hazardous material generated during the targeted remediation works before or during construction activities could require disposal from the Proposed Development Site, with re-use of some soil materials under appropriate permitting. The volume estimates will be further refined following supplementary site investigation.

21.6.16 The Proposed Development design is currently being progressed to optimise the requirements for cut and fill, and where possible, this will be minimised to reduce the import and export of materials and waste, although the current design is expected to generate excavated material that will require off-site treatment or disposal.

Total Construction Waste

21.6.17 A summary of construction waste associated with the Proposed Development is set out in Table 21-22.

Table 21-22: Construction Waste Summary

ACTIVITY	WASTE (M^3)
Excavation associated with the Proposed Development	Hazardous waste A proportion of potentially contaminated material assumed to be hazardous with off-site disposal (currently assumed as 39,255m^3 , the volume estimates will be further refined following supplementary site investigation).) Non-hazardous waste 170,067 m^3 of surplus excavated material (where possible the material will be recovered on-site under an appropriate permit).
Construction of the Proposed Development	35,750 m^3

21.6.18 Total non-hazardous and inert construction waste for the Proposed Development is estimated at 35,750 m^3 (construction waste) plus 170,067 m^3 (surplus excavated material). A worst-case scenario where all waste is disposed of to landfill has been applied. This volume equates to 0.27% of the 89.3 million m^3 of inert and non-hazardous landfill capacity within the waste management Expansive Study Area (the Yorkshire and Humber and North East regions).

21.6.19 In practice, a large proportion of non-hazardous and inert waste from the Proposed Development is likely to be recovered rather than disposed of to landfill, further reducing the overall quantities of waste for disposal. With a recovery rate of 70%, the

percentage of landfill capacity required reduces to 0.08%. With a recovery rate of 90%, the percentage of landfill capacity required reduces to 0.03%.

21.6.20 Based on the above, construction of the Proposed Development is estimated to result in less than a 1% reduction of landfill capacity within the non-hazardous waste management Expansive Study Area. Accordingly, for non-hazardous and inert waste, the sensitivity of the receptor is classified as 'very high' (as per Table 21-3 and Section 21.4) whilst the magnitude of impact is considered to be 'negligible' (as per Table 21-6), resulting in a Slight Adverse (Not Significant) effect.

21.6.21 At this stage, no estimate of general hazardous waste generation during Proposed Development construction is available (apart from contaminated material generated during excavation). Based on the size and scale of the Proposed Development the quantities of hazardous waste (e.g. oils, batteries, aerosol cans etc.) are anticipated to be small compared to the overall construction waste arisings and anticipated to be <0.1% of the hazardous waste landfill capacity in England (12,107 m^3). Many hazardous waste types have well defined waste management routes, including recovery, and are unlikely to be sent directly to landfill. Procedures for the storage and management of these wastes will be set out in the contractors' SWMP. Accordingly, for hazardous waste, the sensitivity of the receptor is classified as 'very high' (as per Table 21-4 and Section 21.4) whilst the magnitude of impact is considered to be 'negligible' (as per Table 21-7), resulting in a Slight Adverse (Not Significant) effect.

21.6.22 Construction site operations will also generate waste streams from temporary offices, welfare facilities, material packaging and construction plant maintenance. The quantities are anticipated to be small compared to the main construction wastes and are not included in this assessment. Procedures for the storage and management of these wastes will be set out in the contractors' SWMP.

21.6.23 The volume of hazardous waste generated by excavation requiring off-site disposal for the Proposed Development will be assessed further following a ground investigation. For an assumed volume of 39,255 m^3, under a worst-case scenario that all waste is disposed to hazardous landfill, this equates to 0.3% of the 12.1 million m^3 of the hazardous waste landfill capacity in England. Accordingly, for hazardous waste, the sensitivity of the receptor is classified as 'very high' (as per Table 21-4 and Section 21.4) whilst the magnitude of impact is considered to be 'minor' (as per Table 21-7), resulting in a Moderate Adverse (Significant) Effect.

21.6.24 In practice, a proportion of hazardous waste generated by excavation from the Proposed Development could be non-hazardous and/or likely to be sent to a waste management facility rather than disposed of to landfill, further reducing the overall quantities of waste for disposal to landfill (e.g. <0.1% of hazardous waste landfill capacity in England). This would reduce the resulting effect to Minor Adverse (Not Significant) however the worst case outlined in 21.6.23 is used in the assessment.

Operation

21.6.25 Operational (process) waste from the Proposed Development will comprise waste from site offices and waste from the Production Facility (including thermal

reclamation waste) processes which may be hazardous waste. The main waste types and quantities of waste associated with the operation of the Proposed Development are currently estimated to be nine tonnes per month for inert and non-hazardous wastes (108 tonnes per year) and 20 tonnes per month for hazardous waste (240 tonnes per year).

21.6.26 In the event that inert and non-hazardous wastes from the Proposed Development are disposed of to landfill, the annual quantity is likely to result in a reduction of <1% (893,380 m^3) of regional inert and non-hazardous waste landfill void capacity. Accordingly, for inert and non-hazardous waste, the sensitivity of the receptor is classified as 'very high' (as per Table 21-3 and Section 21.4) whilst the magnitude of impact is considered to be 'negligible' (as per Table 21-8), resulting in a Slight Adverse (Not Significant) effect.

21.6.27 IEMA Guidance (IEMA, 2020) recommends assessing impacts of hazardous waste with reference to the available landfill capacity nationally. In the event that hazardous wastes from the Proposed Development are disposed of to landfill, the annual quantity is likely to result in a reduction of <0.1% (12,107 m^3) of national hazardous waste landfill void capacity. Accordingly, for hazardous waste, the sensitivity of the receptor is classified as 'very high' (as per Table 21-4) whilst the magnitude of impact is considered to be 'negligible' (as per Table 21-7), resulting in a Slight Adverse (Not Significant) effect.

21.6.28 Since some of the operational hazardous wastes likely to be generated by the Proposed Development will not be suitable for landfill disposal (e.g., liquid waste), hazardous operational waste has been compared to national hazardous waste management facility capacity in this assessment. In the event that wastes are sent to a waste management facility, the annual quantity is likely to be small in the context of national capacity.

Decommissioning

21.6.29 The Proposed Development has a long design life and as such, it is not considered possible to reliably forecast decommissioning requirements and infrastructure that far in the future. A DEMP would be prepared which would consider potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated. Effects associated with the decommissioning phase would be no worse than those experienced during construction.

21.7 Mitigation and Enhancement Measures

Construction

21.7.1 A potential significant effect has been identified in relation to hazardous waste from excavation of contaminated material requiring disposal during construction of the Proposed Development. In practice, the proportion of contaminated material from the Proposed Development Site classed as hazardous may be lower; and any hazardous excavated material potentially be sent to a waste management facility rather than disposed of to landfill. This would further reduce the overall quantities of hazardous waste for disposal. Waste management routes will be confirmed by the

construction contractor. This potential significant effect will be re-evaluated as part of the assessment to be included in the ES.

21.7.2 No further or additional mitigation measures related to materials and waste are proposed at this stage.

Operation

21.7.3 No significant effects during operation of the Proposed Development were identified. Therefore, no further or additional mitigation measures as related to materials and waste are proposed.

21.8 Limitations and Difficulties

Construction

21.8.1 Construction waste volumes associated with the Proposed Development have been estimated based on the Proposed Development construction value, as detailed information regarding waste arisings is not available at this stage.

21.8.2 Worst case assumptions have been made to inform this assessment, in particular it is assumed that all waste is sent to landfill. This ensures that a robust, worst-case assessment of the waste impacts of the Proposed Development is provided.

21.8.3 The preliminary assessment is based on information available at the time of writing.

Operation

21.8.4 The types and quantities of operational waste are not yet available. Worst case assumptions have been made to inform this assessment, ensuring that a robust assessment is provided.

21.9 Residual Effects and Conclusions

21.9.1 The effects of the Proposed Development remaining following the implementation of available mitigation measures are known as 'residual effects.' A summary of the potential residual materials and waste effects are summarised in Table 21-23.

Construction

21.9.2 There is a potential residual Significant Adverse effect in relation to contaminated material during the Proposed Development construction phase requiring disposal, as outlined in Section 21.6. In practice, a proportion of contaminated material could be non-hazardous and/or likely to be sent to a waste management facility rather than disposed of to landfill.

21.9.3 No other Significant Adverse residual material and waste effects resulting from the Proposed Development's construction have been identified.

Operation

21.9.4 No significant adverse residual material and waste effects resulting during operation of the Proposed Development have been identified.

Table 21-23: Summary of Effects - Materials and Waste

PROPOSED DEVELOPMENT PHASE	DESCRIPTION OF EFFECT	SIGNIFICANCE OF EFFECT (BEFORE MITIGATION)	MITIGATION MEASURES	SIGNIFICANCE OF RESIDUAL EFFECT (AFTER MITIGATION)	DURATION (SHORT/ MEDIUM/ LONG TERM) AND REVERSIBILITY
Construction	Changes in demand for materials	Slight Adverse (Not Significant)	None required	Slight Adverse (Not Significant)	Short term, irreversible
	Changes in available landfill void capacity	Inert and non-hazardous waste: Slight Adverse (Not Significant) Hazardous waste: Moderate Adverse (Significant)	Inert and non-hazardous waste: None required. Hazardous waste: no additional mitigation measures are proposed at this time however the volume estimates will be further refined following supplementary site investigation and considered further within the design process.	Inert and non-hazardous waste: Slight Adverse (Not Significant) Hazardous waste: Moderate Adverse (significant)	Short term, irreversible
Operation	Changes in available landfill void capacity	Slight Adverse (Not Significant)	None required	Slight Adverse (Not Significant)	Short term, irreversible
	Changes in available hazardous waste management facility capacity	Slight Adverse (Not Significant)	None required	Slight Adverse (Not Significant)	Short term, irreversible
Decommissioning	Scoped out of the assessment	Not applicable	Not applicable	Not applicable	Not applicable

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