AECOM

TKRE Cable Tunnel Replacement Project – National Grid

Environmental Statement Chapter 14 Materials and Waste - Tilbury

November 2023

Quality information

Prepared by		Checked by		Verified by		Approved by
SP – Principal Sustainability Consultant		LH – Principal Waste and Resources Specialist		MB – Technical Director (Waste and Resources)		HT – Principal EIA Consultant

Prepared for:

National Grid Electricity Transmission

Prepared by:

AECOM Limited
Aldgate Tower, 2 Leman Street
London, E1 8FA
United Kingdom

T: +44 20 7061 7000
aecom.com

© 2023 AECOM Limited. All Rights Reserved.

This document has been prepared by AECOM Limited ("AECOM") for sole use of our client (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

14 Materials and Waste 14-1
14.1 Introduction 14-1
14.2 Relevant Legislation, Policy and Guidance 14-2
14.3 Scope of Assessment 14-8
14.4 Assessment Methodology 14-9
14.5 Study Area 14-14
14.6 Baseline Conditions 14-15
14.7 Potential Impacts 14-22
14.8 Mitigation 14-27
14.9 Assessment of Effects 14-29
14.10 Cumulative Effects 14-30
14.11 Summary 14-30
14.12 References 14-31
14.13 Abbreviations 14-34

Figures

Figure 14.1 Authorised and Historic Landfills (Tilbury) 14-17

Plates

Plate 14-1: The Waste Hierarchy (Ref 14-34) 14-27

Tables

Table 14-1: National Planning Policy 14-3
Table 14-2: Local Planning Policy 14-5
Table 14-3: Materials Receptor Sensitivity 14-10
Table 14-4: Inert and Non-hazardous Landfill Capacity Sensitivity 14-11
Table 14-5: Hazardous Landfill Capacity Sensitivity 14-12
Table 14-6: Materials Magnitude of Impacts 14-12
Table 14-7: Inert and Non-hazardous Waste - Magnitude of Impact 14-13
Table 14-8: Hazardous Waste - Magnitude of Impact 14-13
Table 14-9: Significance of Effect Matrix 14-13
Table 14-10: National Consumption and Demand for Key Construction Materials .. 14-18
Table 14-11: Regional Sales for Construction Materials (Ref 14-30) 14-18
Table 14-12: Summary of Waste Inputs by Facility 2021 (Ref 14-31) 14-19
Table 14-13: Landfill Capacity (2021) in East of England, South East and England 14-20
Table 14-14: Standard, Good and Best Practice Recovery Rates by Material 14-20
Table 14-15: Potential Recycled Content (Ref 14-37) 14-22
Table 14-16: Construction Material Use and Waste Types Arising from the Construction of the Proposed Development 14-23

Table 14-17: Estimated Quantities for Key Construction Materials Used, Estimated Material Wastage, % of National and Regional Consumption 14-24
Table 14-18: Assessment of Materials and Waste Effects 14-29

14 Materials and Waste

14.1 Introduction

14.1.1 This chapter of the Environment Statement (ES) assesses the likely effects of the Tilbury to Grain and Tilbury to Kingsnorth (TKRE) Cable Tunnel Replacement Project ("the Proposed Development") on materials and waste. It considers the likely effects on material and waste receptors during the construction (including site clearance and demolition, excavation and construction) and operational phases.

14.1.2 The assessment includes consideration of impacts to landfill void capacity, national and regional availability of key construction materials and safeguarded mineral and waste sites. It should be noted that the assessment of materials and waste considers the impacts arising from the Proposed Development combined for the Gravesend and Tilbury sites rather than separating them into two assessments. This approach has been taken to allow the total impact to be considered in the context of the study area.

14.1.3 This chapter also identifies any additional mitigation measures to prevent, minimise or control likely adverse effects on material and waste receptors arising from the Proposed Development.

14.1.4 This chapter 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') (Ref 14-1).

14.1.5 For the purpose of this ES, materials and waste comprise:

- The consumption of materials (key construction materials only); and
- The generation and management of waste.

14.1.6 Materials are defined in the IEMA Guidance as *"physical resources that are used across the lifecycle of a development. Examples include key construction materials such as concrete, aggregate, asphalt and steel."* Other material assets considered include built assets such as landfill void capacity and safeguarded mineral and waste sites.

14.1.7 A safeguarded mineral site is defined as an operational site or sites identified within strategic planning documents for the extraction of minerals, e.g. quarry, wharf, rail depot, concrete plant. Mineral Safeguarding Areas (MSAs) are not included in this definition. As minerals can only be worked where they are found, it is important they are 'safeguarded' from by other development to help to secure a long-term supply of minerals.

14.1.8 MSAs are not assessed in this chapter accordance with the IEMA Guidance and are defined in Guidance Minerals (Ref 14-2) as *"an area designated by a Mineral Planning Authority (MPA) which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development".* MSAs are covered in the baseline section to provide context only.

14.1.9 Waste is defined as per the Waste Framework Directive (Ref 14-3) as *"any substance or object which the holder discards or intends or is required to discard".*

14.1.10 This chapter should be read together with the introductory chapters of this ES (Chapters 1 – 6).

14.1.11 This chapter is supported by the following appendix:

- Appendix 3.1: Outline Construction Environmental Management Plan (CEMP).

14.2 Relevant Legislation, Policy and Guidance

Introduction

14.2.1 The section of this chapter provides an overview of the relevant legislation, planning policy and technical guidance relevant to the materials and waste assessment.

Legislation

14.2.2 The following legislation is considered:

a. Waste Framework Directive (Ref 14-3);

b. The Environmental Protection Act 1990 (Ref 14-4);

c. The Hazardous Waste (England and Wales) Regulations 2005 (Ref 14-5);

d. The Waste (England and Wales) Regulations 2011 (Ref 14-6);

e. The Environmental Permitting (England and Wales) Regulations 2016 (Ref 14-7); and

f. Environment Act 2021 (Ref 14-8).

14.2.3 The Waste (England and Wales) Regulations 2011 (Ref 14-6) transpose the requirements of the Waste Framework Directive (Ref 14-3) 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 Framework Directive and prioritises waste prevention, followed by preparing for reuse, recycling, recovery and finally disposal as means of management of waste.

14.2.4 The Waste (England and Wales) Regulations 2011 (Ref 14-6) require businesses to apply the waste hierarchy when managing waste as a priority order (prevention, preparing for reuse, recycling, other recovery and disposal). From 2020, they also require that measures are taken to ensure that, 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)).

14.2.5 A business may depart from the waste hierarchy priority order to achieve the best overall environmental outcome where this is justified by life cycle thinking on the overall impacts of the generation and management of the waste. The following considerations must also be considered:

a. Environmental protection principles of precaution and sustainability;

b. Proximity principle for treatment and disposal of waste to be as close to its source as possible;

c. Technical feasibility and economic viability;

d. Protection of resources; and

e. Overall environmental, human health, economic and social impacts.

National Planning Policy

14.2.6 National planning policy relevant to this materials and waste assessment are detailed in Table 14-1.

Table 14-1: National Planning Policy

Policy Reference	Policy Context
National Planning Policy Framework (NPPF) (2023) (Ref 14-9**)**	
	The 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, 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."* That planning policies (set out in paragraph 210 of the NPPF) should: a. *"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;" and* b. *"safeguard mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development where this should be avoided (whilst not creating a presumption that the resources defined will be worked)."*
National Planning Practice Guidance (PPG) for Minerals (Ref 14-2**)**	
	This PPG provides guidance (to be read in conjunction with the NPPF) on minerals safeguarding and extraction in the plan making and application process. In relation to the Proposed Development, the following is relevant to consider: *"Whilst district councils are not mineral planning authorities, they have an important role in safeguarding minerals in 3 ways:* *a. having regard to the local minerals plan when identifying suitable areas for non-mineral development in their local plans. District councils should show Mineral Safeguarding Areas on their policy maps;* *b. "in those areas where a mineral planning authority has defined a Minerals Consultation Area, consulting the mineral planning authority and taking account of the local minerals plan before determining a planning application on any proposal for non-minerals development within it; and* c. *when determining planning applications, doing so in accordance with development policy on minerals safeguarding, and taking account of the views of the mineral planning authority on the risk of preventing minerals extraction."*
National Planning Practice Guidance (PPG) for Waste (Ref 14-10**)**	
	This PPG provides guidance (to be read in conjunction with the NPPF) on the implementation of waste planning policy in relation to its role in the planning process, implementation of the Waste Hierarchy, and waste management capacity and facilities. In relation to the Proposed Development, the following is relevant to consider: Planning authorities *"must have regard to national planning policy for waste and are expected to help deliver the Waste Hierarchy. This might include:* *a. considering, where relevant, the likely impact of proposed, non-waste related development on existing waste management sites and on sites and areas allocated for waste management"*
National Planning Policy for Waste (Ref 14-11**)**	

Policy Reference	Policy Context
	The National Planning Policy for Waste sets out detailed waste planning policies to be applied in conjunction with the NPPF. It sets out (in paragraph 8 of the document) guidance for local planning authorities when determining planning applications for non-waste developments: *"When determining planning applications for non-waste development, local planning authorities should, to the extent appropriate to their responsibilities, ensure that:* *a. 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;* *b. 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, in less developed areas, with the local landscape. This includes providing adequate storage facilities at residential premises, for example by ensuring that there is sufficient and discrete provision for bins, to facilitate a high quality, comprehensive and frequent household collection service; and* c. *the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal."*
Waste Management Plan for England (Ref 14-12**)**	
	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 (Ref 14-13**)**	
	Environmental Improvement Plan 2023 is the first refresh of the 25 Year Environmental Plan (25YEP) to Improve the Environment (published in 2018), the 25YEP *"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. Environmental Improvement Plan 2023 includes Goal 5: Maximise our resources, minimise our waste, which assesses progress against the 2018 version of the plan and sets out to *"minimise waste, reuse materials as much as we can and manage materials at the end of their life to minimise the impact on the environment"*. The following targets and commitments in Goal 5 are relevant: • Eliminate avoidable waste by 2050 and double resource productivity by 2050; • Eliminate avoidable plastic waste by 2042; • Halve 'residual' waste (excluding major mineral waste) produced per person by 2042. Residual is defined as waste that is sent to landfill, put through incineration or used in energy recovery in the UK, or that is sent overseas to be used in energy recovery.
Our Waste, Our Resources: A Strategy for England (Ref 14-14**)**	
	The strategy published in 2018 will 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*

Policy Reference	Policy Context
	damage caused to our natural environment by reducing and managing waste safely and carefully, and by tackling waste crime." The strategy combines actions to be taken now and commitments for the coming years. Key targets and milestones and targets, which could be relevant to the Proposed Development, include: a. Roll out of a deposit return scheme (subject to consultation) by 2023; b. Legislation for mandatory separate food waste collections (subject to consultation) by 2023; c. 75% recycling rate for packaging (subject to consultation) by 2030; d. 65% recycling rate for municipal solid waste by 2035; and e. Municipal waste to landfill 10% or less by 2035.

Local Planning Policy

14.2.7 Local planning policies relevant to this materials and waste assessment are detailed in Table 14-2.

Table 14-2: Local Planning Policy

Policy Reference	Policy Context
Tilbury	
Thurrock Council's Core Strategy and Policies for Management of Development (as amended) (Ref 14-15)	Adopted January 2015, the Core Strategy includes the following relevant policies: CSTP29: Waste Strategy ➢ Ensure developments minimise waste at source and maximise use of recycled materials. ➢ Reducing waste arisings and increased reuse, recycling and recovery of waste in line with Waste Hierarchy principles. ➢ Requirement for non-landfill waste sites to deal with C&D waste CSTP32: Safeguarding Mineral Resources ➢ Mineral Safeguarding Areas (MSAs) will be safeguarded from non-mineral related developments. The MSAs will be identified in the Thurrock local Plan. ➢ Applications for non-mineral related development on the sites within MSAs will be assessed against the policies provided in the Thurrock Local Plan. ➢ All existing aggregate wharves will be safeguarded against proposals which prejudice their use for the importation of aggregates. These wharves will be identified in the Thurrock Local Plan.
Thurrock Council Policies Map (Ref 14-6)	Accompanies the Thurrock Core Strategy (Ref 14-15), providing an interactive map that covers the Thurrock borough area to show where land-based area policies apply.
Thurrock Local Plan : Local Development Scheme (Ref 14-17)	Sets out the timetable for producing a new Local Plan which will set out the amount development for Thurrock and its distribution across the borough, which will be a long-term planning policy framework for the area. As of September 2023, Thurrock Council were still in the process of preparing a draft Local Plan (no draft was available for review at the time of writing). The purpose as outlined in the
Essex Minerals Local Plan (Ref 14-18)	The Essex Minerals Local Plan identified the following sites for safeguarding in relation to the landing of marine sand and gravel and imports: **Type of Facility** / **Location – Operator** Marine Wharves / Purfleet Wharf – Civil & marine and Aggregates Industries

Policy Reference	Policy Context
	<table><tr><td></td><td>Gibbs Wharf – Aggregates Industries</td></tr><tr><td>Combined Rail Depot and Wharves</td><td>Purfleet – Aggregates Industries West Thurrock – Lafarge</td></tr><tr><td>Operational Port of Tilbury</td><td>Tilbury</td></tr></table> Thurrock Council's Core Strategy provides detailed guidance on the policies relating to minerals policies relating to these facilities.
Gravesend	
Gravesham Local Plan Core Strategy (Ref 14-19)	Adopted in 2014, the Core Strategy should be read in conjunction with the Kent Minerals and Waste Local Plan (KMWLP) 2013-2030. It comprises 19 objectives and 20 policies to provide the framework for the council's jurisdiction up to 2028 to: a. Set out a long-term vision for the future of Gravesham; b. Support and inform on sustainable development; an c. Provide a consistent basis for planning application decisions. The Core Strategy includes the following relevant policies: CS11: Transport ➢ Proposes that commercial wharves are safeguarded, protecting them from development which could prejudice their future use for minerals importation. CS19: Development and Design Principles ➢ New developments will be required to provide appropriate facilities for the storage and recycling of waste.
Gravesham Local Plan Policies Map (Ref 14-20)	Accompanies the Gravesham Core Strategy (Ref 14-20), providing maps that cover the Gravesham borough area to show where land-based area policies apply.
Kent Minerals and Waste Local Plan 2013-30 (as amended by the Early Partial Review) (Ref 14-21)	Adopted in 2020, the KMWLP includes strategic policies for minerals and waste development as well as development management policies used to determine planning applications. Here are relevant guidance and policies: **Strategic Objectives** • For Minerals, *"safeguarding existing, planned and potential sites for mineral infrastructure including wharves and rail depots across Kent to enable the on-going transportation of marine dredged aggregates, crushed rock and other minerals as well as other product facilities"*; and • For Waste, *"increase amounts of Kent's waste being re-used, recycled or recovered. Promote the movement of waste up the Waste Hierarchy by enabling the waste industry to provide facilities that help to deliver a major reduction in the amount of Kent's waste being disposed of in landfill."* **Policies** CSM 6: Safeguarded Wharves and Rail Depots ➢ *"The Local Planning authorities will consult the Minerals Planning Authority and take into account its views before making a planning decision for non-mineral related development on all development proposed at, or within 250m of, a safeguarded minerals transportation facility."* ➢ Of the locations listed in this policy, Clubbs Marine Terminal, Gravesend and Wharf 42, Northfleet are the nearest safeguarded sites to the Proposed Development site, but neither are within a 250m radius. CSW 2: Waste Hierarchy

<table>
<tr><th>Policy Reference</th><th>Policy Context</th></tr>
<tr><td></td><td>
“To deliver sustainable waste management solutions for Kent, proposals for waste management must demonstrate how the proposal will help drive waste to ascend the Waste Hierarchy whenever possible.”
CSW 3: Waste Reduction
All new developments must minimize construction, demolition, and excavation waste production while aligning with Policy CSW 2 objectives. Planning applications must include:
Measures for demonstrating policy compliance.
Details of the type and quantity of construction, demolition, and excavation waste and its management.
An assessment of waste generated during occupation, addressing storage, collection, and management.
Proposals should ensure:
Sufficient temporary waste storage space for development-generated waste, with segregation for recyclables.
Provision of communal waste storage, including separate recyclable areas if needed, prior to collection.
High-quality waste storage and collection systems, designed for user and collection operative access, supporting waste management targets.
Contingency plans for addressing mechanical breakdowns. All relevant proposals must include a recycling and waste management strategy demonstrating adherence to local authority waste management targets.
CSW 4: Strategy for Waste Management Capacity
The KMWLP sets out minimum targets to be achieved by 2025/26 and 2030/31 for management of different waste types.
<table>
<tr><th>Commercial and Industrial Waste</th><th>2025/26</th><th>2030/31</th></tr>
<tr><td>Recycling/Composting</td><td>55%</td><td>60%</td></tr>
<tr><td>Other Recovery</td><td>32.5%</td><td>30%</td></tr>
<tr><td>Remainder to Landfill</td><td>12.5%</td><td>10%</td></tr>
<tr><th>C&D Waste (Non-Inert only)</th><th>2025/26</th><th>2030/31</th></tr>
<tr><td>Recycling</td><td>13%</td><td>14%</td></tr>
<tr><td>Composting</td><td>1%</td><td>1%</td></tr>
<tr><td>Other Recovery</td><td>5%</td><td>5%</td></tr>
<tr><td>Remainder to Landfill</td><td>0.5%</td><td>0.5%</td></tr>
</table>
</td></tr>
</table>

Guidance

14.2.8 This materials and waste assessment has been carried out in accordance with the following:

a. IEMA Guide to: Materials and Waste in Environmental Impact Assessment (Ref 14-1);

b. Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (DoWCoP), v2 (2011) (Ref 14-22); and

c. Waste and Resources Action Programme (WRAP) Designing Out Waste: A Design Team Guide for Civil Engineering (Ref 14-23).

14.3 Scope of Assessment

Considered in the Assessment

14.3.1 The following have been considered as in scope for the Materials and Waste assessment:

a. Changes in demand for materials during construction; and

b. Changes in available landfill capacity during construction.

Not Considered in the Assessment

14.3.2 The following items have been considered as out of scope for the Materials and Waste assessment:

a. Waste arising from extraction, processing and manufacture of construction components and products. This assumes 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;

b. 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 addressed separately in other relevant chapters;

c. Impacts on safeguarded mineral sites. The Site Boundary does not pass through any such sites therefore this aspect is scoped out of the assessment;

d. Direct impacts on MSAs. In accordance with the IEMA Guidance, impacts are not assessed in the materials and waste assessment. MSAs are included for context in the baseline since MSAs are a planning consideration and further consultation and assessment in accordance with MPA policies may be required at a later stage. MSAs are addressed in the Planning Statement accompanying the planning application for the Proposed Development;

e. Effects on the availability of materials during the operational phase of the Proposed Development: forecast effects are (using professional judgement) considered negligible in relation to the scale and nature of the development, since only very small quantities of materials would be required on an intermittent basis;

f. Effects of the Proposed Development on regional inert and non-hazardous waste landfill capacity and national hazardous waste landfill capacity during the operational phase of the Proposed Development. Effects associated with the operational phase are scoped out due to the nature of the Proposed Development, and knowledge of similar Proposed Developments' limited operational material usage and waste disposal requirements; and

g. Effects associated with decommissioning, as the Proposed Development has an initial design life of 120 years and if it is to be decommissioned, its constituent parts would be decommissioned in accordance with the relevant legislation at that time and removed or disposed or used in an appropriate manner.

Additional Consultations

14.3.3 Screening opinions were received from Thurrock Council and Gravesham Borough Council. Thurrock Council confirmed the Proposed Development was not EIA development. However as Gravesham Borough Council deemed the Proposed Development to be EIA development, an Environmental Statement is being provided with planning applications to both Thurrock Council and Gravesham Borough Council. The screening opinion did not include any specific comments or feedback related to materials and waste, and no additional consultation has been carried out.

14.4 Assessment Methodology

14.4.1 This section outlines the methodology employed for assessing the likely significant effects associated with materials and waste. The IEMA Guidance offers two methods for the assessment of waste:

a. W1 – Void Capacity

b. W2 – Landfill Diversion

14.4.2 For the purposes of this assessment, Method W1 – void capacity has been selected as this is a more detailed methodology and is appropriate for larger and more complex projects.

Overview

14.4.3 The assessment of materials and waste considers the impacts arising from the Proposed Development combined for the Gravesend and Tilbury sites rather than separating them into two assessments. This approach has been taken to allow the total impact to be considered in the context of the study area.

14.4.4 The assessment of materials and waste considers the following:

a. 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;

b. Facilities transferring, treating, or disposing of waste must be either licensed or apply for an exemption from a licence, and impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for these facilities themselves;

c. 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

d. Minerals 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.

Key Receptors

14.4.5 The sensitive receptors for this assessment of construction impacts are:

a. Landfill void capacity in the Study Areas of East of England and South East (non-hazardous landfill void capacity) and England (hazardous landfill void capacity) – as defined in the IEMA Guidance *"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."*

b. Materials, national and regional consumption of key construction materials – as outlined in the IEMA Guidance *"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."*

14.4.6 The IEMA Guidance *"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."*

14.4.7 The sensitivity of receptors and magnitude of impacts on materials and waste is assessed through the following:

Materials

a. Establishing the baseline for national and regional consumption of key materials (construction materials) by weight;

b. Assessing the sensitivity of materials as related to the availability and types of materials to be consumed by the Proposed Development in construction;

c. Establishing the quantities of key construction materials required for the construction of the Proposed Development; and

d. Comparing the total quantities of key construction materials with the most recent national and regional demand (utilising a percentage approach).

Waste

a. Establishing the baseline landfill void capacity in the Study Areas;

b. Assessing the sensitivity of landfill void capacity;

c. Establishing the quantities of construction, demolition and excavation waste to be generated during the construction of the Proposed Development; and

d. Comparing the total waste arising from the construction of the Proposed Development against the landfill void capacity (utilising a percentage approach).

Receptor Sensitivity

14.4.8 The sensitivity of materials relates to the availability and type of construction material to be consumed by the Proposed Development. The IEMA Guidance criteria described within Table 14-3 are used to determine the sensitivity of materials.

Table 14-3: 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.

Effects	Criteria for materials receptor sensitivity
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.	

14.4.9 The sensitivity of waste relates to availability of landfill capacity in the absence of the Proposed Development. As outlined in the IEMA Guidance *"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.

14.4.10 The criteria described within Table 14-4 and Table 14-5 are used to determine the sensitivity of landfill capacity.

Table 14-4: Inert and Non-hazardous Landfill Capacity Sensitivity

Effects	Criteria for inert and non-hazardous landfill capacity sensitivity
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:	
Negligible	remain unchanged or is expected to increase through a committed change in capacity.
Low	reduce minimally by <1% as a result of wastes forecast.
Medium	reduce noticeably by 1-5% as a result of wastes forecast.
High	reduce considerably: by 6-10% as a result of wastes forecast.
Very High	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 14-5: Hazardous Landfill Capacity Sensitivity

Effects	Criteria for hazardous landfill capacity sensitivity
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:	
Negligible	remain unchanged, or is expected to increase through a committed change in capacity.
Low	reduce minimally: by <0.1% as a result of wastes forecast.
Medium	reduce noticeably: by 0.1-0.5% as a result of wastes forecast.
High	reduce considerably: by 0.5-1% as a result of wastes forecast.
Very High	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

14.4.11 The magnitude of impact describes the degree of variation from the baseline conditions as result of the Proposed Development. The methodology for assessing the magnitude of impact on 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 within Table 14-6.

Table 14-6: Materials Magnitude of Impacts

Effects	Criteria for materials magnitude of impacts
No change	No consumption of materials is required.
Negligible	Consumption of no individual material type is equal to or greater than 1% by volume of the national* baseline availability.
Low	Consumption of one or more materials is between 1-5% by volume of the national* baseline availability.
Medium	Consumption of one or more materials is between 6-10% by volume of the national* baseline availability.
High	Consumption of one or more materials is >10% by volume of the national* baseline availability.
* National baseline is used in the absence of regional construction material consumption data for all key materials	

14.4.12 The methodology for assessing the magnitude of impact for waste comprises a percentage-based approach that determines the influence of waste generation from the construction phase 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 14-7 and Table 14-8.

Table 14-7: Inert and Non-hazardous Waste - Magnitude of Impact

Effects	Criteria for waste magnitude of impacts
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce Study Area landfill capacity baseline* by <1%
Low	Waste generated by the development will reduce Study Area landfill capacity baseline* by 1-5%
Medium	Waste generated by the development will reduce Study Area landfill capacity baseline* by 6-10%.
High	Waste generated by the development will reduce Study Area landfill capacity baseline* by >10%
* Forecast as the worst-case scenario, during a defined construction and/or operational phase.	

Table 14-8: Hazardous Waste - Magnitude of Impact

Effects	Criteria for waste magnitude of impacts
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce Study Area landfill capacity baseline* by <0.1%
Low	Waste generated by the development will reduce Study Area landfill capacity baseline* by <0.1-0.5%
Medium	Waste generated by the development will reduce Study Area landfill capacity baseline* by <0.5-1%
High	Waste generated by the development will reduce Study Area landfill capacity baseline* by >1%
* Forecast as the worst-case scenario, during a defined construction and/or operational phase.	

Significance Criteria

14.4.13 Table 14-9 describes the effect thresholds used in determining the significance of potential effects and shows the significance of the effects as reproduced from the IEMA Guidance.

Table 14-9: Significance of Effect Matrix

		Magnitude of Impact				
		No change	Negligible	Minor	Moderate	Major
Sensitivity of Receptor	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

14.4.14 Any effects which are considered to be either Negligible or Minor are not considered to be significant in impact. Effects which are classed as either Moderate, Major or Very Large are considered to be significant effects for the purposes of this assessment.

Assumptions and Limitations

14.4.15 The material and waste assessment has been undertaken on the basis of information available at the time of the assessment. the following assumptions have been applied:

a. Based on a reasonable worst-case assessment, a 5% wastage rate applied to all construction materials.

b. It is anticipated that a number of items (e.g. pre-fabricated steel) would not produce wastage and so the 5% wastage rate has not been applied in those instances.

c. In a worst-case scenario, all waste would be disposed of to landfill, however 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.

14.4.16 A detailed description of the Proposed Development is provided in Chapter 3 - The Project Description. The following aspects of the Proposed Development relevant to this chapter comprise:

- Excavation (including site remediation, preparation and earthworks):
  a. Vegetation clearance and removal of top-soil at the Gravesend site (minimal clearance is expected at the Tilbury site due to the existing hardstanding);
  b. Soil, stone and dredging spoil due to excavation for:
     i. the tunnel (based on a cut diameter of 4.7m and 2.205km length);
     ii. the Tilbury access shaft (based on a cut diameter of 16.4m with a depth of 41m);
     iii. the Gravesend access shaft (based on a cut diameter of 16.4m with a depth of 39m).
  c. Storage areas for construction and excavated materials.

- Demolition:
  a. Removal of three pylons and a small building within the Tilbury works and one pylon within the Gravesend works.

- Site construction:
  a. Aggregate material to be imported to raise site levels to required values at Tilbury and Gravesend sites; and
  b. Key construction materials (steel, concrete and aggregates) required for the Proposed Development.

14.5 Study Area

14.5.1 The Study Areas for the assessment of impacts related to materials and waste have been defined in line with the IEMA Guidance.

14.5.2 Within this section, Study Areas are defined for the following:

a. Construction waste generation;

b. Use of construction materials (key construction materials only);

c. Impacts on safeguarded mineral and waste sites;

d. Presence of MSAs for context (a study area for MSAs is not defined in the IEMA Guidance);

e. Presence of historic landfills within the Proposed Development Boundary (a study area for historic landfills is not defined in the IEMA Guidance);

f. Non-hazardous, inert, and hazardous construction waste management; and

g. Availability of key construction materials.

14.5.3 The Study Area for construction waste generation, use of construction materials, impacts on safeguarded mineral and waste sites, presence of MSAs for context, and presence of historic landfills is the Site Boundary.

Study Area for non-hazardous and inert waste management

14.5.4 The Study Area for non-hazardous waste management comprises the East of England and South East of England. The Study Area includes the following sub-regions as outlined in the Environment Agency's (EA) 2021 Waste Summary Tables for England - Version 3 last updated in January 2023 (Ref 14-24):

a. Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk and Suffolk; and

b. Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex.

14.5.5 The Study Area for non-hazardous and inert waste management is defined based on professional judgement and informed by consideration of the proximity principle. The Study Area has been determined to comprise the wider region within which landfill capacity is located (i.e. the East of England and South East of England) since the Proposed Development is located across the border of these two regions and waste could be managed in either region.

Study Area for hazardous waste management

14.5.6 The Study Area for hazardous waste management is England. The Study Area 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 *"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"* (Ref 14-25). Planning for hazardous waste management is also undertaken at a national level.

Study Area for availability of key construction materials

14.5.7 The Study Area for availability of key construction materials (aggregates, asphalt, concrete and steel) is national (United Kingdom (UK) or Great Britain (GB)) and regional, dependent on baseline information availability).

14.6 Baseline Conditions

14.6.1 Baseline data relevant to the Proposed Development Boundary and regional and national study areas is set out below.

Safeguarded Mineral and Waste Sites, MSAs and Historic Landfills

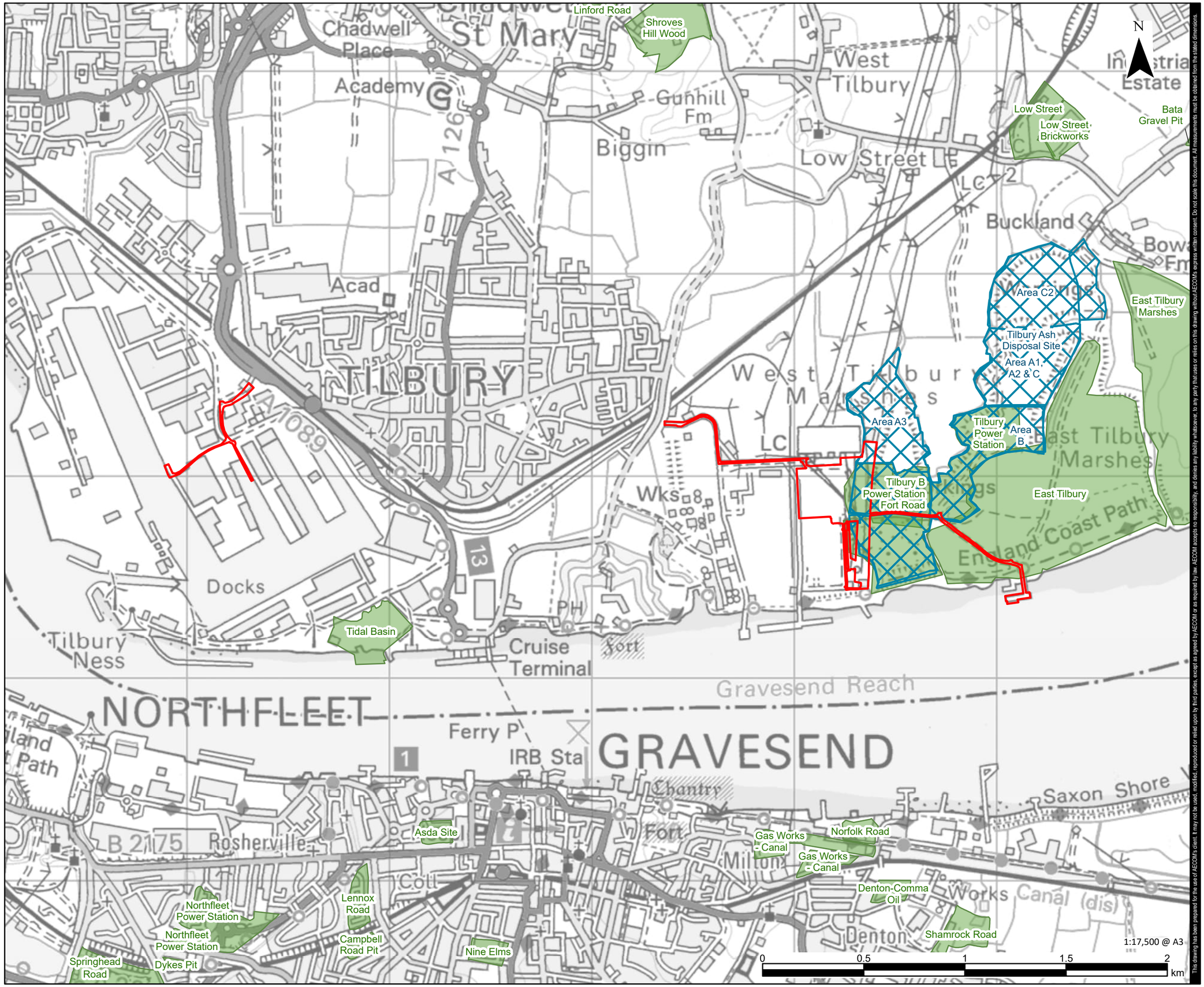
Tilbury Site

14.6.2 The Proposed Development lies within the boundary of one historic landfill (Tilbury B Power Station Fort Road authorised for inert waste with first input in 1978) (Ref 14-26) and two authorised landfills (R W E n Power plc Tilbury B Power Station Fort Road and Ingrebourne Valley Ltd Tilbury Ash Disposal Tip) (Ref 14-27). See Figure 14.1 below.

14.6.3 There are no other permitted waste sites or waste site applications in the vicinity (within 500m) of the Proposed Development (Ref 14-28).

14.6.4 The Thurrock Council Core Strategy and Policies for Management of Development (Ref 14-15) safeguards MSAs, mineral and waste sites however, the associated Policies Map (Ref 14-16) does not show any MSAs or safeguarded mineral or waste sites (policy "*CSTP32 Safeguarding Mineral Resources"*, "*CSTP29 Waste Strategy"* and *"Strategic Spatial Objective SSO15"*.

14.6.5 Thurrock Council are working on a new Local Plan and the preparation of a Minerals and Waste Local Plan is currently under review (Ref 14-17). The documents will set out MSAs and safeguarded mineral and waste sites.



This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.

AECOM

PROJECT

TKRE National Grid

CLIENT

National Grid

CONSULTANT

AECOM Limited
100 Embankment
Cathedral Approach
Manchester, M3 7FB
www.aecom.com

LEGEND

- Red Line Boundary (Above Ground)
- Authorised Landfill Sites
- Historic Landfill Sites

NOTES

Reproduced from Ordnance Survey digital map data © Crown copyright 2023. All rights reserved. Licence number 0100031673.

ISSUE PURPOSE

Environmental Statement

PROJECT NUMBER

60677311

FIGURE TITLE

Authorised and Historic Landfills (Tilbury)

FIGURE NUMBER

Figure 14.1

Revision: 0 Drawn: JH Checked: DF Approved: HT Date: 2023-11-09

Filename: \\na.aecomnet.com\fs\EMEA\Manchester-UKMCR5\Legacy\UKMCR\FP002-V1\EP\proposal\3512\National Grid TKRE GIS\02_Maps\ES\Vol III Tilbury Technical Chapters\Chapter 14 Materials and Waste\TKRE_ES_Chapter14_MaterialsAndWaste_20231109_JH.aprx

Gravesend Site

14.6.7 There are no historic or authorised landfill, permitted waste sites or waste site applications in the vicinity of the Proposed Development. The closest site is the Shamrock Road historic landfill approximately 480m south west of the works (Ref 14-27, Ref 14-28, Ref 14-29).

14.6.8 There is a safeguarded wharf (Clubb's Marine Terminal) approximately 420m from the west of the Proposed Development (policies "CS07 Economy, Employment and Skills" and "CS11 Transport" of the Gravesham Council Local Plan (Ref 14-19) and policies map (Ref 14-20) and policy *"CSM 6 Safeguarded Wharves and Rail Depots"* of the Kent Minerals and Waste Local Plan (Ref 14-21).

14.6.9 There are no safeguarded mineral or waste sites in the vicinity of the Proposed Development. The Proposed Development lies within a MSA for sub-alluvial river terrace deposits (Policy CSM 5 Land-won Mineral Safeguarding) (Ref 14-21). MSAs are not considered in a materials and waste assessment (see section 14.1.7– 14.1.8).

National and Regional Availability of Key Construction Materials

14.6.10 UK and GB and regional data has been used to establish a quantitative national and regional baseline of the consumption (proxy for availability) for key constructional materials. Table 14-10 summarises national consumption in 2018 for aggregates, asphalt, concrete and steel (the most recent years for which data is available), which are the key construction materials expected to be used during the construction of the Proposed Developm1ent. Regional data for 2018 is presented in Table 14-11. Construction material sales by region are provided for the regions surrounding the Proposed Development. It is assumed that the majority of key construction materials would be sourced locally, taking into account the proximity principle and value for money.

Table 14-10: National Consumption and Demand for Key Construction Materials

Construction Material	National Consumption (tonnes/ year)	Data Description	1% of National Consumption (tonnes)	5% of National Consumption (tonnes)
Steel	17,000,000	UK total consumption (Ref 14-29)	170,000	850,000
Aggregates	250,973,836	Minerals products sales in UK (Ref 14-30)	2,509,738	12,548,692
Ready-mixed Concrete	41,027,861		410,279	2,051,393
Asphalt	22,896,598		228,966	1,144,830

Table 14-11: Regional Sales for Construction Materials (Ref 14-30)

Construction Material	East of England (tonnes/ year)	South East (tonnes/ year)	Total Regional (tonnes / year)	1% of Total (tonnes)	5% of Total (tonnes)
Crushed Rock (tonnes)	0	0	0	0	0
Sand and Gravel (tonnes)	13,668,002	16,121,701	29,789,703	297,897	1,489,485
Ready-mixed Concrete (cubic metres)	3,536,710	5,713,754	9,250,464	92,505	462,523
Asphalt (tonnes)	2,488,518	1,927,312	4,415,830	44,158	220,792

Landfill Capacity

14.6.11 Remaining landfill capacity at the end of 2021 as outlined on the EA's 2021 Waste Summary Tables for England – Version 3 (Ref 14-24) for the non-hazardous and inert waste expansive study area (East of England and South East) and the hazardous waste study area (England) is shown in Table 14-13. Total non-hazardous landfill capacity in the East of England and South East was 99 million m^3. Hazardous waste landfill capacity in England was 1.3 million m^3.

14.6.12 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) and therefore additional capacity is excluded from the baseline. Some non-hazardous landfill have a Stable Non-Reactive Hazardous Waste Cell (SNHRW) 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 14-12: Summary of Waste Inputs by Facility 2021 (Ref 14-31)

Facility type	East of England (tonnes received)	South East (tonnes received)
Metal Recycling Services	2,376,521	1,036,641
On/In Land	1,590,034	2,381,949
Transfer	4,867,368	6,504,965
Treatment	11,518,694	11,817,292
Use of Waste	2,043	0
Combustion	98,687	51,634
Incineration	1,533,352	3,488,603
Storage	337,820	861,710
Processing	517,570	1,233,677

Waste Management Infrastructure

14.6.13 The permitted capacity of other types of waste infrastructure is publicly available (e.g. Environmental Permitting Regulations - Waste Sites (Ref 14-28)). However, the permitted capacity is not necessarily representative of the actual operational capacity of the infrastructure. Therefore data are collated for the Study Areas from the EA's Waste Data Interrogator 2021 – Waste Received last updated 2nd June 2023 (Ref 14-31) and presented in Table 14-13. Inputs are not totalled since there will be double counting of waste in the Waste Data Interrogator as waste is transferred between different facilities.

14.6.14 The IEMA Guidance (p.14) *"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."* Therefore, a full list of waste management infrastructure in the region is not included in the baseline.

Table 14-13: Landfill Capacity (2021) in East of England, South East and England

Landfill Type	Sub-Region					
	East of England	South East	Total for East of England & South East	1% of total landfill capacity in East of England & South East	England	1% of total landfill capacity in England
	Capacity (000s m^3)					
Hazardous Merchant	0	121	121	Not applicable (hazardous landfill considered at national level)	12,528	125
Non-hazardous with SNRHW Cell	4,679	12,556	17,235	172	N/A	Not applicable (non-hazardous and inert landfill considered at regional level
Non-hazardous	18,511	19,184	37,695	377	N/A	
Inert	24,089	20,084	44,173	442	N/A	
Total Non-hazardous and Inert	47,279	51,824	99,103	991	N/A	

Targets for Waste Management

14.6.15 The national target for recovery of construction and demolition waste is 70% by weight, as set out in the Waste Framework Directive (WFD) (Ref 14-3) and the Waste Management Plan for England (Ref 14-16). 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)). Recovery is deemed to include reuse, recycling and other recovery e.g. energy recovery.

14.6.16 A good practice landfill diversion target of 90% has been achieved and exceeded by major UK developments as outlined in the IEMA Guidance (Ref 14-1). In 2018, the UK generated 68.2 million tonnes of non-hazardous Construction and Demolition (C&D) waste, of which 63.7 million tonnes was recovered. This represents a recovery rate of 93.3% (Ref 14-32).

14.6.17 Standard, good and best practice recovery rates by material are provided by Waste and Resources Action Programme (WRAP) (Ref 14-33). Recovery rates for key construction materials and other construction wastes relevant to the Proposed Development are provided in Table 14-14.

Table 14-14: 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

Material	Standard Practice Recovery (%)	Good Practice Recovery (%)	Best Practice Recovery (%)
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.	

14.6.18 As set out in the National Grid's Our 2021–2026 Environmental Action Plan (dated April 2021) (Ref 14-35) by 2026 National Grid aims to:

a. achieve zero-waste to landfill across construction projects;

b. reduce the waste intensity of construction projects year on year;

c. pilot and implement circular economy principles by aligning the business to internationally recognised standards, e.g. BS 8001– circular economy standards;

d. increase construction recycling and composting rates and set a target from a 2021/22 baseline;

e. align Procurement Strategy to internationally recognised standards, e.g. ISO20400 Sustainable Procurement;

f. increase operational and office recycling rates from 45% and 46% (respectively) to 60%; and

g. maintain high standards of oil containment and pollution management.

Future Baseline

National and Regional Availability of Key Construction Materials

14.6.19 There is no publicly available information on any potential long-term changes to this national demand by the time the Proposed Development will be constructed. Construction material demand such as ready mixed concrete is closely aligned to both the quantity of construction taking place and the general economy therefore it is deemed inappropriate to forecast future demand as the demand is unlikely to be linear. It is therefore not possible to set a future baseline for resources. Therefore, future consumption is assumed to be the same as the current baseline as outlined in Table 14-10 and Table 14-11.

Landfill Capacity

14.6.20 There is no publicly available information on any potential changes to this landfill capacity by the time of the construction or operation of the Proposed Development.

14.6.21 Due the fluctuating nature of inert and hazardous landfill capacity, it is not realistic to forecast future landfill capacity since this may result in an increase in landfill capacity (due to increases in capacity as new sites are developed). Therefore, inert and hazardous landfill capacity is assumed to remain the same as the current baseline outlined in Table 14-13:.

14.6.22 For non-hazardous capacity 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: if there is still a need for landfill, then the waste planning authority 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 outlined in Table 14-13:.

14.7 Potential Impacts

Introduction

14.7.1 The assessment of effects has been carried out on a project wide basis.

14.7.2 Material receptor sensitivity is conservatively determined as 'medium'. On balance, the key materials required for the construction of the Proposed Development are forecast:

a. to suffer from some potential issues regarding supply and stock; and

b. Key materials are available comprising some sustainable features and benefits compared to industry-standard materials (e.g. recycled content).

14.7.3 Potential recycled content for the main construction materials are outlined in Table 14-15.

Table 14-15: Potential Recycled Content (Ref 14-37)

Material type	Potential recycled content (% by weight)
Concrete	16
Asphalt	25
Aggregates	50
Steel reinforcement	100
Structural steel	60
Steel pipework	0

14.7.4 Waste receptor sensitivity is determined as 'very high'. This is because, as there is no publicly available information on any potential changes to landfill capacity by the time of the construction or operation of the Proposed Development a worst scenario is considered, namely that:

a. Without the Proposed Development, non-hazardous landfill void capacity in the Study Area is expected to:

   i. Reduce very considerably (by >10%);

   ii. End during construction and operation;

   iii. Is already known to be unavailable; or,

   iv. Would require new capacity or infrastructure to be put in place to meet forecast demand.

b. Without the Proposed Development, hazardous landfill void capacity in the Study Area is expected to:

   i. Reduce very considerably (by >1%), in the past there has been >1% reduction in landfill capacity;

   ii. End during construction and operation;

   iii. Is already known to be unavailable; or,

   iv. Would require new capacity or infrastructure to be put in place to meet forecast demand.

Potential Construction Effects

14.7.5 Potential construction effects are considered for the whole of the Proposed Development.

14.7.6 Table 14-16 summarises the likely types of materials that will be used and wastes that are likely to be generated during the construction of the Proposed Development.

Table 14-16: Construction Material Use and Waste Types Arising from the Construction of the Proposed Development

Construction Activity	Materials Used	Waste Types Generated
Site remediation / 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. • Tunnel and shaft excavation materials. • Tunnel Boring Machine (TBM) slurry (if slurry method used).
Demolition	• Materials are not required for demolition works.	• Waste arisings from the required demolition of the existing building at Tilbury.
Site construction	• Main construction materials including: – Steel – Aggregates – Concrete – Reinforced concrete for tunnel segments. • Other materials – Cement – Bentonite – Retardants/ accelerators – Hydraulic oil – Foam agents and polymers – Acid	• 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.

Construction Materials

14.7.7 The estimated main types and quantities of construction materials (i.e. steel, concrete and aggregate) anticipated to be used during construction of the Proposed Development are outlined in Table 14-17.

Table 14-17: Estimated Quantities for Key Construction Materials Used, Estimated Material Wastage, % of National and Regional Consumption

Material Type	Material Density (tonnes/m³)	Quantity Used (tonnes)	Quantity Used (m³)	5% Wastage (tonnes)	5% Wastage (m³)	National Material Consumption (tonnes)	% of National Material Consumption	Magnitude of Impact	Sensitivity	Effect	Regional Material Consumption (tonnes)	% of Regional Material Consumption	Magnitude of Impact	Sensitivity	Effect
Steel	8.0*	656	82	0	0	17,000,000	<0.1%	Negligible	Medium	Slight	*No Regional Data*		*n/a*	*n/a*	*n/a*
Concrete	2.4*	28,392	11,830	532	222	41,027,861	<0.1%				9,250,464	0.3%	Negligible	Medium	Slight
Aggregate	2.0*	108,754	54,393	5,438	2,720	250,973,703	<0.1%				29,789,703	0.4%			
Total	N/A	137,802	66,305	5,969	2,941										

** National Highways Material Density Factors (Ref 14-36)*

Excavated Material

14.7.8 The Proposed Development's design team aim to achieve a cut-fill balance where practicable, however predicted cut and fill is currently imbalanced with an estimated cut volume of 144,272 m^3. A worst-case scenario where all waste is disposed of to landfill has been applied. This equates to 0.15% of the 99.1 million m^3 of inert and non-hazardous landfill capacity within the waste management study area (East of England and the South East).

14.7.9 In practice, it is likely that some of the excavated material could be reused on-site or recovered, rather than being disposed of to landfill. It is National Grid's strong preference that no waste be sent to landfill and the organisation has a target to achieve this by 2026 i.e. during the construction period of the Proposed Development.

14.7.10 Based on the above, the construction of the Proposed Development is likely to result in less than a 1% reduction of landfill capacity within the waste management study area, which equates to a 'negligible' magnitude of impact.

14.7.11 The sensitivity of the receptor is classified as 'very high', therefore when also considering a 'negligible' magnitude of impact, the significance of effect is assessed to result in a 'Slight' effect which is considered to be not significant.

14.7.12 National Grid aims to achieve zero-waste to landfill across construction projects and investigations into opportunities to reuse tunnel arisings are underway. These include:

a. the infill and restoration of saline lagoons ponds at Cliffe Pools in partnership with Brett Aggregates or a similar operator that can offer habitat restoration benefits;

b. use as construction material for the various other large developments that are planned in the Tilbury area (e.g. Lower Thames Crossing); and

c. to support other restoration and wetland projects in the Tilbury area.

14.7.13 It is assumed that tunnel arisings will be reused in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice.

Demolition Waste

14.7.14 Limited demolition works are anticipated (e.g. three pylons and a small building within the Tilbury works and one pylon within the Gravesend works) as part of the Proposed Development. Quantities of waste associated with the demolition of these structures have not been quantified in cubic metres.

14.7.15 However, it is anticipated that the waste arising will be very small in the context of regional landfill capacity (99.1 million m^3). It is also expected that the materials will be fully recovered or recycled rather than sent to landfill as per National Grid's ambition

Construction Materials

14.7.16 The Proposed Development estimates that 137,802 tonnes of key construction materials (see Table 14-17) will be required. This equates to 0.04% of national consumption and 0.35% of material demand for waste management study area (East of England and the South East), this is broken down by material type below.

a. For steel, 0.004% of national demand will be required (no data is available regionally);

b. For concrete, 0.07% of national consumption and 0.31% of regional demand; and

c. For aggregate, 0.04% of national consumption and 0.37% of regional demand.

14.7.17 Based on the above, the construction of the Proposed Development is likely to result in less than a 1% of material availability within the waste management study area, which equates to a 'negligible' magnitude of impact.

14.7.18 The sensitivity of the receptor is classified as 'medium', therefore when also considering a 'negligible' magnitude of impact, the significance of effect is assessed to result in a 'Slight' effect which is considered to be not significant.

Construction Waste

14.7.19 For the key construction materials used in the Proposed Development, a 5% wastage rate has been applied which results in 2,941 m^3 of waste arisings as a result of the construction. This equates to 0.003% of the 99.1 million m^3 of inert and non-hazardous landfill capacity within the waste management study area (East of England and the South East).

14.7.20 Based on the above, the construction of the Proposed Development is likely to result in less than a 1% reduction of landfill capacity within the waste management study area, which equates to a 'negligible' magnitude of impact.

14.7.21 The sensitivity of the receptor is classified as 'very high', therefore when also considering a 'negligible' magnitude of impact, the significance of effect is assessed to result in a 'Slight' effect which is considered to be not significant.

Total Construction Waste

14.7.22 Total waste arising from the construction of the Overall Project and Proposed Development would account for <1% of national waste arisings (for the relevant categories of waste), this is assessed to result in a Slight and Not Significant effect and sufficient management capacity is expected to be available.

14.7.23 Taking into account the above, significant waste effects are unlikely. A total recovery rate of at least 70% is likely to be achievable for non-hazardous waste (excluding naturally occurring soil and stones (Waste Code 17 05 04)) managed off-site in line with the Waste (England and Wales) Regulations 2011 (Ref 14-6).

14.7.24 At this stage, no estimate of hazardous waste generation during Proposed Development construction is available. 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 (125,280 m^3). Accordingly, for hazardous waste, the sensitivity of the receptor is classified as 'very high' whilst the magnitude of impact is considered to be 'negligible', resulting in a Slight effect which is considered to be not significant.

14.7.25 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.

Potential Operational Effects

14.7.26 Potential operational effects are considered for the whole of the Proposed Development.

14.7.27 The exact types and quantity of construction material use, and waste generation associated with the operation of the Proposed Development is not yet known. However, the headhouse will be unmanned and existing infrastructure of this type is known to produce insignificant quantities of waste.

14.7.28 During operation, minimal maintenance activities will be required. Waste arising from these maintenance activities during Proposed Development operation is expected to be negligible and significantly less than construction. Materials and waste types will generally be the same to those generated by other National Grid sites; and wastes would be managed using established procedures and facilities. Therefore, significant effects are unlikely.

Potential Cumulative Effects

14.7.29 In regard to Materials and Waste, a detailed cumulative effects assessment has not been undertaken since:

a. As part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that enough 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

b. Minerals 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.

14.7.30 In preparing their waste management strategies, the WPAs already take into account waste generation at the regional and sub-regional scale, since these are the figures which are then used for determining the need for waste facilities. The landfill void capacity remaining (which is used to evaluate the effects of the Proposed Development) already takes into account the cumulative effects of waste generated by other developments, and hence a separate cumulative impact assessment is not required for waste.

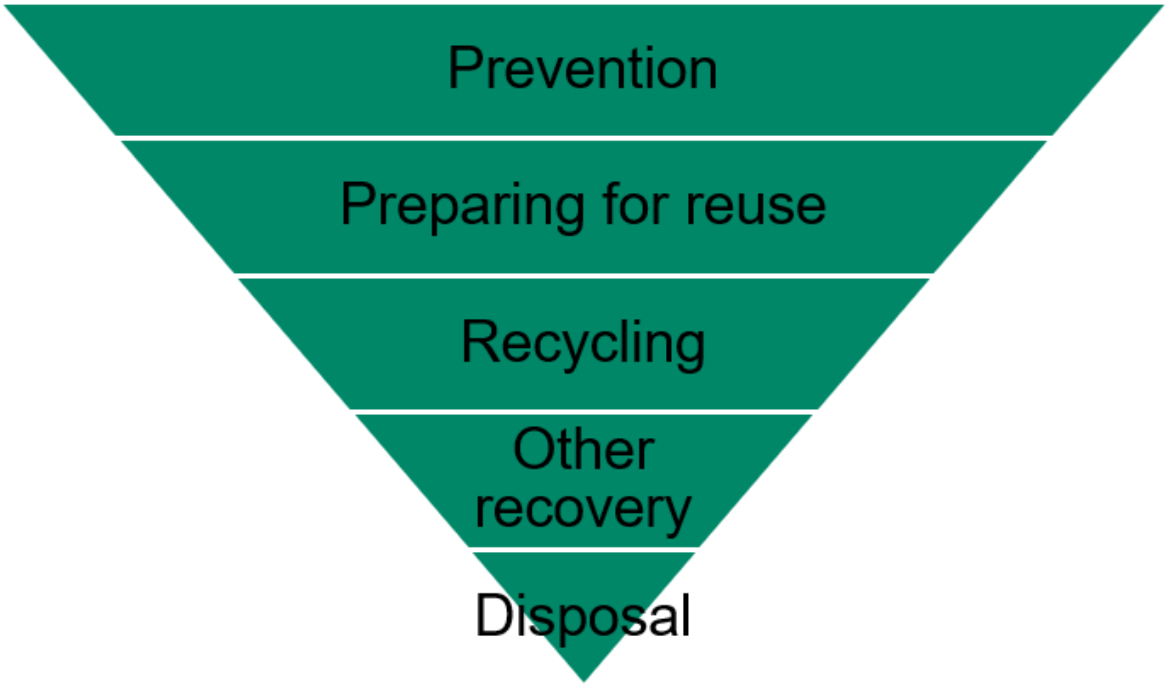
14.7.31 It is therefore not necessary or feasible for each development within the region to, in effect, duplicate the function of the WPA as part of the EIA process.

14.8 Mitigation

14.8.1 Mitigation is considered for the whole of the Proposed Development.

14.8.2 The Proposed Development will aim to prioritise waste prevention, followed by preparing for reuse, recycling and recovery and lastly disposal to landfill as per the internationally recognised waste hierarchy (Plate 14-1).

Plate 14-1: The Waste Hierarchy (Ref 14-34)



Embedded Mitigation

14.8.3 The following mitigation measures have been considered and implemented where applicable during the current design phases and subsequent design and construction work:

a. **Designing for reuse and recovery**: identifying, securing, and using materials that already exist on site, or can be sourced from other projects.

b. **Designing 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.

c. **Designing for off-site construction**: maximising the use of pre-fabricated structure and components, encouraging a process of assembly rather than construction.

d. **Designing for the future (deconstruction and flexibility):** identify 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.

e. **Designing for waste and material efficient procurement**: identify and specify materials that can be acquired responsibly, in accordance with a recognised industry standard.

14.8.4 The construction contractor would be required to implement a Construction Environmental Management plan (CEMP) and a Site Waste Management Plan would be prepared as part of the Detailed CEMP. An Outline CEMP has been prepared as part of the ES – refer to ES Appendix 3.1 in Volume VI. Other standard practice mitigation measures are included in the Outline CEMP including:

- Register with the Considerate Constructors Scheme.
- Sort and segregate waste into different waste streams (where technically and economically feasible).
- Shelter would be provided to prevent materials such as cardboard and paper from deteriorating while being sorted or awaiting collection. Space would be provided to accommodate skips and the storage of reusable materials.

Additional Mitigation

14.8.5 The following additional mitigation measures have been included as part of the mitigation register with the Outline CEMP:

- The construction contractor would be required to implement a Materials Management Plan if one is required under the CL:AIRE Definition of Waste: Development Industry Code of Practice to support the re-use of excavated materials, minimize off-site disposal; and to demonstrate the necessary lines of evidence to support the proper reuse/offsite disposal of materials and ensure compliance with regulatory guidance;
- Develop a Site Waste Management Plan (SWMP). This will be required to include measures to ensure waste produced or held on a site is disposed of safely, efficiently and lawfully, and meets all of National Grid's environmental targets;
- Incorporation of *"appropriate facilities for the storage and recycling of waste"* as required by Gravesham Council (Ref 14-19) policy "*CS19: Development and Design Principles*"; and
- Application of National Grid's materials and waste targets as outlined in Paragraph 14.6.18.

14.9 Assessment of Effects

14.9.1 This assessment of materials and waste effects has been undertaken after the implementation of the embedded and additional mitigation above. Please see Table 14-18 below.

Table 14-18: Assessment of Materials and Waste Effects

Receptor	Value/Sensitivity	Potential Impact	Embedded Mitigation	Additional Mitigation	Magnitude	Significance
Construction Phase						
Construction materials	Medium	Changes in demand for materials	See section 14.7	None required	Negligible	Slight, not significant
Landfill void capacity	Very High	Changes in available landfill void capacity	See section 14.7	None required	Negligible	Slight, not significant
Operational Phase						
Significant effects are highly unlikely						
Decommissioning Phase						
Not considered in this assessment						

14.10 Cumulative Effects

Combined Effects

14.10.1 There are unlikely to be any significant environmental effects associated with the environmental topics assessed above and given the nature of the Proposed Development (the industrious nature of the surrounding area and the fact that the Proposed Development is replacing existing infrastructure), as well as the mitigation measures to be implemented as identified through the environmental assessments it is determined that the combined impacts are of a scale that no significant combined impacts would arise.

Cumulative Effects

14.10.2 In regard to Materials and Waste, a detailed cumulative effects assessment has not been undertaken since:

- As part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that enough 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
- Minerals 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.

14.10.3 In preparing their waste management strategies, the WPAs already take into account waste generation at the regional and sub-regional scale, since these are the figures which are then used for determining the need for waste facilities. The landfill void capacity remaining (which is used to evaluate the effects of the Proposed Development) already takes into account the cumulative effects of waste generated by other developments, and hence a separate cumulative impact assessment is not required for waste.

14.10.4 It is therefore not necessary or feasible for each development within the region to, in effect, duplicate the function of the WPA as part of the EIA process.

14.11 Summary

14.11.1 Taking into account the baseline conditions, information available to date on the Proposed Development, the size and scale of the Proposed Development and the mitigation outlined above, significant effects in relation to materials and waste are unlikely.

14.12 References

Ref 14-1 IEMA (2020). *IEMA Guide to: Materials and Waste in Environmental Impact Assessment*. Available at: https://www.iema.net/resources/reading-room/2020/03/30/materials-and-waste-in-environmental-impact-assessment

Ref 14-2 Department for Levelling Up, Housing & Communities and Ministry of Housing, Communities & Local Government (2014). *Guidance Minerals: Guidance on the planning for mineral extraction in plan making and the application process.* Available at: https://www.gov.uk/guidance/minerals

Ref 14-3 European Parliament and The Council of the European Union (2008). *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705

Ref 14-4 The Stationery Office (1990). Environmental Protection Act 1990 (as amended). Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

Ref 14-5 The Stationery Office (2005). *The Hazardous Waste (England and Wales) Regulations 2005 (as amended).* Available at: https://www.legislation.gov.uk/uksi/2005/894/contents/made

Ref 14-6 The Stationery Office (2011). *The Waste (England and Wales) Regulations 2011 (as amended).* Available at: https://www.legislation.gov.uk/uksi/2011/988/contents/made

Ref 14-7 The Stationery Office (2016). *The Environmental Permitting (England and Wales) Regulations 2016.* Available at: https://www.legislation.gov.uk/uksi/2016/1154/contents/made

Ref 14-8 The Stationery Office (2021). *Environment Act 2021.* Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted

Ref 14-9 Department for Levelling Up, Housing & Communities (2023). *National Planning Policy Framework.* Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 14-10 Department for Levelling Up, Housing & Communities and Ministry of Housing, Communities & Local Government (2015). *Guidance Waste: Provides further information in support of the implementation of waste planning policy. Available at: https://www.gov.uk/guidance/waste*

Ref 14-11 Department for Levelling Up, Housing & Communities and Ministry of Housing, Communities & Local Government (2014). *National planning policy for waste.* Available at: https://www.gov.uk/government/publications/national-planning-policy-for-waste

Ref 14-12 Department for Environment, Food & Rural Affairs (DEFRA) (2021). *Waste Management Plan for England.* Available at: https://www.gov.uk/government/publications/waste-management-plan-for-england-2021

Ref 14-13 DEFRA (2023). *Environmental Improvement Plan 2023.* Available at: https://www.gov.uk/government/publications/environmental-improvement-plan

Ref 14-14 DEFRA (2018). *Our waste, our resources: a strategy for England.* Available at: https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england

Ref 14-15 Thurrock Council (2015*). Core Strategy and Policies for Management of Development (as amended)*. Available at: https://www.thurrock.gov.uk/core-strategy-local-plan/about-core-strategy

Ref 14-16 Thurrock Council (2015). *Thurrock Council Policies Map.* Available at*:* https://www.planvu.co.uk/thurrock/

Ref 14-17 Thurrock Council (2022). *Thurrock Local Plan Local Development Scheme.* Available at: https://www.thurrock.gov.uk/new-local-plan-for-thurrock/thurrock-local-plan#:~:text=Thurrock%20Local%20Plan,-In%20February%202014&text=The%20new%20Local%20Plan%20will,deciding%20all%20future%20planning%20applications.

Ref 14-18 Essex County Council (1997). *Essex Minerals Local Plan.* Available at: https://www.thurrock.gov.uk/core-strategy-local-plan/minerals-and-waste

Ref 14-19 Gravesham Borough Council (2014). *Gravesham Local Plan Core Strategy.* Available at: https://www.gravesham.gov.uk/local-plan-policy/local-plan

Ref 14-20 Gravesham Borough Council (2014). *Gravesham Local Plan Core Strategy – Policies Map.* Available at: https://www.gravesham.gov.uk/local-plan-policy/local-plan

Ref 14-21 Kent County Council (2020). *Kent Minerals and Waste Local Plan 2013-30.* Available at: https://www.kent.gov.uk/about-the-council/strategies-and-policies/service-specific-policies/housing,-regeneration-and-planning-policies/planning-policies/minerals-and-waste-planning-policy

Ref 14-22 Contaminated Land: Applications In Real Environments (CL:AIRE) (2011). *Definition of Waste: Development Industry Code of Practice (DoW CoP), Version 2.* Available at: https://www.claire.co.uk/component/phocadownload/category/8-initiatives?download=212:definition-of-waste-development-industry-code-of-practice

Ref 14-23 Waste & Resource Action Programme (WRAP) (Undated). *Designing out Waste: A design team guide for civil engineering.* Available at: https://www.ciria.org/Resources/REK/Guidance/Designing%20out%20waste%20guidance%20a%20design%20team%20guide.aspx

Ref 14-24 Environment Agency (2023). *2021 Waste Summary Tables for England - Version 3. Available at: https://environment.data.gov.uk/portalstg/home/item.html?id=a2bf884f8e72435db1998a3cab92b784*

Ref 14-25 DEFRA (2010). A Strategy for Hazardous Waste Management in England. Available at: https://www2.richmond.gov.uk/docs/arlington/CDE10_hazardous_waste_strategy_england_2010.pdf

Ref 14-26 Environment Agency (2023). *Historic Landfill Sites.* Available at: https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites

Ref 14-27 Environment Agency (2023). *Permitted Waste Sites - Authorised Landfill Site Boundaries.* Available at: https://www.data.gov.uk/dataset/ad695596-d71d-4cbb-8e32-99108371c0ee/permitted-waste-sites-authorised-landfill-site-boundaries

Ref 14-28 Environment Agency (2023). *Environmental Permitting Regulations - Waste Sites.* Available at: https://www.data.gov.uk/dataset/ad695596-d71d-4cbb-8e32-99108371c0ee/permitted-waste-sites-authorised-landfill-site-boundaries

Ref 14-29 Make UK (2019). *A new deal for steel: laying the foundations for a vibrant UK steel industry.* Available at: https://www.makeuk.org/insights/publications/new-deal-for-steel

Ref 14-30 MPA (2020). *Profile of the UK Mineral Products Industry (2020 Edition): Statistical Workbook*. Available at: https://mineralproducts.org/Facts-and-Figures/Profile-of-the-UK-Mineral-Products-Industry.aspx

Ref 14-31 Environment Agency (2023). *2021 Waste Data Interrogator – Wastes Received (Excel) – Version 2.* Available at: https://www.data.gov.uk/dataset/d8a12b93-03ef-4fbf-9a43-1ca7a054479c/2021-waste-data-interrogator

Ref 14-32 DEFRA (2021). *UK statistics on waste (Updated 28 June 2023).* Available at: https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste#key-points

Ref 14-33 WRAP (2007). *Waste Recovery Quick Wins. Improving Recovery Rates without Increasing Costs.* (No longer available online).

Ref 14-34 DEFRA (2011). *Guidance on Applying the Waste Hierarchy.* Available at*:* https://www.gov.uk/government/publications/guidance-on-applying-the-waste-hierarchy

Ref 14-35 National Grid (2021). *Our Environmental Action Plan 2021-2026.* Available at: https://www.nationalgrid.com/electricity-transmission/environment-and-net-zero

Ref 14-36 National Highways (2021). *Carbon emissions calculator tool.* Available at: https://nationalhighways.co.uk/suppliers/design-standards-and-specifications/carbon-emissions-calculation-tool

Ref 14-37 WRAP (2010). *Designing Out Waste Tool for Civil Engineering* (Tool no longer available online).

14.13 Abbreviations

Abbreviation	Meaning
CEMP	Construction Environmental Management Plan
CL:AIRE	Contaminated Land: Applications in Real Environments
C&D	Construction & Demolition
DoWCoP	Definition of Waste: Development Industry Code of Practice
EIA	Environmental Impact Assessment
ES	Environmental Statement
IEMA	Environmental Management and Assessment
KMWLP	Kent Minerals and Waste Local Plan
MPA	Mineral Planning Authority
MSA	Mineral Safeguarding Areas
NPPF	National Planning Policy Framework
PPG	Planning Practice Guidance
SNHRW	Stable Non-Reactive Hazardous Waste
SWMP	Site Waste Management Plan
TKRE	Tilbury to Grain and Tilbury to Kingsnorth
WFD	Water Framework Directive
WPA	Waste Planning Authorities
WRAP	Waste and Resources Action Programme
25YEP	25 Year Environmental Plan

aecom.com