

LIGHTHOUSE GREEN FUELS PROJECT

Preliminary Environmental Information Report Chapter 13: Materials and Waste

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13. MATERIALS AND WASTE

13.1. INTRODUCTION

13.1.1. This Chapter reports the preliminary assessment of the likely significant effects of the Proposed Scheme on the consumption of material resources, and generation and disposal of waste, during construction and operation (Materials and Waste assessment). The Chapter comprises:

- Relevant policy, legislation and guidance;
- Assessment methodology and significance criteria;
- Current and future baseline conditions;
- Preliminary assessment of likely impacts and significant effects of the Proposed Scheme; and
- Additional mitigation and enhancement measures.

13.2. MATTERS SCOPED OUT

13.2.1. The EIA Scoping Report¹ sets out effects that are considered unlikely to be significant, in agreement with the Inspectorate, and therefore have not been considered further in this assessment. As described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the partial demolition of TV1 and demolition and clearance of TV2 facilities are not included in the Development Consent Order (DCO) as these activities will occur before the construction of the Proposed Scheme. As a result, these will not be considered in the Materials and Waste assessment. The matters that have been scoped out are:

- Consumption of material resources during operation of the Proposed Scheme. The operational phase activities are not anticipated to require consumption of non-renewable material resources beyond those necessary for routine repair and maintenance.
- Consumption of material resources during decommissioning. Material resources are not anticipated to be required for decommissioning of the Proposed Scheme.
- The extraction of raw resources and the manufacture of products. The Proposed Scheme does not require direct extraction of minerals, processing and manufacture of raw resources.

13.3. MATTERS SIGNPOSTED

13.3.1. The following matters in relation to Materials and Waste have been covered by other Chapters within this PEIR:

- Impacts and effects resulting from the transportation of material resources and waste to and from the site. The impacts associated with transportation are considered as part of **Chapter 5: Air Quality (Volume 1)**, **Chapter 6: Noise and Vibration (Volume 1)**, **Chapter 11: Greenhouse Gases (Volume 1)**, and

Chapter 16: Traffic and Transport (Volume 1) – as appropriate to these specialist topics within this PEIR and/or ES.

- Impacts on human health and controlled waters as a result of contaminated site arisings from the Proposed Scheme. Impacts and effects on human health and controlled waters are considered in **Chapter 15: Population and Human Health (Volume 1)** and **Chapter 9: Water Environment and Flood Risk (Volume 1)**, as appropriate to that specialist topics within this PEIR and/or ES.

13.4. POLICY, LEGISLATION, AND GUIDANCE

13.4.1. The policy, legislation, and guidance relevant to the Materials and Waste assessment of the Proposed Scheme is detailed in **Appendix 4A: Policy, Legislation and Guidance (Volume 3)**. The policy, legislation and guidance relevant to this Chapter is outlined below:

- Policy:
 - Overarching NPS for Energy (EN-1) 2023²;
 - National Planning Policy Framework (2023) (NPPF)³;
 - National Planning Policy for Waste (2014)⁴;
 - National Policy Statement for Hazardous Waste (2013)⁵;
 - Environmental Improvement Plan 2023⁶;
 - Waste Management Plan for England (2021)⁷;
 - Our Waste, Our Resources: A Strategy for England (2018)⁸;
 - A Green Future: Our 25 Year Environment Plan to improve the Environment⁹; and
 - Tees Valley Joint Minerals and Waste Development Plan (2011)¹⁰ and ¹¹.
- Legislation:
 - The Environment Act 2021¹²;
 - Waste (Circular Economy) (Amendment) Regulations 2020¹³;
 - The Environmental Permitting (England and Wales) Regulations 2016 (as amended)¹⁴;
 - The Controlled Waste (England and Wales) Regulations 2012¹⁵;
 - The Waste (England and Wales) Regulations 2011¹⁶;
 - The Revised EU Waste Framework Directive 2008/98/EC (2008)¹⁷;
 - The Clean Neighbourhoods and Environment Act 2005¹⁸;
 - The Hazardous Waste (England and Wales) Regulations 2005¹⁹;
 - Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste (1999)²⁰ 'The Landfill Directive';
 - The Waste Minimisation Act 1998²¹;
 - The Environmental Protection Act 1990²²;
 - The Control of Pollution (Amendment) Act 1989²³; and

- The Control of Pollution Act 1974²⁴.
- Guidance:
 - IEMA Guide to Materials and Waste in Environmental Impact Assessment (2020)²⁵ (the IEMA Guidance).

13.5. SCOPING OPINION AND CONSULTATION

13.5.1. An EIA Scoping Opinion²⁶ was received by the Applicant from the Planning Inspectorate on behalf of the Secretary of State on 01 September 2023, including formal responses from Statutory Consultees. The responses from the Planning Inspectorate in relation to Materials and Waste, and a description on how these requirements are being addressed by the Applicant, are set out in **Table 13-1**.

Table 13-1: Summary of the EIA Scoping Opinion in relation to Materials and Waste

Section ID	Applicant’s Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.10.1	Consumption of material resources – operation	<p><i>“The Applicant proposes to scope this matter out on the basis that operational phase activities are not anticipated to require consumption of material resources beyond routine repair and maintenance. Paragraph 14.7.4. states that the feedstock for the Proposed Scheme (derived from domestic and commercial waste) is not a naturally occurring material and therefore will not impact on the depletion of material resources. On the basis that repair and maintenance activities are likely to be sporadic the Inspectorate is content that any impacts from consumption of material resources during operation are likely to be minimal and therefore unlikely to lead to significant effects. This matter can be scoped out. Regarding the feedstock, the ES should explain what the feedstock options will constitute and describe how the use of ‘waste biomass’ (as opposed to virgin biomass or energy crops) has been secured. In the event that feedstock is likely to be derived from sources other than waste streams, the ES must factor this into assessments in relevant aspect chapters.”</i></p>	<p>The feedstock composition is described in Chapter 2: Site and Proposed Scheme Description (Volume 1). An explanation of the feedstock options and how they will be secured will be expanded upon for the ES as the design matures, including an analysis of whether feedstock is likely to be derived from sources other than waste streams. Biocarbon Feedstock is a renewable material resource, and therefore does not form part of the Materials and Waste assessment.</p> <p>It should be noted that this will not result in a change of the determination to scoping out this topic.</p>

Section ID	Applicant’s Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.10.2	Disposal and recovery of waste – operation	<p><i>“It is recognised in the Scoping Report¹ that the operation of the Proposed Scheme would result in the production of waste. However, the Applicant proposes to scope this matter out on the basis that an outline Waste Management Plan (WMP) will be prepared as part of the application which will describe the management arrangements for operational solid waste arising from the Proposed Scheme. Paragraph 14.7.5 states that “some operational waste may be disposed of to landfill, such as ash, tramp, slag, if alternative waste recovery routes cannot be found”.</i></p> <p><i>In the absence of further information on likely quantities of waste which are likely to be produced during the operational phase the Inspectorate is not content to scope this matter out at this stage. The ES should include an assessment of the solid waste generated by the operation of the Proposed Scheme. The ES should also specify the quantities of any hazardous liquid wastes produced, e.g., from the carbon capture process, and provide an assessment of any potentially significant effects.”</i></p>	<p>An assessment of disposal and recovery of waste during operation has been scoped in and will be presented in the ES.</p> <p>Quantitative data to inform a full assessment of the operational waste effects of the Proposed Scheme is currently unavailable for inclusion in this PEIR due to the early design stage, and a qualitative assessment has been undertaken. This PEIR has assumed that there will be a need to dispose of a quantity of non-hazardous and hazardous waste from the Proposed Scheme – waste that could be sent for recovery at a specialist facility or final disposal at a landfill site. Given the current uncertainty around quantities of non-hazardous and hazardous waste to be generated, the assessment will be refined for the ES and, the Chapter will include a quantitative assessment of the disposal or recovery of waste generated during the operation of the Proposed Scheme.</p>

Section ID	Applicant’s Proposed Matters to Scope Out	Scoping Opinion Comments	Response
3.10.3	Consumption of material resources – decommissioning	<i>“It is stated that decommissioning of the Proposed Scheme is not likely to require material resource consumption. The Inspectorate agrees that this matter can be scoped out on this basis.”</i>	Element scoped out, no further action required.
3.10.4	Disposal and recovery of waste – decommissioning	<i>“The Applicant states that impacts from the disposal and recovery of waste during decommissioning cannot be reliably predicted so far into the future and therefore this matter is proposed to be scoped out. Instead, this will be assessed and managed in the decommissioning plan in accordance with best practice at the time. Difficulty of assessment is not an adequate justification to scope matters out. The ES should provide estimates of the type and quantity of waste at the point of decommissioning and address the likely significant effects from waste at decommissioning to the extent possible at this time, including consideration of any measures to ensure that component waste will avoid entering the waste chain. Where uncertainty exists regarding the likely waste streams at the point of decommissioning a worst-case scenario should be assumed.”</i>	An assessment of disposal and recovery of waste during decommissioning has been scoped in and will be presented in the ES. Quantitative data is not available for this PEIR due to the early design stage and future timeframe for decommissioning, and therefore a qualitative assessment has been undertaken. However, the ES Chapter will include a refined assessment of the disposal or recovery of waste generated during the decommissioning of the Proposed Scheme.
3.10.5	Extraction of raw resources and the manufacture of	<i>“It is stated that the impacts associated with extraction and manufacture of</i>	The Proposed Scheme does not require the direct extraction of minerals, processing, and

Section ID	Applicant's Proposed Matters to Scope Out	Scoping Opinion Comments	Response
	products – construction and operation	<p><i>materials cannot be assured with any accuracy and are subject to separate environmental consent and permitting processes. It is also stated that the Proposed Scheme does not require the direct extraction, processing, and manufacture of raw resources.</i></p> <p><i>The Inspectorate is content to scope this matter out of further assessment on the basis that the Proposed Scheme does not require the direct extraction, processing, and manufacture of raw resources."</i></p>	manufacture of raw resources. Consequently this element has been scoped out.
3.10.6	Transportation of material resources and waste to and from the site – construction and operation	<p><i>"This matter is proposed to be scoped out on the basis that it will be considered within the Air Quality, Noise and Vibration, Greenhouse Gases, and Traffic and Transport aspect chapters. The Inspectorate is content with this approach. Cross-references should be made between aspect chapters where appropriate."</i></p>	The impacts arising from the transportation of material and waste, will be assessed at ES stage in Chapter 5: Air Quality (Volume 1), Chapter 6: Noise and Vibration (Volume 1), Chapter 11: Greenhouse Gases (Volume 1), and Chapter 16: Traffic and Transport (Volume 1) – as appropriate, and in scope of these specialist topics.
3.10.7	Impacts on human health and controlled waters as a result of contaminated site arisings – construction and operation	<p><i>"This matter is proposed to be scoped out on the basis that it will be assessed within the Population and Human Health and Water Environment and Flood Risk aspect chapters. The Inspectorate is content with this approach. Cross-references should be made between aspect chapters where appropriate."</i></p>	The impacts on human health and controlled waters as a result of contaminated arisings will be assessed at ES stage in Chapter 15: Population and Human Health (Volume 1) and Chapter 9: Water Environment and Flood Risk (Volume 1) , where within scope of the specialist topic area.

Section ID	Applicant’s Proposed Matters to Scope Out	Scoping Opinion Comments	Response
<p>Appendix 1L Consultation Bodies Formally Consulted (Environment Agency)</p>	<p>Disposal and recovery of waste – operation</p>	<p><i>“The Proposed Scheme is located on and within a number active landfill sites. One of these sites, Clarence Landfill Site (Non Haz)– EPR/BV14021C, is known to be producing landfill gas. Landfill gas consists of methane and carbon dioxide. The risks associated with landfill gas will depend on the controls in place to prevent uncontrolled release of landfill gas from the landfill site.</i></p> <p><i>Some operational waste may be disposed of to landfill, such as ash, tramp, slag, if alternative waste recovery routes cannot be found’ – can you dispose of slag to landfill?</i></p> <p><i>A full waste assessment must be performed on waste generated by the operation and waste must be sent for a suitable authorised facility for recovery or disposal.”</i></p>	<p>The assessment criteria for materials and waste does not consider risk of landfill gas. This was scoped out as part of Chapter 17: Geology and Soils of the EIA Scoping report¹ due to the Proposed Scheme’s lack of anticipated disturbance to the active landfill sites.</p> <p>Quantitative data to inform a full assessment of the operational waste effects of the Proposed Scheme is currently unavailable for inclusion in this PEIR due to the early design stage, and therefore a qualitative assessment has been undertaken. This assessment will be refined for the ES and as such, the Chapter will include an assessment of the disposal or recovery of waste generated during the operation of the Proposed Scheme. The assessment will consider the appropriate disposal routes and locations for the operational waste types generated.</p>

13.5.2. No consultation, beyond the comments provided through the Scoping Opinion²⁶, has been undertaken to date to inform the Materials and Waste assessment. Data to inform the baseline is publicly available (as detailed in **Paragraph 13.6.7**) and does not require consultation with statutory or other stakeholders.

13.6. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

13.6.1. The Materials and Waste assessment of the Proposed Scheme reported in this Chapter has been undertaken in line with the legislation, policy and guidance described in **Section 13.1** and **Appendix 4A: Policy, Legislation and Guidance (Volume 3)**.

POTENTIAL SIGNIFICANT EFFECTS

13.6.2. A preliminary assessment of the significance of effect(s) (prior to mitigation measures) likely to arise during the construction and operational phases of the Proposed Scheme has been undertaken in accordance with methodology presented in the EIA Scoping Report¹ and based on current available information. At this stage of the design, there is insufficient information to determine the quantities of materials required for construction and waste that is likely to be generated by the Proposed Scheme (construction, operation and demolition) and therefore a worst case approach has been adopted.

13.6.3. Elements of the Materials and Waste Assessment which are considered to potentially give rise to significant effects, and will be assessed within this PEIR and the ES comprise:

- Consumption of material resources during construction;
- Disposal and recovery of waste associated with the construction phase;
- Disposal and recovery of waste during operation phase; and
- Disposal and recovery of waste during decommissioning.

SENSITIVE RECEPTORS

13.6.4. In the context of this assessment and aligning with the IEMA Guidance²⁵, the following sensitive receptors have been identified:

- Material resources – consumption impacts on materials' immediate and long-term availability, and results in depletion of natural resources; and
- Landfill void capacity – reductions in regional and national infrastructure result in unsustainable use and loss of resources, and temporary or permanent degradation of the natural environment.

BASELINE DATA COLLECTION

13.6.5. The Materials and Waste assessment has been informed by desk-based assessment, as is standard practice. Publicly available information at the time of carrying out the scoping assessment has been used to identify the baseline data relevant to material resource availability; existing waste transfer, recovery, and recycling management facilities; and remaining landfill capacity.

- 13.6.6. Data collected by the Applicant regarding the materials required and waste generated has been used to assess the effects of the Proposed Scheme on material resource availability and remaining landfill capacity.
- 13.6.7. Data sources have been referenced throughout the Chapter and the most recent publications of data have been used to inform the assessment at the time of writing. Key data sources include:
- Department for Business and Trade (2023). Monthly Statistics of Building Materials and Components.
 - North East England Aggregates Working Party (2021). Annual Monitoring Report 2020.
 - Mineral Products Association (2022). Aggregates demand and supply in Great Britain: Scenarios for 2035.
 - Mineral Products Association (2023). Profile of the UK Mineral Products Industry.
 - StatsWales (2023). Iron and Steel Production by Year, Measure and Area.
 - DEFRA (2022). UK Statistics on Waste.
 - Environment Agency (2023). 2021 Waste Data Interrogator (v3).
 - Environment Agency (2023). Remaining Landfill Capacity: England as at end 2021 (V2).
- 13.6.8. No site visit or surveys are required to inform the Materials and Waste assessment, as the assessment is informed by desk-based information, following standard practice.

ASSESSMENT METHODOLOGY

- 13.6.9. IEMA Guidance²⁵ has been used to identify potential impacts and assess potential significant effects from the Proposed Scheme on material resource consumption and waste generation and disposal, using the process and significance criteria it sets out. Method W1 (Void Capacity, as detailed in the IEMA Guidance) has been used to best reflect the scale and nature of the Proposed Scheme. The assessment methodology during the construction, operation and decommissioning phase are the same.
- 13.6.10. In accordance with the IEMA Guidance²⁵, the assessment is a quantitative exercise that aims to identify the following, where information is available:
- The type and volume of materials to be consumed by the Proposed Scheme, including details of any recycled materials content (applicable to the construction phase assessment only);
 - The type and volume of waste to be generated by the Proposed Scheme, with details of planned recovery and / or disposal method (for example onsite reuse, offsite recycling, disposal to landfill) (applicable to the construction, operation and demolition assessment only);
 - The cut and fill balance (applicable to the construction phase assessment only); and
 - Details of any materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond

expected industry standards (applicable to the construction phase assessment only).

13.6.11. Notwithstanding, due to current early design stage, quantitative data to inform a full assessment of the materials and waste effects of the Proposed Scheme is currently unavailable for inclusion in this PEIR and therefore a qualitative assessment has been undertaken.

13.6.12. In accordance with the IEMA Guidance²⁵, the impacts from the Proposed Scheme that would be considered in the assessment include:

- Anticipated reductions in availability (stocks, production and/or sales) of materials regionally and nationally (applicable to the construction phase assessment); and
- Anticipated reductions in the landfill void capacity of regional and national infrastructure (during construction, operation and demolition phase).

13.6.13. The likely types and estimated quantities of construction material resources required (including site arisings generated) for the Proposed Scheme will be assessed as part of the ES. Impacts and effects will be evaluated against data for the regional and national materials markets, where information is available.

13.6.14. The likely types and estimated quantities of construction waste, operational waste and demolition waste generated by the Proposed Scheme will be assessed as part of the ES. Impacts will be evaluated against the capacity of regional (or where justified, national) waste management infrastructure.

13.6.15. The construction phase assessment will align with the currently proposed construction programme presented in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**.

SIGNIFICANCE CRITERIA

13.6.16. The significance criteria set out in IEMA Guidance²⁵ has been used to inform the assessment, as outlined below.

Sensitivity

13.6.17. The sensitivity of materials resources is determined by identifying where one or more of the criteria from the following thresholds (set out in **Table 13-2**, reproduced from the IEMA Guidance) are met across the construction phase. The sensitivity of landfill capacity is determined by considering both the existing baseline and future baseline of regional (or where justified, national) landfill void capacity across the construction, operation and decommissioning phase.

Table 13-2: Materials and waste sensitivity criteria

Sensitivity	Materials criteria On balance, the key materials required for the construction of the Project...	Inert and non-hazardous waste criteria Landfill void capacity is expected to...	Hazardous waste criteria Landfill void capacity is expected to...
Negligible	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*	... remain unchanged, or is expected to increase through a committed change in capacity.	...remain unchanged, or is expected to increase through a committed change in capacity.
Low	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.	...reduce minimally: by <1% as a result of wastes forecast.	...reduce minimally: by <0.1% as a result of wastes forecast.
Medium	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.	...reduce noticeably: by 1-5% as a result of wastes forecast.	...reduce noticeably: by 0.1-0.5% as a result of wastes forecast.
High	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.	...reduce considerably: by 6-10% as a result of wastes forecast.	...reduce considerably: by 0.5-1% as a result of wastes forecast.
Very High	Are known to be insufficient in terms of production, supply and/or	... reduce very considerably	... reduce very considerably (by

Sensitivity	Materials criteria On balance, the key materials required for the construction of the Project...	Inert and non-hazardous waste criteria Landfill void capacity is expected to...	Hazardous waste criteria Landfill void capacity is expected to...
	stock; and/or comprise no sustainable features and benefits compared to industry-standard materials.	(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.	>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.
Notes	<p>* Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that:</p> <ul style="list-style-type: none"> – comprise reused, secondary or recycled content (including excavated and other arisings); – support the drive to a circular economy; and/or – in some other way reduce lifetime environmental impacts. 		

Magnitude

13.6.18. **Table 13-3**, reproduced from the IEMA Guidance, sets out the criteria for assessing magnitude of materials and waste, using the IEMA Guidance Method W1 for void capacity. The criteria will be relevant to the construction phase for the materials, and for the construction, operation and decommissioning phase for waste.

Table 13-3: Materials and Waste Magnitude Criteria

Magnitude	Materials Criteria The assessment of the Project is made by determining whether the consumption of...	Inert and non-hazardous waste criteria The percentage depletion of remaining landfill void capacity	Hazardous waste criteria The percentage depletion of remaining landfill void capacity
No change	...no materials are required	Zero waste generation and disposal from the development.	Zero waste generation and disposal from development
Negligible	...no individual material type is equal to or greater than 1% by volume of the	Waste generated by the development will reduce regional* landfill void	Waste generated by the development will reduce national landfill void

Magnitude	Materials Criteria The assessment of the Project is made by determining whether the consumption of...	Inert and non-hazardous waste criteria The percentage depletion of remaining landfill void capacity	Hazardous waste criteria The percentage depletion of remaining landfill void capacity
	regional* baseline availability.	capacity baseline** by <1%.	capacity baseline** by <0.1%
Minor	<p>...one or more materials is between 1-5% by volume of the regional* baseline availability;</p> <p>and/or</p> <p>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.</p>	Waste generated by the development will reduce regional* landfill void capacity baseline** by 1-5%.	Waste generated by the development will reduce national landfill void capacity baseline** by <0.1-0.5%
Moderate	<p>...one or more materials is between 6-10% by volume of the regional* baseline availability;</p> <p>and/or</p> <p>one allocated mineral site is substantially*** sterilised by the development rendering it inaccessible for future use.</p>	Waste generated by the development will reduce regional* landfill void capacity baseline** by 6-10%.	Waste generated by the development will reduce national landfill void capacity baseline** by <0.5-1%
Major	<p>...one or more materials is >10% by volume of the regional* baseline availability;</p> <p>and/or</p> <p>more than one allocated mineral site is substantially*** sterilised by the development rendering it inaccessible for future use.</p>	Waste generated by the development will reduce regional* landfill void capacity baseline** by >10%.	Waste generated by the development will reduce national landfill void capacity baseline** by >1%

Magnitude	Materials Criteria The assessment of the Project is made by determining whether the consumption of...	Inert and non-hazardous waste criteria The percentage depletion of remaining landfill void capacity	Hazardous waste criteria The percentage depletion of remaining landfill void capacity
Notes	<p>* or where justified, national.</p> <p>** forecast as the worst-case scenario, during a defined construction phase.</p> <p>*** justified using professional judgement, based on the scale and nature of the allocated mineral site being assessed.</p>		

Significance of Effects

13.6.19. In accordance with the IEMA Guidance²⁵, the significance of effects from materials and waste will be determined by comparing sensitivity and magnitude within the significance of effects matrix provided in **Table 13-4**, reproduced from the IEMA Guidance.

Table 13-4: Matrix to assign Significance of Effects Category

	Magnitude of impact				
	No change	Negligible	Minor	Moderate	Major
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
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

Effect Threshold

13.6.20. As detailed in the IEMA Guidance²⁵, effects that are classified as Moderate, Large or Very Large are considered to be Significant. Effects classified as Slight or Neutral are considered to be Not Significant.

13.7. STUDY AREA

13.7.1. The Study Areas that are applicable to the Proposed Scheme (as defined in the IEMA Guidance²⁵), are:

- The **Development Study Area** is the extent of works within the Site, including areas required for temporary access, site compounds and other enabling activities; and
- The **Expansive Study Area** extends to the availability of construction materials and the capacity of waste management facilities within the UK in general with a specific focus on the regions where the Proposed Scheme is located; the North East of England region (Durham, Northumberland, Tees Valley Unitary Authorities and Tyne and Wear).

13.8. BASELINE CONDITIONS AND FUTURE BASELINE

13.8.1. This baseline for materials consumption and waste generation and disposal:

- Is determined by the materials required and waste generated and disposed of by the current land use and assets; and
- Provides regional and national information and data for material resource availability and remaining landfill capacity.

13.8.2. The most up to date sources of information at the time of writing have been used to collate data for material resource availability, landfill capacity and waste recovery. An indication of the most recent year from which data has been acquired is provided throughout. The baseline data collected and presented in this section were obtained by desk study, from publicly available data sources (as detailed in in **Paragraph 13.6.7**).

EXISTING BASELINE

Baseline Materials Required

- 13.8.3. The Site comprises an area of land incorporating infrastructure previously commissioned for a former energy generation facility; the plot is not operational and therefore does not currently consume any naturally or other occurring material resources.
- 13.8.4. Other areas within the Development Study Area includes bulk liquid storage tank farms, jetties and rail and road infrastructure. These areas are not under ownership or operational duty of the Applicant.
- 13.8.5. Materials required for the operation of the active infrastructure is anticipated to comprise resources for routine maintenance and repair. This is expected to include small volumes of steel or other metals, or asphalt for upkeep of roadways.
- 13.8.6. Although no specific data are available on material resource consumption for the activities undertaken within the Development Study Area, professional judgement can be used to assert that by comparison with regional and national availability of resources, consumption of construction and other materials for routine activities currently required within the current land uses, is minimal.

Construction Materials Availability

13.8.7. **Table 13-5** provides a summary of the availability of the main construction materials in the North East of England region and the UK. The items listed are considered to be appropriate to the bulk construction materials required for the Proposed Scheme. Aligning with the IEMA Guidance²⁵, ‘materials’ covers physical resources such as concrete, aggregate, asphalt and timber. The overview provided in **Table 13-5** excludes technological products but provides the context in which the assessment of impacts and significant effects from material consumption from the Proposed Scheme can be undertaken.

Table 13-5: Construction materials’ availability in the North East of England and the UK

Material Type	North East England	UK
Sand and gravel ²⁷ *	2.2 million tonnes (Mt) (2022)	53.3 million tonnes (Mt) (GB) (2022)
Permitted crushed rock * +	4.9 Mt (2020) ²⁸	148.2 Mt (GB) (2021) ²⁹
Primary aggregate (comprises sand and gravel and crushed rock) * +	6.5 Mt (2022) ²⁸	191.1 (GB) (2022) ³⁰
Concrete blocks ²⁷ +	29.4 million square meters (Mm ²) (North) (2022)	72.8 Mm ² (2022)
Recycled and secondary aggregate * +	0.8 Mt (2022) ²⁸	69.6 Mt (2021) (GB) ³¹
Ready-mix concrete ³² +	0.6 million cubic meters (Mm ³) (2019)	21.1 Mm ³ (2022)
Steel ³³ +	(no data)	7.2 Mt (2021)
Asphalt ³⁴ +	0.9Mt (2022)	26.8 Mt (2022)
+ annual production * annual sales		
GB: Great Britain (England, Wales and Scotland) figures used where UK figures (including Northern Ireland) are unavailable		

13.8.8. Across the UK, the availability of materials typically required for construction schemes, indicates that production and sales remain buoyant, although information on steel production is not available for the region.

13.8.9. The North East England Aggregates Working Party Annual Monitoring Report 2020²⁸ indicates that the landbank of permitted reserves for sand and gravel is 12.6 years and for crushed rock is 35.1 years (as of 31 December 2020).

13.8.10. The Tees Valley Core Strategy¹⁰ includes plans for Mineral Safeguarding Areas. Whilst the Strategy indicates that there are no shallow reserves of coal, sand and gravel or limestone, there are deep reserves of gypsum and salt located within and adjacent to the Development Study Area. However, it is also noted that these reserves are already sterilised by the existing infrastructure.

Baseline Site Waste Arisings

13.8.11. Site waste arisings refers to the waste that can be diverted from landfill through reuse, recycling, recovery or treatment, and is therefore different to waste which is disposed of to landfill.

13.8.12. The Site comprises infrastructure commissioned for a former energy generation facility which is not operational and therefore, does not generate any site waste arisings.

13.8.13. Other areas within the Development Study Area (bulk liquid storage tank farm, jetties and rail and roads, as described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**) may generate site arisings, waste which can be diverted from landfill, or hazardous waste which can be treated.

13.8.14. Although no specific data are available onsite arisings for the activities undertaken within the Development Study Area, professional judgement can be used to assert that generation of site arisings associated with the operation of these facilities is unlikely to change in the baseline scenario.

Regional Perspective: Transfer, Recovery and Recycling

13.8.15. The charts and data presented in this section confirm the availability of waste management facilities in the North East region; these facilities are expected to enable suitable recovery of site arisings generated by the Proposed Scheme. Data pertaining to waste management, obtained from DEFRA and the Environment Agency (as referenced in **Table 13-7** and **Figure 13-1**) suggests that there is strong potential to divert any site arisings from landfill.

13.8.16. DEFRA data (shown in **Table 13-6**)³⁵ show that within England, the recovery rate for non-hazardous construction and demolition wastes has remained above 90% since 2015.

Table 13-6: Non-Hazardous Construction and Demolition Waste Recovery in England

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
2015	57.7	53.3	92.3%
2016	59.6	55.0	92.1%
2017	62.2	57.9	93.1%
2018	61.4	57.5	93.8%
2019	62.3	58.3	93.6%

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
2020	53.6	50.0	93.2%

Note: DEFRA's 2022 update of the data in this table did not extend the data range for England beyond 2020

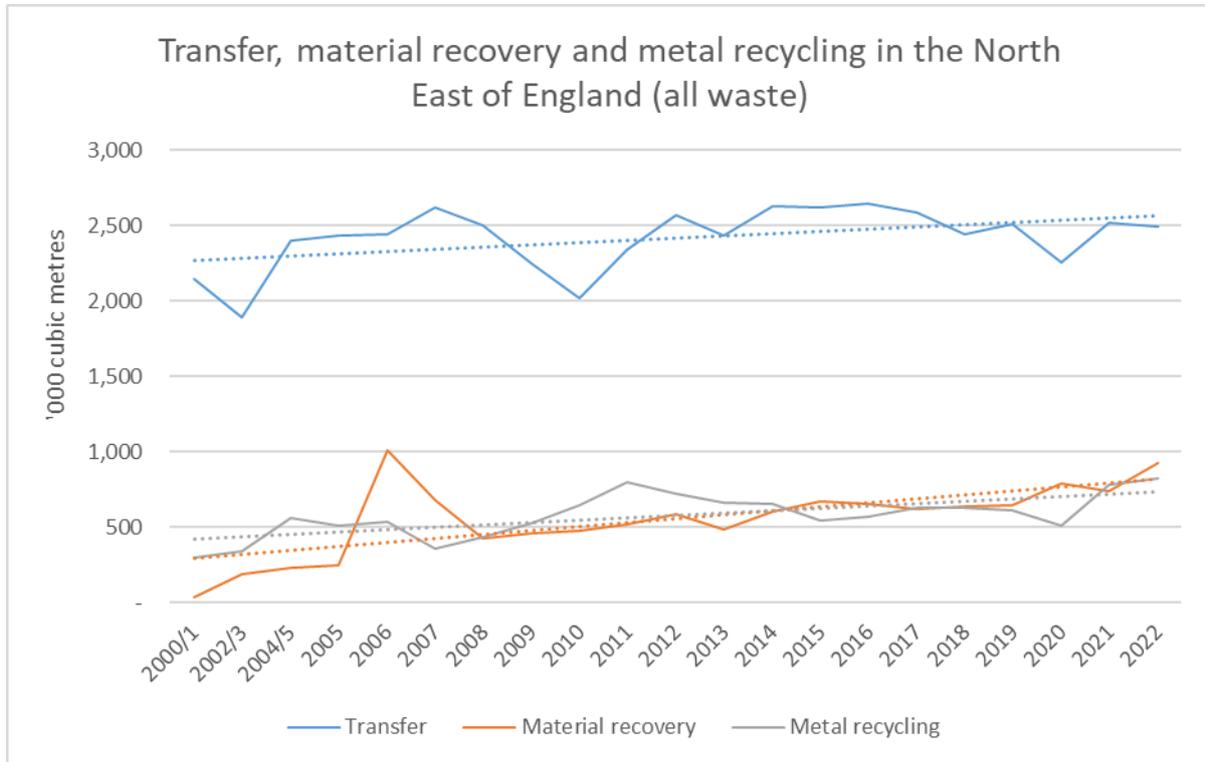
13.8.17. Regional data for construction and demolition waste (**Table 13-7**) show that the North East Region's recovery percentage (57%) is lower than the recovery rate trend of circa 92 to 93%, which as occurred historically within England, as demonstrated in **Table 13-6**. Data includes the total waste received from both within North East England and from other regions in the UK³⁶.

Table 13-7: Waste management routes for waste received in North East England (2022)

Waste management route	Inert and non-hazardous waste (tonnes)	Hazardous waste (tonnes)	Total waste (tonnes)	Percentage
Recovery	2,636,546	80,890	2,717,436	57%
Landfill	2,012,313	22,688	2,035,001	43%
Other fate	4,800	2	4,801	0%
Totals	4,653,659	103,580	4,757,239	100%

13.8.18. Data in **Figure 13-1** has been collated to show that trends for waste recovery in the region have risen steadily over the past 22 years³⁶. Data is provided for all waste types in North East England and hence will include, but are not specific to, construction, demolition and excavation wastes.

Figure 13-1: Transfer, materials recovery and metal recycling in North East England (2000/1 – 2022)



13.8.19. Trends for transfer, recovery and metal recycling in North East England indicate that there is likely to be regional infrastructure and capacity for managing construction, operational and decommissioning wastes from the Proposed Scheme. Construction and demolition recovery trends across North East England (Figure 13-1) and the data in Table 13-8 confirm this assertion³⁶.

Table 13-8: Permitted waste recovery sites in North East England (2022)

Waste recovery facility type	Number of sites
Incineration	15
Transfer	158
Treatment	109
Metal recovery	119
Use of waste	1
Total	402

13.8.20. The Tees Valley Joint Minerals and Waste Development Plan Policies and Sites¹¹ considers construction and demolition waste recycling and encourages the promotion of facilities able to manage site arisings close to their source. Policy MWC7 allows for:

- Land to be provided to increase construction and demolition waste recycling from 700,000 tonnes per annum (tpa) in 2016 to 791,000 tpa in 2021.
- The recovery of value from at least 103,000 tonnes of municipal solid waste and commercial and industrial waste per year from 2010, falling to 83,000 tonnes per year by 2021. This would be provided by at least two sites for municipal and commercial and industrial waste recovery.
- Provision of additional treatment and management facilities to reduce the amount of hazardous waste that is sent for landfill or disposal each year from the 2007 level of around 130,000 tonnes. This would be provided by one large, or several smaller facilities.

Baseline Waste Generated and Disposed to Landfill

13.8.21. The Development Study Area comprises infrastructure developed for a former energy generation facility which is not operational, and does not currently generate any waste for disposal to landfill.

13.8.22. The existing operational infrastructure within the Site (bulk liquid storage tank farm, jetties and rail and roads) may generate some waste for disposal to landfill. Given that the bulk liquid storage tank farm operates under an environmental permit (under third party ownership), it is anticipated that waste management procedures will be in place to apply the Waste Hierarchy and minimise the volume of waste for disposal to landfill. The jetties, rail and road infrastructure may generate some waste for disposal to landfill, such as litter, packaging or waste from maintenance and repair works. The magnitude of impact associated with disposing of this waste is expected – using professional judgement and based upon the available evidence which suggests that the overwhelming majority of construction and demolition waste is recycled – to be negligible in the context of available regional capacity.

Remaining Landfill Capacity

13.8.23. The most recent Environment Agency data at the time of writing³⁷ confirm that, at the end of 2022, 19 landfill sites in North East England were recorded as having 19 million cubic meters (Mm³) of remaining capacity; this data is presented in **Table 13-9**, which also shows the change in capacity from 2021 to 2022.

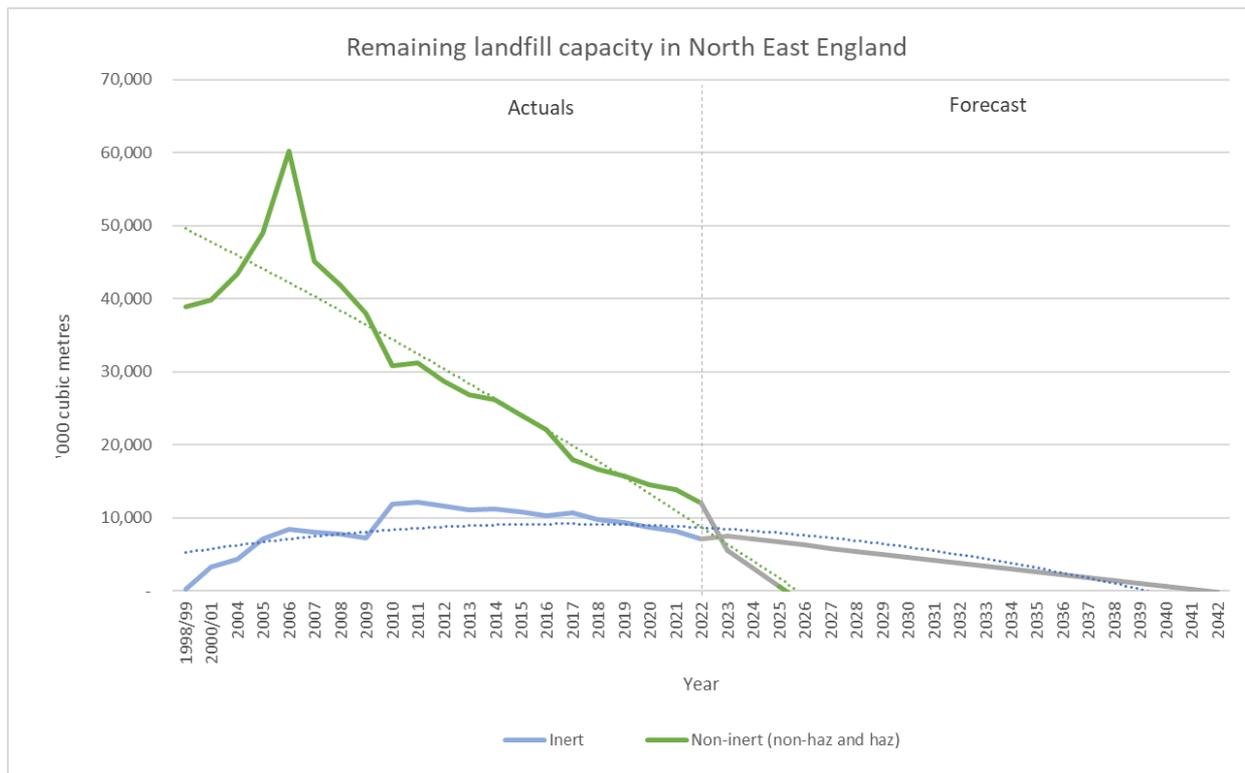
Table 13-9: Remaining landfill capacity in North East England (2021-2022)

Landfill type	Capacity in 2021 (m ³)	Remaining capacity m ³ (2022)	2021 to 2022 capacity comparison (Million m ³)
Hazardous (merchant)	4,486,359	2,243,238	-2.2 (-50.0%)
Inert	8,170,173	7,078,450	-1.1 (-13.4%)
Non-hazardous (including stable hazardous waste cells)	9,445,125	9,817,823	0.4 (3.9%)

Landfill type	Capacity in 2021 (m ³)	Remaining capacity m ³ (2022)	2021 to 2022 capacity comparison (Million m ³)
Total	22,101,657	19,139,510	-3.0 (-13.4%)
Notes	Restricted hazardous landfill sites are excluded as they only accept waste from restricted sources and producers, e.g. site operator / managing site.		

13.8.24. Baseline regional landfill capacity is detailed in **Figure 13-2**. Simple statistical forecasting (using the Microsoft Excel forecasting function) has been used to demonstrate long term void capacity in the absence of future provision. The future forecast remaining capacity is calculated from the last increase in capacity from Environment Agency data records³⁷ dating back to 1998/99. Currently the construction phase for the Proposed Scheme (with enabling taking place across a 12 month period prior to this) is assumed to commence in Q4 2025, with completion anticipated Q3 2028. The Operation Phase is expected to have a 50 years design life, until approximately 2078.

Figure 13-2: Remaining landfill capacity in North East England



13.8.25. Baseline data indicates that in the absence of future provision, inert and non-inert landfill capacity is likely to become an increasingly sensitive receptor throughout the duration of the construction phase and in operation phase of the Proposed Scheme. **Figure 13-2** shows that in the absence of future provision, inert waste capacity is

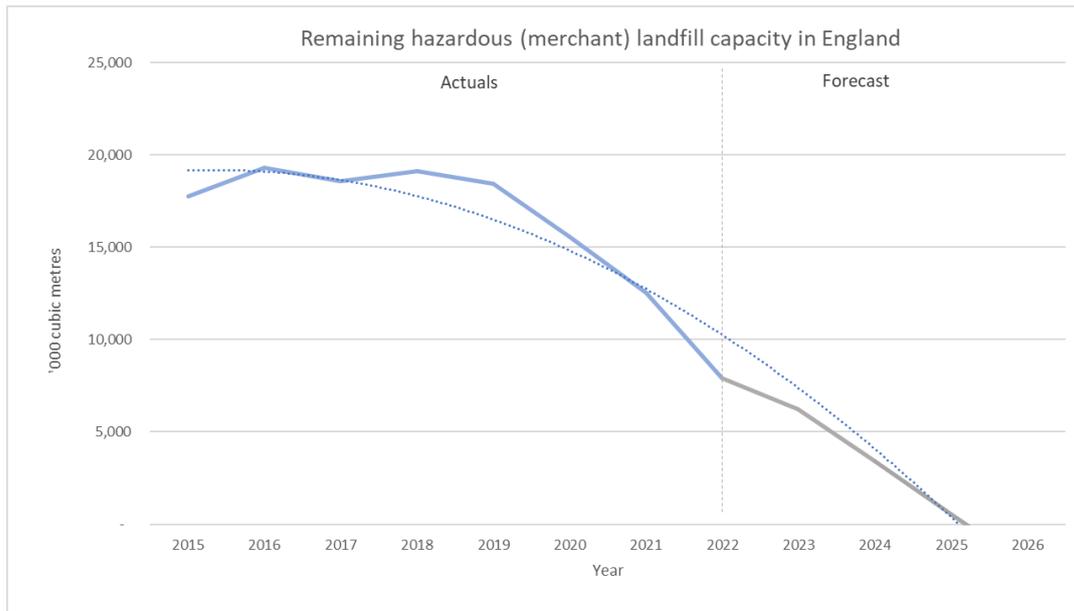
forecast to elapse in 2042, and non-inert waste is forecast to elapse in 2026. During the construction phase, waste capacity in North East England is forecast to reduce from 2022 to 2028 by as much as:

- Inert waste: 23% to 5.4 Mm³; and
- Non-inert waste: 100% to 0 Mm³ (remaining capacity is forecast to elapse in 2026).

13.8.26. To align with the IEMA Guidance²⁵ assessment classifications, remaining hazardous landfill capacity is assessed at a national level (rather than regionally). The data from the Environment Agency confirms that at the end of 2022, England had 7.9 Mm³ of remaining capacity for hazardous (merchant) waste.

13.8.27. Historical data for remaining hazardous landfill capacity is only publicly available from the Environment Agency dating back to 2015. Remaining hazardous (merchant) landfill capacity in England is illustrated in **Figure 13-3**. Using simple statistical forecasting (using the Microsoft Excel forecasting function), in the absence of additional capacity, hazardous waste capacity is forecast to elapse in 2025.

Figure 13-3: Remaining hazardous (merchant) landfill capacity in England



13.8.28. The Tees Valley Joint Minerals and Waste Development Plan¹⁰ recognises the challenges around waste management and notes the opportunities that specialist waste management industries can provide to develop new waste management technologies and develop symbiotic relationships: making use of waste streams from one process as feed stocks for others. As noted in **paragraph 13.8.20**, the Plan includes measures for additional waste management facilities to aid the diversion of waste from landfill. Whilst the Plan does not identify the requirement for additional landfill space, the potential for privately manage additional landfill capacity cannot be ruled out. Furthermore, with overarching ambitions of the waste industry, local authorities and private companies to adhere to the highest tiers of the Waste Hierarchy and work to circular economy

principles, the quantities of waste which will require disposed of to landfill will continue to decrease over time.

FUTURE BASELINE

- 13.8.29. In a future baseline, and in the absence of the Proposed Scheme, it is considered that the land use within the Development Study Area will generally remain in its current state. However, as noted in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the area of the proposed former reclamation pond has planning permission for levelling the existing ground levels to a development platform (01/2203/P) granted in 2004.
- 13.8.30. The existing operational infrastructure operated by third parties (materials from waste facility, hydrogen storage facility, jetties and rail and roads) are anticipated to remain (where they are not subject to change by the Proposed Scheme). Whilst there may be occasional requirement to manage any potential damage or dilapidation of the existing infrastructure, it is anticipated that any material consumption or waste generation for disposal to landfill would be minimal.

13.9. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 13.9.1. This section sets out the embedded design, mitigation and enhancement measures which are relevant to the materials and waste assessment.

DESIGN AND CONSTRUCTION PHASE

- 13.9.2. Mitigation measures would be considered during the design and construction phase, including the reuse of site arisings generated during the construction phase and general best practice mitigation available at the time.
- 13.9.3. The Outline Code of Construction Plan (OCoCP), to be prepared at ES stage and submitted as part of the DCO, will detail the requirement for the Principal Contractor to develop and implement a Site Waste Management Plan (SWMP) and Material Management Plan (MMP). The detail of the OCoCP will be confirmed at ES stage.
- 13.9.4. The SWMP will detail how resources will be managed and waste controlled during the construction phase, and as a minimum includes:
- Details of the types of waste and quantities.
 - The management methods aligning to the Waste Hierarchy and Circular Economy Principles.
 - Legal requirements including any environmental permits, licences and discharge of duty of care responsibilities.
 - Details of the waste contractors used, including verification of their permitted or licensed status.
 - Roles and responsibilities for waste and resource management.
 - Key performance indicators and/or audit measures to ensure accountability of waste management.

13.9.5. The MMP will align to the CL:AIRE Definition of Waste Code of Practice³⁸ and put measures in place to maximise the reuse of any excavated arisings, in conjunction with the SWMP.

OPERATIONAL PHASE

13.9.6. In line with best practice, the Applicant will have in place a waste management plan (WMP) that adheres to and reflects the Waste Hierarchy.

DECOMMISSIONING PHASE

13.9.7. As outlined in **Chapter 2: Site and Proposed Scheme Description) (Volume 1)** a decommissioning plan would be prepared at the appropriate time. The Decommissioning Plan will include measures for the sustainable management of waste.

13.10. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

13.10.1. This section details the preliminary assessment of predicted impacts and effects for the Proposed Scheme during the construction, operational and decommissioning phases.

13.10.2. At the current design stage quantitative material waste data is unavailable. As such, a qualitative assessment has been undertaken to indicate the potential for significant effects to arise. The material and waste types and quantities will be reviewed for assessment within the ES.

ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

Construction Phase: Material Resources

13.10.3. The Proposed Scheme is anticipated to require the following materials during the construction phase:

- Concrete;
- Steel;
- Pipework;
- Soil;
- Breeze blocks;
- Cables; and
- Insulation.

13.10.4. As described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, levelling and infilling of the land made up of the former remediation pond may be required, although this will be undertaken by the landowner and does not form part of the Proposed Scheme.

13.10.5. Taking into account the scale and nature of the Proposed Scheme, the availability of material resources (detailed in **Table 13-5**) and using professional judgement, it is anticipated that sufficient supply of material resources will be available from regional (or where necessary national sources) during the construction phase.

- 13.10.6. The potential to incorporate recycled materials (where this does not compromise the form or function of the asset), would reduce any adverse effects. This may be considered as part of the preliminary design and processed further at detailed design stage.
- 13.10.7. The Proposed Scheme is located over a Mineral Safeguarding Area for gypsum and salt. The reserves are at significant depth and are already sterilised by existing infrastructure. As such, they would not be further sterilised by the construction of the Proposed Scheme. Further details can be found in **Appendix 3C: Geology and Soils Technical Note (Volume 3)**.
- 13.10.8. Using the existing baseline data for material resource availability in the North East of England and the UK, it can be asserted that there are currently no severe supply issues regarding supply and stock of key construction materials. Using professional judgement to apply the assessment criteria set out in **Table 13-2**, the sensitivity of material resources is considered **low**.
- 13.10.9. Given the current absence of quantitative information on the anticipated material types and quantities required for the Proposed Scheme, a qualitative assessment of effects on material resource consumption has been undertaken. The assessment uses professional judgement to take into consideration the regional and national availability of construction materials, the 'order of scale' of resources likely to be required, and no further sterilization of Mineral Safeguarding Areas, the magnitude for material resource consumption is not expected to exceed **minor**.
- 13.10.10. The potential significance of effects (subject to analysis of qualitative data) for construction phase material resources is therefore currently considered to be Slight Adverse and therefore not significant.

Construction Phase: Waste Generation and Disposal

- 13.10.11. At the current design stage, data on the anticipated wastes generated during the construction phase is limited. Key waste types likely to be generated for the Proposed Scheme construction are expected to comprise:
- Topsoil removal;
 - Excavation of concrete, aggregate and potential remediation arisings during site clearance, foundation removal and site preparation^a;
 - Organic waste; and
 - General construction waste including packaging, surplus or damaged items.
- 13.10.12. Quantities of these anticipated waste types are currently unconfirmed.
- 13.10.13. The Principal Contactor will be managing waste disposal and minimisation of waste to landfill through the SWMP.

^a Further details regarding ground investigation and the potential for remediation works are discussed in **Appendix 3-C: Geology and Soils Technical Note (Volume 3)**.

- 13.10.14. Using the baseline data for remaining capacity in North East England, forecast analysis suggest that there will be zero non-inert (hazardous and non-hazardous) landfill capacity by 2026, and inert waste landfill capacity will have reduced by 23% by 2028.
- 13.10.15. Remaining hazardous landfill capacity in North East England as of 2022 comprises 8.0Mm³, and is forecast (using simple forecasting techniques) to elapse in 2025, in the absence of additional capacity.
- 13.10.16. Given the forecast reduction in remaining landfill capacity and using professional judgement to apply the criteria set out in **Table 13-2**, the sensitivity of non-hazardous landfill as a receptor is considered **very high**, as new capacity, particularly for non-inert waste, would be required to meet demand. The sensitivity of hazardous waste is considered to be **high** as the remaining capacity is anticipated to decrease during the construction phase.
- 13.10.17. Given the current absence of detailed, quantitative information on the anticipated waste types, quantities, and the disposal route for wastes for the Proposed Scheme, a qualitative assessment of the magnitude of impact on remaining landfill capacity has been undertaken. The assessment uses professional judgement and takes into account the development and implementation of a SWMP for the Proposed Scheme, the magnitude for waste is currently considered **minor**, whereby regional landfill void capacity will be reduced between one and five percent. The potential significance of effect (subject to analysis of quantitative data) is therefore considered to be **Moderate Adverse** and therefore significant for non-hazardous and hazardous waste.

Operational Phase: Waste Generation and Disposal

- 13.10.18. As described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the Proposed Scheme has the potential to generate waste materials during its operational phase. These materials comprise:
- Wastewater;
 - Solid vitrified slag materials;
 - Filter cake effluent;
 - Other waste inorganic components that are larger than fine ash, including materials such as metals, glass, rocks and ceramics; and
 - Hazardous liquids associated with the carbon capture process.
- 13.10.19. These waste materials have significant scope to be recycled and / or have value recovered from them prior to any final disposal to land. In addition to this, given the forecast reduction in remaining landfill capacity and using professional judgement to apply the criteria set out in **Table 13-2**, the sensitivity of non-hazardous landfill as a receptor is considered very high as new capacity, particularly for non-inert waste, would be required to meet demand (as its scheduled to run out in 2026).
- 13.10.20. The sensitivity of hazardous waste is also considered to be high as the remaining regional capacity is anticipated to continue to decrease during the operational phase of the Proposed Scheme.

13.10.21. Given the current absence of detailed, quantitative information on the anticipated waste types, quantities, and the disposal route for wastes for the waste materials to be generated during the operational phase of the Proposed Scheme, a qualitative assessment of the magnitude of impact on remaining landfill capacity has been undertaken. The assessment uses professional judgement to assert that the magnitude for waste is currently considered **minor** whereby regional landfill void capacity will be reduced between one and five percent. The potential significance of effect (subject to analysis of quantitative data) is therefore considered to be **Moderate Adverse** and therefore significant for non-hazardous and hazardous waste.

Decommissioning phase: Waste Generation and Disposal

13.10.22. As described in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, it is assumed that at the end of the 50 years design life, structures of the Proposed Scheme will be demolished and removed to ground level or just below. Quantities of the expected demolition wastes are unconfirmed at this stage, however it is anticipated that the following process will be applied:

- Concrete will be crushed.
- Metals be recycled.
- Storage silos will be removed and either recycled or disposed.
- Below ground structures will be left in-situ (including piles, pipework, cables).

13.10.23. The baseline for remaining landfill capacity indicated that, in the absence of future provision, non-inert landfill capacity will expire in 2026. Forecasts for inert landfill capacity indicates the reduction in capacity is slower, but forecast to elapse in 2042. Similarly, hazardous waste landfill capacity will reduce year on year in the absence of any new capacity.

13.10.24. It is not considered a robust approach to forecast remaining landfill capacity for the 50 years design life of the Proposed Scheme as changes in waste management infrastructure, technology and policy and legal requirements will occur. However, given the development of a Decommissioning Plan that includes measure for sustainable waste management, using professional judgment, it can be asserted that any **Moderate Adverse** effects would be sufficiently mitigated, resulting in no significant effects.

13.11. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

13.11.1. The assessment of significant effects in this document will be reviewed and (where necessary) updated during the preparation of the ES, in response to the ongoing refinement of design information.

13.11.2. At this stage, it has been identified that there are potentially significant effects in relation to waste demolition and disposal for the construction phase, and end of life decommissioning phase. No likely significant effects have been identified for material resource consumption.

13.11.3. Additional mitigation measures during construction phase will be presented in the ES and may include a requirement for the Principal Contractor to achieve a minimum of

70% inert and non-hazardous material recovery rate in accordance with standard industry practice, with opportunities sought by the Principal Contractor to improve on this target. The Principal Contractor should consider how 100% reuse, recovery or recycling of construction waste could be achieved and provide justification where this is considered viable in terms of cost, safety and/or material quality or performance.

- 13.11.4. Management and handling of operational waste will need to comply with the Environmental Permit which will be sought for the Proposed Scheme by the Applicant. The Environmental Permit would control potential impacts from waste generated by the process.
- 13.11.5. During decommissioning phase, additional mitigation will comprise consideration of waste generation and disposal to be incorporated into the Decommissioning Plan. The Decommissioning Plan must include a statement on the sustainable management and disposal of waste generation and disposal which aligns with best practices as well as regulatory requirements at the time.
- 13.11.6. Other additional mitigation and good practice measures that may be appropriate to the use of material resources and waste generation and disposal are presented in **Table 13-10** and would be considered during the assessment at ES stage.

Table 13-10: Potential additional design, mitigation and enhancement measures

Element	Description	Stage
Materials	Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products ³⁹	Design and construction
	Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content, and setting net importation as a scheme goal.	Design
	Design for offsite construction: Maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction.	Design
	Design for the future: Considering how materials can be designed to be more easily adapted over an asset lifetime, and how deconstructability and demountability of elements can be maximised at end-of-first-life.	Design
	Identify opportunities to minimise the export and import of material resources.	Design and construction
	Manage engineering plan configurations and layouts to ensure the most effective use of materials and arisings can be achieved.	Design and construction

Element	Description	Stage
Waste	Engage early with contractors to identify possible opportunities to reduce waste through collaboration and regional synergies.	Design and Procurement
	Design for recovery and reuse: identifying, securing, and using material resources at their highest value, whether they already exist onsite, or are sourced from other schemes.	Design
	Ensure arisings are properly characterised before or during design, to maximise the potential for highest value reuse.	Design
	Forecast and identify the volume and type of woodland and other vegetative arisings that will be generated and establish opportunities for high-value reuse and recycling, both on and offsite.	Design and construction
	Identify areas for stockpiling and storing wastes that will minimise quality degradation and leachate and will minimise damage and loss.	Design and construction
	Working to a proximity principle, ensuring arisings generated are handled, stored, managed and reused or recycled as close as possible to the point of origin.	Design and construction

13.12. MONITORING

- 13.12.1.As detailed in the Embedded Design, Mitigation and Enhancement section, a SWMP will be prepared by the Principal Contractor and will include management and monitoring of site waste to reduce associated impacts, including potential harm to the environment.
- 13.12.2.A MMP will also be produced by the Principal Contractor and used to monitor the maximum reuse of both natural soils and made ground (contaminated or otherwise).
- 13.12.3.Operational waste generation and diversion from landfill should be monitored by the Applicant to ensure the Waste Hierarchy is implemented to its fullest extent possible. The Environmental Permit may require the Applicant to undertake some form of monitoring of operational waste, however this will be determined by the Environment Agency.

13.13. RESIDUAL EFFECTS

- 13.13.1.On the basis that the embedded and additional mitigation measures are adopted, it is expected that the magnitude of impact will reduce to where impacts are no more than **Slight Adverse**, and therefore not significant. This will be assessed fully in the ES.

Table 13-11: Summary of Residual Effects for Materials and Waste

Description of Effect	Sensitive Receptor	Significance of Effects	Additional Design, Mitigation and Enhancement Measures	Residual Effects
Construction Phase				
Depletion of material resources during construction.	Material resources	Slight Adverse (Not significant)	None required	Slight Adverse (Not Significant)
Reduction in regional or national landfill void capacity during construction.	Landfill void capacity	Moderate Adverse (Significant)	The Principal Contractor to achieve a minimum 70% inert and non-hazardous material recovery rate in accordance with standard industry practice and measures sought by the Principal Contractor to improve on this.	Slight Adverse (Not Significant)
Operation Phase				
Reduction in regional or national landfill void capacity during operation.	Landfill void capacity	Moderate Adverse (Significant)	Adherence to Environmental Permit requirements for managing and handling operational waste.	Slight Adverse (Not Significant)
Decommissioning Phase				
Reduction in regional or national landfill void capacity during decommissioning.	Landfill void capacity	Slight Adverse, (Not Significant)	None required	Slight Adverse (Not Significant)

13.14. NEXT STEPS

13.14.1. Further work to be completed and included in the ES will include:

- Refinement of the materials required, site arisings and wastes generated by the Proposed Scheme. Emerging data will therefore be used to assess at ES stage, the impact of the Proposed Scheme against the baseline information and using methodology set out within this chapter.
- Review of the baseline data to ensure the most up to foundation of data and information is presented.
- As the impacts of the Proposed Scheme are assessed at ES stage, details of embedded and other mitigation can be factored into the assessment. Should significant effects be identified, additional mitigation measures will be presented with an updated assessment of residual effects.

13.15. LIMITATIONS AND ASSUMPTIONS

13.15.1. The assessment of effects on material resources and landfill void capacity is based upon collated information, including third party data, which is assumed (by accessing reputable sources) to be valid.

13.15.2. The Material and Waste assessment has been limited to qualitative information due to the lack of qualitative data available at this stage of the design.

13.15.3. For material resources, the assessment baseline uses the most recent available published data, which is up to and including 2022 (unless stated otherwise). Future trends for material resources are not available; variance in stocks, production and/or sales are known to be relatively unpredictable.

13.15.4. For waste, baseline data and publicly available information for the assessment (unless otherwise stated) are available up to and including 2021. The Environment Agency (EA) typically updates waste data for England annually. The most up-to-date data available at the time of writing has been used to inform the Material and Waste Assessment; any subsequent updates to these data will be captured in the ES.

13.15.5. Landfill operators can claim commercial confidentiality for their data at time of submission; data for sites with a commercial confidentiality agreement in place are therefore unavailable for the analyses presented in this Chapter. Therefore, publicly available data has been used to inform the assessment. However, any absence of data through confidentiality agreements are considered unlikely to materially affect the findings of the assessment.

13.15.6. The assessment undertaken for the Material and Waste Assessment is relevant to the current design stage and will be updated for the ES as information on the design and (hence) materials and waste types and quantities (where available), are refined.

13.16. REFERENCES

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The logo for Lighthouse Green Fuels, featuring the company name in a bold, sans-serif font. The text is white and is contained within a white rectangular box. The background of the top half of the page is a solid green color, with a blue diagonal stripe running from the bottom left towards the top right, partially overlapping the green area.

**Lighthouse
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