



ENVIRONMENTAL STATEMENT: 6.1 CHAPTER 16: MATERIALS AND WASTE

DECARBONISATION

Cory Decarbonisation Project

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16. MATERIALS AND WASTE

16.1. INTRODUCTION

16.1.1. This chapter reports the assessment of the likely significant effects of the Proposed Scheme on materials consumption, waste generation and disposal, during construction and operation. It describes:

- relevant policy, legislation and guidance;
- consultation undertaken to date;
- the methodology for assessment;
- potential effects of the construction phase; and
- potential effects of the operation phase.

16.2. POLICY, LEGISLATION, AND GUIDANCE

16.2.1. The policy, legislation, and guidance relevant to the assessment of materials and waste for the Proposed Scheme is detailed in **Table 16-1**.

Table 16-1: Materials and Waste Summary of Key Policy, Legislation and Guidance

Policy, Legislation or Guidance	Description
Policy	
Overarching National Policy Statement (NPS) for Energy EN-1 2024¹	This Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPS designated by the Secretary of State of DESNZ in January 2024. In Section 5.15: ‘Resource and Waste Management’, Government policy on hazardous and non-hazardous waste management is outlined; this is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Applicants should ensure that through construction best practices, material is reused or recycled onsite where possible, or sourced from recycled or reused sources, and that low carbon materials, sustainable sources and local suppliers are used. Paragraph 5.15.9 of the policy makes reference to operational waste, noting that <i>“an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation”</i> .

Policy, Legislation or Guidance	Description
	<p>As part of the UK’s commitment of moving towards a more ‘circular economy’ the policy notes at 5.15.12 that <i>“Construction best practices should be used to ensure that material is reused or recycled onsite where possible”</i>. This also includes taking measures to ensure adequate and suitable storage of materials.</p> <p>With regard to dredged material the policy states at 5.15.11 that <i>“If the applicant’s assessment includes dredged material, the assessment should also include other uses of such material before disposal to sea, for example through reuse in the construction process”</i>.</p>
<p>National Planning Policy Framework (NPPF) 2023²</p>	<p>The NPPF sets out the Government’s planning policies for England and how these should be applied, with the following paragraphs relating to materials and waste. Paragraph 8 highlights that the purpose of the planning system is to contribute to the achievement of sustainable development through three overarching objectives: economic, social and environmental. The environmental objective requires the planning system to contribute and enhance the natural and local environment by <i>“using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy”</i>.</p> <p>Paragraphs 209 to 214 outline the sustainable use of minerals, which are <i>“a finite natural resource and can only be worked where they are found”</i>. Therefore, it is essential that sufficient supply is maintained through various planning policies, including safeguarding mineral resources by defining Mineral Safeguarding Areas and Mineral Consultation Areas.</p> <p>Specific guidance under this framework (Planning Practice Guidance) provides further information in support of the implementation of waste planning policy⁵.</p>
<p>The London Plan 2021³</p>	<p>The Spatial Development Strategy for Greater London sets out a framework for how London will develop over the next 20-25 years and the Mayor’s vision for Good Growth.</p> <p>Policy SI 7: Reducing waste and supporting the circular economy of the London Plan is one of the key policies</p>

Policy, Legislation or Guidance	Description
	<p>specific to materials and waste within Greater London, which states that:</p> <p><i>“Resource conservation, waste reduction, increase in materials re-use and recycling, and reductions in waste going for disposal will be achieved by the Mayor, waste planning authorities and industry working in collaboration...”</i></p> <p>Collaborative measures include promoting circular economy principles, encouraging waste minimisation and prevention, reusing materials, meeting or exceeding targets for construction and demolition (95% landfill avoidance), and designing adequate space to allow for separation of waste.</p> <p>Policy SI 8: Waste capacity and net waste self-sufficiency outlines policies to manage London’s waste sustainably, through safeguarding existing waste management sites (Policy SI 9); optimising capacity at existing sites and enhancing waste and secondary materials management facilities at both existing and new sites.</p> <p>Policy SI 10: Aggregates states that</p> <p><i>“An adequate supply of aggregates to support construction in London will be achieved by:</i></p> <ul style="list-style-type: none"> ● <i>encouraging re-use and recycling of construction, demolition and excavation waste within London, including onsite</i> ● <i>extracting land-won aggregates within London</i> ● <i>importing aggregates to London by sustainable transport modes”.</i> <p>Policy SI 10 also requires Mineral Planning Authorities to:</p> <ul style="list-style-type: none"> ● <i>“identify mineral safeguarding areas to protect sand and gravel resources from development that would otherwise sterilise future potential extraction</i> ● <i>identify and safeguard sites and facilities, including wharves and railheads, with existing, planned or potential capacity for transportation, distribution, processing and/or production of primary and/or secondary recycled aggregates”.</i>

Policy, Legislation or Guidance	Description
<p>The Bexley Local Plan 2023⁴</p>	<p>The Local Plan, adopted on 26 April 2023, positively plans for sustainable development across the Borough. It is essential to the delivery of the Council's other key plans and strategies, including the Bexley Plan, the Growth Strategy and the Connected Communities Strategy. The Local Plan addresses materials and waste through the following policies.</p> <p>Policy SP12: Sustainable waste management identifies that new developments will ensure that waste is managed to follow the principles of the circular economy by applying the waste hierarchy.</p> <p>Policy DP27: Minerals and aggregates sets out the importance of minerals and aggregates as a non-renewable resource. For non-mineral development, the policy states that <i>“Planning permission will not be granted for non-mineral development that would lead to the unnecessary sterilisation of mineral resources within a Minerals Safeguarding Area.”</i> Exceptions would be considered where it can be demonstrated that the mineral is not of economic value or that the mineral reserves can be extracted prior to development. The policy also requires consideration of how the reuse and recycling of construction, demolition and excavation materials can be maximised onsite or if, this is not possible, in London.</p>
<p>National Planning Policy for Waste 2014⁵</p>	<p>Outlines the Government's ambition to promote a sustainable approach to resource use and management. It sets out waste planning policies and should be read alongside: the NPPF; the National Waste Management Plan for England and any relevant successor policies, guidance or documents.</p>
<p>Waste Management Plan for England 2021⁶</p>	<p>Provides a detailed analysis of the present state of waste management at the national level and considers how the objectives of the Waste Framework Directive will be supported effectively. It outlines the waste hierarchy, which gives priority to waste prevention, followed by preparing for reuse, recycling, other types of recovery and finally disposal (e.g., landfill).</p>

Policy, Legislation or Guidance	Description
25 Year Environment Plan⁷	<p>The 25 Year Environment Plan sets out government actions to improve, regain and retain the natural world. The Plan sets out high level goals, which <i>includes</i> “using resources from nature more sustainably and efficiently” and “minimising waste”⁷.</p>
Our Waste, Our Resources: A Strategy for England 2018⁸	<p>Sets out how the UK Government will preserve material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. The Strategy also outlines the Government’s aims to minimise the damage caused to the natural environment by reducing and managing waste safely and carefully, and by tackling waste crime. It combines actions to take now with firm commitments for the coming years and gives a clear longer-term policy direction in line with the 25 Year Environment Plan.</p>
London Environment Strategy 2018⁹	<p>Chapter 7: Waste of the London Environment Strategy sets out the aims and objectives to plan for a circular economy by aiming to design out waste entirely.</p>
Bexley’s Environmental Sustainability Strategy 2011¹⁰	<p>Bexley’s Environmental Sustainability Strategy 2011 aims to achieve sustainable growth by 2025, including the preservation of the environmental character of the Borough.</p> <p>Theme 7 – Waste Minimisation and Management is a key theme which outlines aims to manage waste through higher tiers of the waste hierarchy and working alongside other local boroughs to manage waste and share facilities.</p>
South East London Joint Waste Planning Technical Paper 2022¹¹	<p>This technical paper was prepared as evidence to demonstrate that each London borough’s waste apportionment requirements, as set out in the London Plan 2021, can be met. This paper has been ratified by each member borough: Bexley, Bromley, Lewisham, Southwark, Greenwich and the City of London. The paper identifies safeguarded waste sites including Riverside 1 (referred to as the ‘Riverside Resource Recovery Facility’ in the technical paper).</p>

Policy, Legislation or Guidance	Description
<p>London Borough of Barking and Dagenham Adopted Core Strategy (2010)¹²</p>	<p>This Strategy is considered relevant due to the Study Area proposed for the assessment (see Section 16.5).</p> <p>A key component of this Strategy is Policy CR3: Sustainable Waste Management, which outlines the borough’s commitment to manage waste in a sustainable way and to help achieve national recycling and composting targets. The Strategy states that this will be achieved by considering landfill acceptable only as a last resort.</p>
<p>London Borough of Barking and Dagenham Local Plan (Emerging) 2023¹³</p>	<p>This forthcoming Local Plan is considered relevant to the Study Area proposed for the assessment (see Section 16.5). The Local Plan will set out the vision and framework for how Barking and Dagenham will be transformed to 2037. Once adopted, it will replace the Core Strategy for Barking and Dagenham.</p> <p>Policy DMSI 8 refers to demolition and construction wastes and expects development proposals to develop a construction waste management plan, and where appropriate, implement the principles in CL:AIRE The Definition of Waste: Development Industry Code of Practice¹⁴ to avoid waste disposal to landfill and maximise reuse of waste.</p> <p>With regard to operational waste, Policy DMSI 8 requires all new development proposals to submit a strategy to minimise waste, provide sufficient storage for segregation, and, where hazardous waste is anticipated, ensure the risks to public safety and the environment are appropriately managed.</p>
<p>London Borough of Havering Local Plan 2016-2031¹⁵</p>	<p>This Local Plan is considered relevant to the Study Area proposed for the assessment (see Section 16.5). Policy 35 Waste management sets out criteria to consider when reviewing planning applications to ensure that waste is managed sustainably, with emphasis on waste reduction and segregation.</p> <p>The Council follows the waste hierarchy approach and is committed to minimising the production of waste (through prevention) and then maximising the reuse and recycling or composting and minimising the use of landfill, with disposal seen as the final option.</p> <p>Policy 37 Mineral Reserves within this Local Plan sets out criteria to consider when reviewing planning</p>

Policy, Legislation or Guidance	Description
	applications to ensure that mineral reserves are managed sustainably. This includes designated Minerals Safeguarding Areas.
South East Inshore Marine Plan 2021¹⁶	<p>The South East Inshore Marine Plan provides a framework that will shape and inform decisions over how the area’s waters are developed, protected and improved over the next 20 years.</p> <p>Policy SE-DD-3 Dredging and Disposal refers to the disposal of dredged material, and that any proposals to do so must demonstrate that they comply with the waste hierarchy.</p>
Legislation	
Environment Act 1995, as amended in 2021¹⁷	<p>The Environment Act 1995 makes provision for targets, plans and policies for improving the natural environment. Sets out clear statutory targets for the protection and regeneration of the natural world in four priority areas, one of which is waste. Part 3 specifically refers to waste and resource efficiency, incorporating: producer responsibility obligations; resource efficiency; managing waste; and waste enforcement and regulation.</p>
The Revised EU Waste Framework Directive 2008/98/EC¹⁸	<p>Provides a comprehensive foundation for the management of waste across the European Community and gives a common definition of waste. While the UK is no longer a member of the European Union, many of the concepts underpinning the Directive are relevant to the UK’s domestic law. Article 3 of the Waste Framework Directive defines waste as “<i>any substance or object that the holder discards or intends or is required to discard</i>”.</p>
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020¹⁹	<p>Makes provisions and amendments to other statutory instruments relating to waste regulations to ensure that Environmental Permitting and waste regimes continue to operate effectively, now that the UK has exited the EU.</p>
The Environmental Permitting (England and Wales) Regulations 2016 (as amended)²⁰	<p>Aims to streamline the legislative system for industrial and waste installations into a single permitting structure for those activities which have the potential to cause harm to human health or the environment.</p>

Policy, Legislation or Guidance	Description
The Waste Electrical and Electronic Equipment Regulations 2013 (as amended) ²¹	Aims to reduce the impact of electrical waste on the environment by encouraging reuse or recycling. Ensures electrical and electronic equipment is recycled in a sustainable way when it reaches end of life.
The Controlled Waste (England and Wales) Regulations 2012 (as amended) ²²	Classifies waste as household, industrial or commercial waste. It allows local authorities to implement charges for the collection of waste from non-domestic properties.
The Waste (England and Wales) Regulations 2011 (as amended) ²³	Stipulates the requirement for industry and businesses to implement the waste hierarchy. The Waste (England and Wales) (Amendment) Regulations 2014 amend the 2011 Regulations to clarify that the transfer of controlled waste can be recorded on alternative documentation, such as invoices, instead of waste transfer notes.
The Clean Neighbourhoods and Environment Act 2005 ²⁴	Part 5, Chapter 3 of this Act specifically refers to site waste, where there may be a regulatory requirement to prepare Site Waste Management Plans and to ensure compliance with them.
The Hazardous Waste (England and Wales) Regulations 2005 (as amended) ²⁵	Introduces measures to control storage, transport and disposal of hazardous waste. The Regulations provide a means to ensure that hazardous waste and any associated risks are appropriately managed.
The Waste Minimisation Act 1998 ²⁶	Enables local planning authorities to take the appropriate steps to reduce and minimise the generation of household, commercial or industrial waste within their area.
The Environmental Protection Act 1990 ²⁷	As of 2008, defines within England, Scotland and Wales the fundamental structure and authority for waste management and control of emissions into the environment. The Act outlines the requirement of the manager of a development to ensure that any excess materials or waste resulting from construction activities are recovered or disposed of without any subsequent adverse effects upon the surrounding environment.
The Control of Pollution (Amendment) Act 1989 ²⁸	The Control of Pollution (Amendment) Act 1989 makes it a criminal offence for a person who is not a registered carrier to transport controlled waste to or from any place in Great Britain. The Act also provides for the seizure and disposal of vehicles used for illegal waste disposal.

Policy, Legislation or Guidance	Description
Guidance	
Planning Practice Guidance (2021)²⁹	<p>Explains the processes and tools that can be used through the planning system in England.</p> <ul style="list-style-type: none"> Minerals safeguarding: <i>“Since minerals are a non-renewable resource, minerals safeguarding is the process of ensuring that non-minerals development does not needlessly prevent the future extraction of mineral resources, of local and national importance”</i>. The Guidance also outlines how planning authorities plan for mineral extraction and assess impacts from mineral extraction. Waste: In order to protect human health and the local environment <i>“local planning authorities can ensure that waste is handled ... through testing the suitability of proposed sites, both in developing their Local Plans and in considering individual planning applications, against the policies in paragraphs 4 to 7 and the factors in Appendix B of National planning policy for waste”</i>. <p>The Guidance also outlines the principles of self-sufficiency and proximity (referred to as the ‘proximity principle’) that are set out in Article 16 of the Waste Framework Directive, whereby local planning authorities are required, under regulation 18 of the 2011 Regulations which transposed the Directive, to have regard to these requirements when exercising their planning functions relating to waste management.</p>
The Institute of Environmental Management and Assessment (IEMA) Guide to Materials and Waste in EIA³⁰	<p>Guidance used to assess the potential impacts and effects from the Proposed Scheme, using the process and significance criteria it sets out. This guidance is referred to as ‘the IEMA Guide’ throughout this chapter.</p>
Waste Duty of Care: Code of Practice (2018)³¹	<p>This Waste Duty of Care: Code of Practice was issued under Section 34 of the Environmental Protection Act 1990 and sets detail on how to safely and responsibly manage wastes. The Code details the actions to be taken so to prevent unauthorised treatment or disposal of waste, ensure adequate storage to prevent uncontrolled escape of waste and to properly transfer wastes to third parties.</p>

Policy, Legislation or Guidance	Description
	Copies of waste transfer documentation must be retained for two years for non-hazardous waste, and three years for hazardous waste consignment notes.
British Standards Institution (2005) BS 5906:2005 Waste Management in Buildings – Code of Practice³²	The Standard details the requirements for the safe storage, collection, segregation and onsite treatment for residential and non-residential developments. The standard requires designers to ensure safe and easy access to waste facilities which adhere to the aesthetics of the site whilst avoiding social nuisance. Facilities should support the waste hierarchy and be designed in consultation with service users.

16.3. CONSULTATION AND ENGAGEMENT

- 16.3.1. No consultation has been required to inform this assessment. As part of the Scoping Response, the London Borough of Bexley noted that they were *“generally satisfied at the details submitted in this chapter and that the applicant has adequately addressed this issue at this stage”³³*.
- 16.3.2. **Table 16-2** provides a summary of comments provided as part of the statutory consultation process and the Applicant’s response.
- 16.3.3. **Appendix 4-2: Scoping Opinion Responses (Volume 3)** provides a summary of the Planning Inspectorate and consultee comments on the EIA Scoping Opinion³⁴ and the Applicant’s responses.

Table 16-2: Summary of the Statutory Consultation Comments in Relation to Materials and Waste

Statutory Consultee	Response
Port of London Authority	
<p><i>“As noted within the PEIR, as the ES is developed further information on the use of the River Thames for the transportation of construction and waste materials will be presented in Chapter 2 (Site and Proposed Scheme Description) of the ES. The PLA would support the full investigation within the ES of how the river can be utilised as part of the construction stage, noting the need to continue to safely operate the adjacent facility at Middleton Jetty.”</i></p>	<p>The use of the River Thames for transportation of construction and waste materials is discussed in Section 2.4 of Chapter 2: Site and Proposed Scheme Description (Volume 1).</p> <p>A breakdown of the indicative construction programme is provided in Chapter 2: Site and Proposed Scheme Description (Volume 1). Optionality remains over whether Option 1 (60 months) or Option 2 (42 months) will be selected for construction to allow for flexibility post-DCO submission. This means the construction of the Proposed Jetty will potentially begin either in Q3 2026 for Option 1 or Q1 in 2027 (Option 2). It is not practicable to bring the construction of the Proposed Jetty forward because waiting for the Proposed Jetty to be available would delay the programme of construction by 18 months and result in CO₂ emissions continuing for an additional period of time before the Carbon Capture Plant becomes available. The Proposed Jetty would not have the required capacity to accommodate the construction of the Proposed Scheme; its lightweight structure is less suited for bringing in construction materials. The utilisation of landside transport for the construction of the Proposed Scheme will not result in significant effects on the local road network, as set out in Chapter 18: Landside Transport (Volume 1).</p> <p>Options will be explored at detailed design stage with input from the Contractor(s). This will require knowledge of the supply chain and conflict with existing operations at the Site.</p>

16.4. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

16.4.1. The materials and waste assessment of the Proposed Scheme in this chapter has been undertaken in line with the legislation, policy and guidance described in **Section 16.2**.

POTENTIAL SIGNIFICANT EFFECTS

16.4.2. As identified in the EIA Scoping Report³⁵, the following effects are considered to be significant and have been considered further in this assessment:

- Construction Phase:
 - consumption of material resources associated with the construction of the Proposed Scheme; and
 - disposal and recovery (including reuse and recycling) of waste associated with the construction of the Proposed Scheme.
- Operation Phase:
 - consumption of material resources associated with the Proposed Scheme during operation, including amine-based solvents; and
 - disposal and recovery (including reuse and recycling) of waste associated with the Proposed Scheme during operation.

MATTERS SCOPED OUT

16.4.3. The following effects are considered unlikely to be significant, and therefore have not been considered further in this assessment:

- impacts associated with the extraction of raw resources and the manufacture of products;
- impacts from the transportation of material resources and waste to and from the Site; and
- impacts on human health and controlled waters as a result of contaminated site arisings from the Proposed Scheme.

16.4.4. As set out in Section 3.12 of the EIA Scoping Opinion³⁶ (ID 3.12.1, 3.12.4 and 3.12.5) the Planning Inspectorate agrees that the above effects would not likely be significant and, therefore, do not need to be considered further (see **Section 16.3** for details).

BASELINE DATA COLLECTION

16.4.5. The most up-to-date sources of information, available at the time of writing, have been used to collate data for material resource availability, landfill capacity and waste recovery.

16.4.6. The key sources of information used to determine the baseline resource availability, landfill capacity and waste recovery conditions are:

- Department for Business and Trade Monthly Bulletin of Building Materials and Components³⁷;

- South East Aggregates Working Party Annual Report³⁸;
- London Aggregates Working Party Annual Report³⁹;
- Mineral Products Association Profile of the UK Mineral Products Industry⁴⁰;
- United Kingdom Steel Production Data⁴¹;
- Greater London Authority The London Plan (2021)³;
- Natural England MAGIC mapping⁴²;
- Basis of the UK BAP Target for the Reduction in use of Peat in Horticulture – SP0573 (2009)⁴³;
- DEFRA (2023) UK Statistics on Waste⁴⁴;
- Environment Agency Waste Data Interrogator⁴⁵; and
- Environment Agency Remaining landfill capacity, England⁴⁶.

ASSESSMENT METHODOLOGY

- 16.4.7. The materials and waste assessment of the Proposed Scheme has been undertaken in line with the legislation, policy and guidance described in **Section 16.2** of this chapter.
- 16.4.8. The assessment presented within this chapter considers potential impacts from the construction and operation of the Proposed Scheme alongside Riverside 1 and Riverside 2.
- 16.4.9. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the construction programme of the Proposed Scheme are being considered: Option 1 and Option 2. The estimated construction period is approximately 60 months (five years) for Option 1 and approximately 42 months (three and a half years) for Option 2. For the purposes of this assessment, only Option 1 has been considered for the materials and waste assessment as this is deemed to present the worst case scenario for the availability of construction materials and remaining landfill void capacity.
- 16.4.10. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, two options for the design of the Carbon Capture Facility are being considered. One option is for individual lines to be connected to the exhaust stacks for Riverside 1 and Riverside 2, with two individual Stack(s) for the Carbon Capture Facility. A second option is for the two lines from Riverside 1 and Riverside 2 to be combined into a single Stack at the Carbon Capture Facility. The first of these options, two individual Stack(s) for the Carbon Capture Facility, has been considered for the materials and waste assessment as this is deemed to present the worst case scenario for the availability of construction materials and remaining landfill void capacity.
- 16.4.11. As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, the choice between demolition or retention of the Belvedere Power Station Jetty (disused) is being considered. For the purposes of this assessment, the demolition of the Belvedere Power Station Jetty (disused) has been considered to present the worst case scenario for materials and waste. This is because increased quantities of

demolition waste would be generated, managed and disposed as part of the dismantling and removal of the jetty should the Belvedere Power Station Jetty (disused) be demolished. If the Belvedere Power Station Jetty (disused) is to be retained (with modifications), there would be a slight improvement in the assessment of impacts and effects reported within this chapter.

Construction Phase

- 16.4.12. The IEMA Guide³⁰ has been used to assess the potential construction effects from the Proposed Scheme, using the process and significance criteria it sets out. Method W1 (Void Capacity, as detailed in the IEMA Guide) has been used to best reflect the scale and nature of the Proposed Scheme.
- 16.4.13. In accordance with the IEMA Guide³⁰, the assessment is a quantitative exercise that identifies the:
- type and volume of materials to be consumed by the Proposed Scheme during construction, including details of any recycled materials content;
 - type and volume of waste to be generated by the Proposed Scheme during construction, with details of planned recovery and/or disposal method (for example onsite reuse, offsite recycling, disposal to landfill);
 - cut and fill balance, during construction; and
 - details of any construction materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond expected industry standards.
- 16.4.14. The sensitivity of materials relates to the regional (and where unavailable, national) availability and type of resources to be consumed by the Proposed Scheme. The sensitivity of waste relates to the availability of regional (and where appropriate, national) landfill void capacity, in the absence of the Proposed Scheme and future provision.
- 16.4.15. The magnitude of impacts from the Proposed Scheme that will be considered in the assessment include:
- anticipated reductions in availability (stocks, production or sales) of materials regionally and nationally; and
 - anticipated reductions in the landfill void capacity of regional and national infrastructure.
- 16.4.16. The likely types and estimated quantities of material resources required for the Proposed Scheme (including arisings generated from the Site) have been assessed. Impacts are evaluated against regional (and where justified, national) materials availability data where information is obtainable.
- 16.4.17. The likely types and estimated quantities of waste to be generated by the Proposed Scheme have been assessed. Impacts are evaluated against the capacity of regional (and where appropriate, national) landfill infrastructure.

Operation Phase

- 16.4.18. The Definition of Waste is a regulatory construct to determine when an item, substance or material becomes waste that is currently defined under Section 75 of the Environmental Protection Act 1990³². It essentially follows the definition set out in Article 3(1) of the EU Waste Framework Directive¹⁸ (WFD) – “*any substance or object which the holder discards or intends or is required to discard*”, but this definition needs to be read in conjunction with the Article 2 of the WFD exclusions from the scope.
- 16.4.19. The approach to assessing the effects of waste generated by the Proposed Scheme during its operational life broadly aligns with the methodology adopted for the assessment of construction phase wastes. However, rather than the assessment solely relating to the ability of landfill infrastructure to accept any generated wastes, the assessment also considers other recovery and disposal options for the more specialist types of waste to come from the operation phase of the Proposed Scheme. This is because unlike the construction phase, where associated waste, if not recycled, usually ends up in landfill, (e.g. surplus building materials) the types of waste to be generated during the operation phase such as solvent wastes and sludges, are more likely to require alternative forms of treatment at specialist facilities.
- 16.4.20. The operation phase assessment includes:
- expected waste (likely types and estimated quantities) to arise in a typical year of operation;
 - changes to annual waste volumes from improvements or changes to operations e.g. replacement technologies, alterations in capacity of the facility etc.; and
 - changes to annual waste volumes from potential sustainability and waste reduction targets that could impact upon the composition, tonnage and management route for wastes (including internal targets or regulatory targets).
- 16.4.21. Impacts have been evaluated against the capacity of regional (and where appropriate, national) landfill and other final management infrastructure.
- 16.4.22. The operational waste arisings do not include end of life wastes such as the decommissioning of the Proposed Scheme as set out in **Chapter 4: EIA Methodology (Volume 1)**. As set out in **Table 2-6 of Chapter 2: Site and Proposed Scheme Description (Volume 1)**, a Decommissioning Environmental Management Plan will detail the actions to minimise, recover and recycle materials upon decommissioning of the Proposed Scheme.

SENSITIVITY CRITERIA

- 16.4.23. The criteria for assessing sensitivity of materials and waste receptors are set out in **Table 16-3**, in accordance with the criteria outlined in the IEMA Guide³⁰. The sensitivity of materials is determined by identifying where one or more of the criteria thresholds are met. The sensitivity of waste is determined by considering the baseline and forecast future baseline of regional (or where justified, national) landfill void capacity.

Table 16-3: Materials and Waste Sensitivity Criteria

Sensitivity	Materials Criteria <i>“On balance, the key materials required for the construction of the Proposed Scheme...”</i>	Inert and Non-hazardous Waste Criteria <i>Landfill Void or Other Final Management capacity is expected to...</i>	Hazardous Waste Criteria <i>Landfill Void or Other Final Management capacity is expected to...</i>
Negligible	<p><i>...are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock;</i> and/or <i>...are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials ^a</i></p>	<p><i>...remain unchanged or is expected to increase through a committed change in capacity ^b</i></p>	<p><i>...remain unchanged or is expected to increase through a committed change in capacity ^b</i></p>
Low	<p><i>...are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock;</i> and/or <i>...are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.</i></p>	<p><i>...reduce minimally: by <1% as a result of wastes forecast.</i></p>	<p><i>...reduce minimally: by <0.1% as a result of wastes forecast.</i></p>
Medium	<p><i>...are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock;</i> and/or <i>...are available comprising some sustainable features and benefits compared to industry-standard materials.</i></p>	<p><i>...reduce noticeably: by 1-5% as a result of wastes forecast.</i></p>	<p><i>...reduce noticeably: by 0.1-0.5% as a result of wastes forecast.</i></p>

Sensitivity	Materials Criteria <i>“On balance, the key materials required for the construction of the Proposed Scheme...”</i>	Inert and Non-hazardous Waste Criteria <i>Landfill Void or Other Final Management capacity is expected to...</i>	Hazardous Waste Criteria <i>Landfill Void or Other Final Management capacity is expected to...</i>
High	<p><i>...are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock;</i> and/or <i>...comprise little or no sustainable features and benefits compared to industry-standard materials.</i></p>	<p><i>...reduce considerably: by 6-10% as a result of wastes forecast.</i></p>	<p><i>...reduce considerably: by 0.5-1% as a result of wastes forecast.</i></p>
Very High	<p><i>...are known to be insufficient in terms of production, supply and/or stock;</i> and/or <i>...comprise no sustainable features and benefits compared to industry-standard materials.</i></p>	<p><i>... 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.</i></p>	<p><i>... 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.”</i></p>
Notes	<p>^a 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); or ● support the drive to a circular economy; or ● in some other way reduce lifetime environmental impacts. <p>^b By the relevant local planning authority.</p>		

MAGNITUDE CRITERIA

16.4.24. **Table 16-4** sets out the criteria for assessing the magnitude of impact from materials and waste. For the purposes of this assessment, Method W1 (void capacity), as set out in the IEMA Guide³⁰ is used.

Table 16-4: Materials and Waste Magnitude Criteria

Magnitude	Materials Criteria <i>“The assessment of the Proposed Scheme is made by determining whether the consumption of...”</i>	Inert and non-hazardous waste criteria <i>The percentage depletion of remaining landfill void or other final management capacity</i>	Hazardous waste criteria <i>The percentage depletion of remaining landfill void or other final management capacity</i>
No Change	<i>...no materials are required.</i>	<i>Zero waste generation and disposal from the development.</i>	<i>Zero waste generation and disposal from development.</i>
Negligible	<i>...no individual material type is equal to or greater than 1% by volume of the regional^a baseline availability.</i>	<i>Waste generated by the development will reduce regional^a landfill void or other final management capacity baseline^b by <1%.</i>	<i>Waste generated by the development will reduce national landfill void or other final management capacity baseline^b by <0.1%.</i>
Minor	<i>...one or more materials is between 1-5% by volume of the regional^a baseline availability.</i>	<i>Waste generated by the development will reduce regional^a landfill void or other final management capacity baseline^b by 1-5%.</i>	<i>Waste generated by the development will reduce national landfill void or other final management capacity baseline^b by <0.1-0.5%.</i>
Moderate	<i>...one or more materials is between 6-10% by volume of the regional^a baseline availability.</i>	<i>Waste generated by the development will reduce regional^a landfill void or other final management capacity baseline^b by 6-10%.</i>	<i>Waste generated by the development will reduce national landfill void or other final management capacity baseline^b by <0.5-1%.</i>

Magnitude	Materials Criteria <i>“The assessment of the Proposed Scheme is made by determining whether the consumption of...</i>	Inert and non-hazardous waste criteria <i>The percentage depletion of remaining landfill void or other final management capacity</i>	Hazardous waste criteria <i>The percentage depletion of remaining landfill void or other final management capacity</i>
Major	<i>...one or more materials is >10% by volume of the regional^a baseline availability.</i>	<i>Waste generated by the development will reduce regional^a landfill void or other final management capacity baseline^b by >10%.</i>	<i>Waste generated by the development will reduce national landfill void or other final management capacity baseline^b by >1%”.</i>
Notes	<p>^a Or where justified, national.</p> <p>^b Forecast as the worst case scenario during a defined construction phase.</p>		

SIGNIFICANCE CRITERIA

16.4.25. The overall significance of effects from materials and waste are determined in accordance with the IEMA Guide (Section 11)³⁰, by comparing sensitivity and magnitude within the matrix provided in **Table 16-5**. Effects that are classified as moderate or above are considered to be significant.

Table 16-5: Matrix to Assign Significance of Effect Category for Materials and Waste

		Sensitivity of Receptor				
		Negligible	Low	Medium	High	Very high
Magnitude of Impact	No change	Neutral	Neutral	Neutral	Neutral	Neutral
	Negligible	Neutral	Neutral or slight	Neutral or slight	Slight	Slight
	Minor	Neutral or slight	Neutral or slight	Slight	Slight or moderate	Moderate or large
	Moderate	Neutral or slight	Slight	Moderate	Moderate or large	Large or very large
	Major	Slight	Slight or moderate	Moderate or large	Large or very large	Very large

16.5. STUDY AREA

16.5.1. The Study Areas applicable to the Proposed Scheme during construction and operation are as defined in the IEMA Guide³⁰:

- Development Study Area comprises the extent of the Site Boundary (see **Figure 1-1: Site Boundary Location Plan (Volume 2)**); and
- Expansive Study Area extends to the availability of construction materials and the capacity of waste management facilities within the London and the South East regions and the UK (a national study area is used where regional data is unavailable).

SENSITIVE RECEPTORS

16.5.2. The following sensitive receptors have been identified:

- **Material Resources** – consumption impacts on materials’ immediate and long term availability, which results in the permanent depletion of natural resources; and
- **Landfill Void Capacity** – reductions in regional and national capacity resulting in the use or loss of available filling space.

16.6. BASELINE CONDITIONS AND FUTURE BASELINE

BASELINE

16.6.1. A short summary of the baseline conditions for materials, site arisings and waste are presented in this section. The baseline conditions align with the Study Areas defined in **Section 16.5**.

Materials

16.6.2. The baseline for materials consumption:

- is determined by the materials currently required for the existing land use and assets; and
- provides regional and national information and data for material resource availability, in terms of construction materials typically required for developments of a similar scale and nature of the Proposed Scheme.

Materials Required

16.6.3. The operation and maintenance of all facilities located within the Site requires several minor products e.g. lighting, paint, fencing, as well as the intermittent use of bulk products for routine works and repairs of the existing buildings, plant, and access roads where not part of the public highway (e.g. concrete, masonry, aggregate and asphalt for minor re-surfacing).

16.6.4. Although at the time of writing no specific data are available on materials currently required, professional judgement can be used to assert that by comparison with regional and national availability of resources, consumption of materials for routine maintenance by the current assets at the Site is minimal.

16.6.5. Raw material consumption required during operation of Riverside 1⁴⁷ is shown in **Table 16-6**.

Table 16-6: Raw Materials Consumption during Operation at Riverside 1

Material Type	Quantity	Unit per Annum
Mains water	137,060,000	Litres
Ammonia	397,178	Litres
Activated carbon	425,880	Kg
Hydrated lime	7,435,180	Kg
Fuel oil	1,252,948	Litres

Construction Material Availability

16.6.6. A summary of availability of the main construction materials in London and the South East of England (Berkshire, Buckinghamshire, East Sussex, Hampshire, Isle of Wight, Kent, Oxfordshire, Surrey and West Sussex) and the UK^{37, 38, 39, 40, 41} is presented in **Table 16-7**. The overview excludes technological products but provides a context in which the assessment for material consumption during construction of the Proposed Scheme has been undertaken. Data are available for as available over years 2018 to 2022; the most recent information has been presented.

Table 16-7: Construction Materials Availability in London and the South East and the UK

Material Type	London and South East (Year)	UK (Year)	Units	Regional Availability as a % of National Availability
Sand and Gravel ^a	16.1 (2019)	53.2 (2022)	Mt	30
Permitted Crushed Rock ^a	0.0 (2019)	116.5 (GB) (2019)	Mt	0
Concrete Blocks ^b	1.1 (Southern England) (2022)	5.2 (2022)	Mm ²	21
Primary Aggregate ^a	16.1 (2019) (South East, no data for London)	198.8 (2019)	Mt	8
Recycled and Secondary Aggregate ^a	4.5 (2018)	71.0 (2018) (GB)	Mt	6
Ready-mix Concrete ^a	5.5 (2019)	24.7 (2019)	Mm ³	22
Steel ^c	No data.	7.2 (2021)	Mt	N/A
Asphalt ^a	4.6 (2019)	27.4 (2019)	Mt	17

^a sales ^b stocks ^c production

Mt million tonnes Mm² million square metres Mm³ million cubic metres

GB: Great Britain (England, Wales and Scotland) figures used where UK figures (including Northern Ireland) are unavailable.

Note: for concrete blocks, the information is only available for Southern England (not the London and the South East regions).

- 16.6.7. Further analysis of the data suggests that across the UK, the availability of construction materials typically required for development in terms of stocks, production or sales remains buoyant, although information on steel production is not currently available at a regional level. Future trends are not available for scrutiny, and at the time of publication, it is noted that there may be short term fluctuations in supply.
- 16.6.8. Where data are available, London and the South East has, in general a higher than average availability of some construction materials by comparison with other UK regions. Stocks of asphalt and primary aggregate (in particular sand and gravel) are amongst the highest in the UK; the availability (sales) of ready-mix concrete are also the highest in the UK. The availability (sales) of concrete blocks is, however, lower than the UK average; there are no sales from permitted crushed rock facilities in London or the South East.
- 16.6.9. There are no identified Minerals Safeguarding Areas¹³, no known peat resources⁴² or active peat extractions⁴³ within the Site.

Amine-based Solvents Availability

- 16.6.10. Baseline data on the production of amine-based solvents in the UK is not publicly available at the time of writing. However, the presence of major amine manufacturing suppliers in the UK, including Rutpen Ltd in Berkshire, and increasing global manufacture and supply of amines (given the recognised policy need for carbon capture to be rolled out at scale), can be used to assert that these resources are widely available and unlikely to have any supply issues.

Site Arisings

- 16.6.11. The baseline for site arisings:
- is determined by the resources and waste generated through excavation, construction, demolition and other activities on the existing land use and assets; and
 - provides regional and national information and data for existing transfer, recovery and recycling waste management facilities.

Site Arisings Generated

- 16.6.12. The current land uses within the Site are understood to generate minimal volumes of site arisings, limited to waste and surplus materials produced from the operation and maintenance of: Riverside 1 (including the Middleton Jetty, but not including the residual wastes received for recovery at the Riverside 1); Crossness LNR; Munster Joinery (UK) Limited; and Norman Road. These arisings substantially comprise municipal and commercial and industrial (C&I), as well as maintenance (construction, demolition and excavation (CDE)) waste types. Most of these arisings would be expected to be diverted from landfill as a matter of good practice to reuse, recover or recycle materials. Further information on the UK and regional baseline is provided below.

CDE Waste Management: UK and Regional Perspective

- 16.6.13. The charts and data presented in this section confirm the availability of waste management facilities in the region; these facilities are expected to enable suitable recovery of site arisings generated by the Proposed Scheme.
- 16.6.14. DEFRA data, summarised in **Table 16-8**, shows that within England the recovery rate for non-hazardous construction and demolition wastes (excluding excavation wastes) has remained above 90% since 2010⁴⁴. This exceeds the EU target of 70% (by weight) which the UK needed to meet by 2020. This target excluded naturally occurring materials, specifically category 17 05 04 in the list of wastes, defined as non-hazardous soils and stones¹⁸.

Table 16-8: Non-hazardous Construction and Demolition Waste Recovery in England

Year	Generation (Mt)	Recovery (Mt)	Recovery rate (%)
2010	53.6	49.4	92.2
2011	54.9	50.8	92.5
2012	50.5	46.4	92.0
2013	51.7	47.6	92.0
2014	55.9	51.7	92.4
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
2020	53.6	50.0	93.2

Source: DEFRA (2023) UK Statistics on Waste⁴⁴.

Note: DEFRA's 2023 update of the data in this table did not extend the data range beyond 2020.

- 16.6.15. Data in **Figure 16-1** has been collated to show that trends for transfer and materials recovery in London and the South East have risen steadily over the past 22 years⁴⁵. Metal recycling has remained relatively consistent since 2014. Data are provided for all waste types and hence will include, but are not specific to, construction and demolition waste.

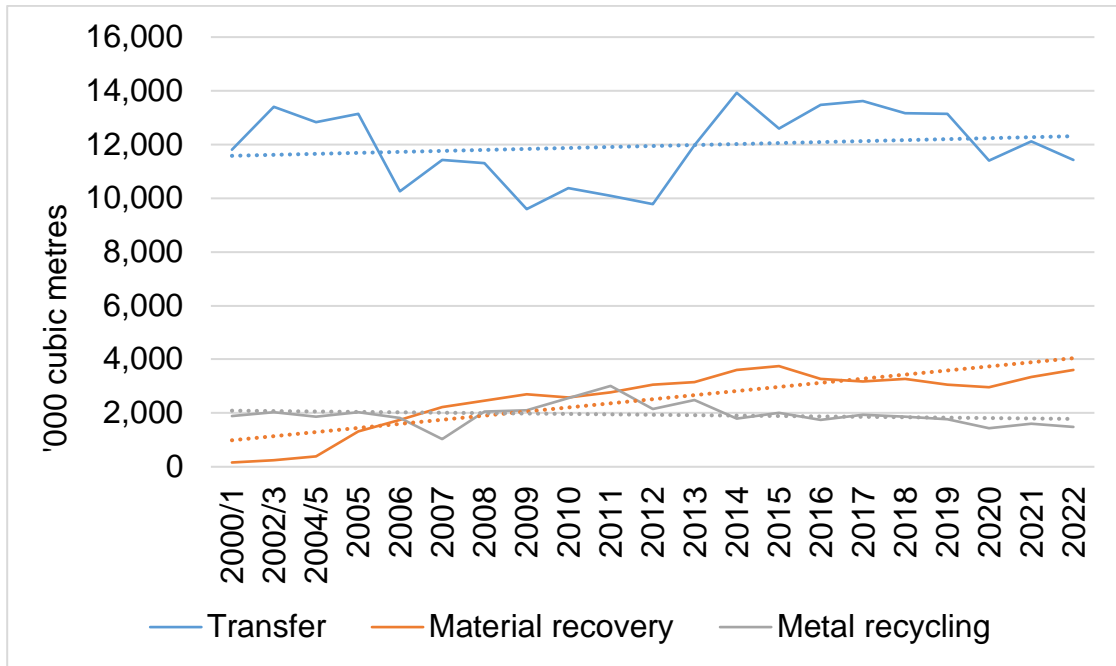


Figure 16-1: Transfer, Materials Recovery and Metal Recycling in London and South East (2000/1 – 2022)

16.6.16. Linear trends (shown as dashed lines in **Figure 16-1**) for transfer, recovery and metal recycling in London and the South East and the data⁴⁵ in **Table 16-9** indicate that there is likely to be waste management infrastructure and capacity available for managing CDE wastes generated by the Proposed Scheme.

Table 16-9: Permitted Waste Recovery Sites in London and South East (2022)

Waste Recovery Facility Type	Number of Sites
Incineration	41
Transfer	589
Treatment	471
Metal Recovery	263
Use of Waste	1
Total	1,365

16.6.17. Regional data for construction and demolition waste management are presented in **Figure 16-2** (London) and **Figure 16-3** (South East). Information has been derived from an analysis of publicly available information in the Waste Data Interrogator⁴⁵.

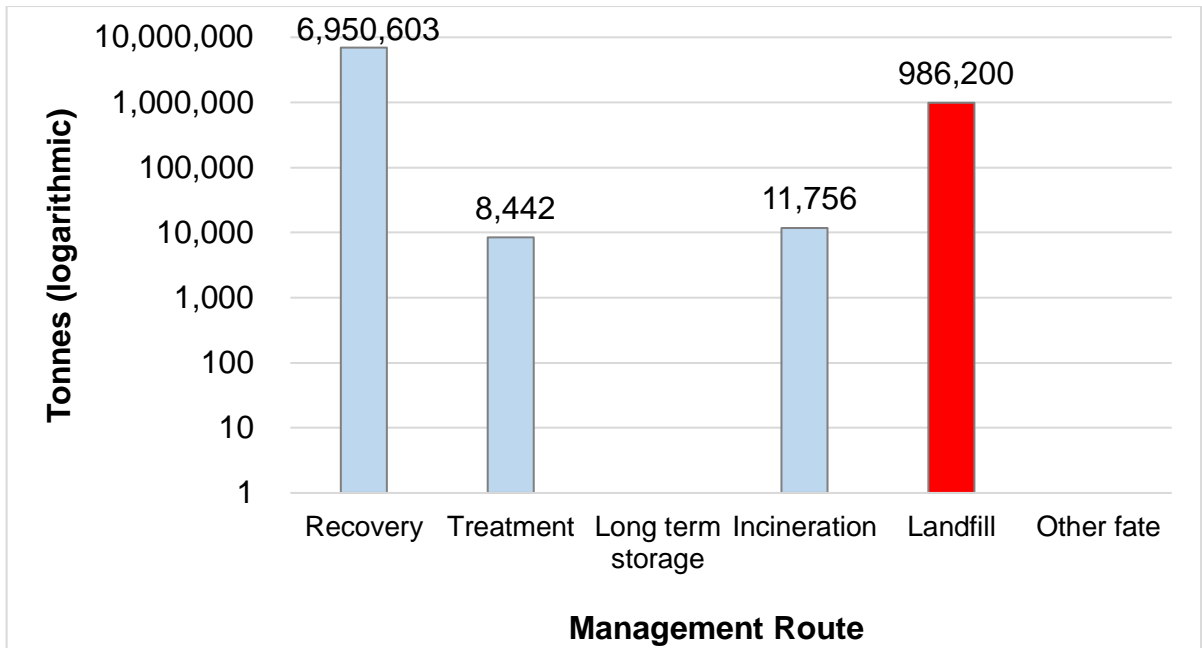


Figure 16-2: London Construction and Demolition Waste Management (2022)

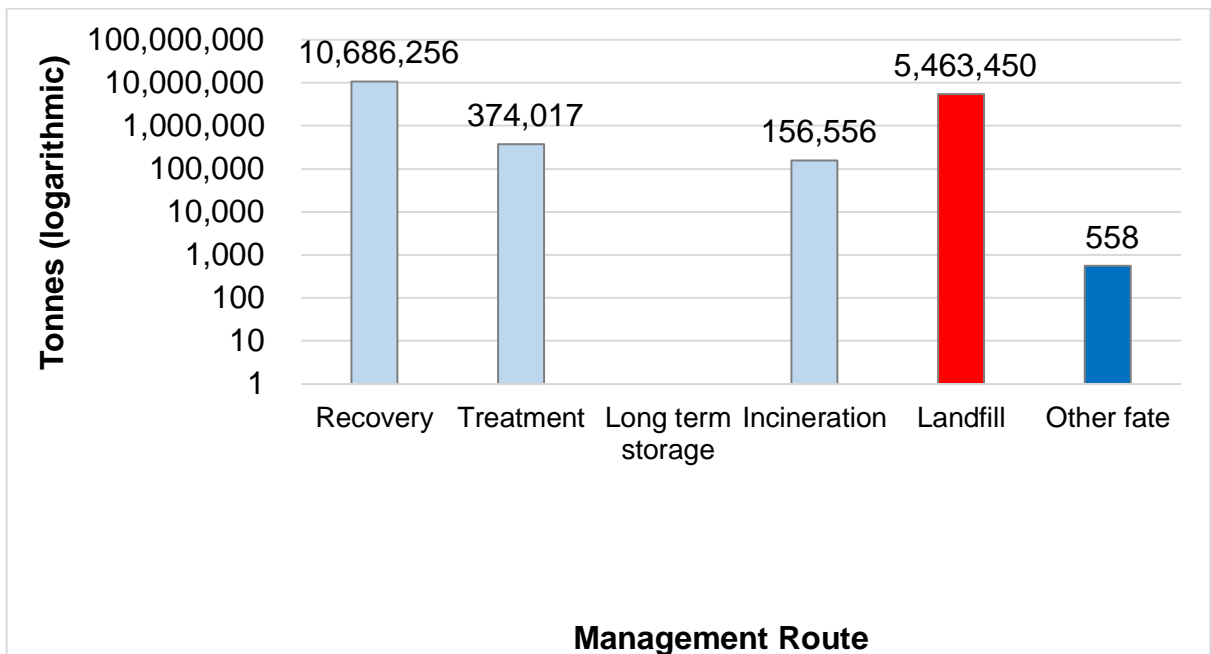


Figure 16-3: South East Construction and Demolition Waste Management Route (2022)

- 16.6.18. Environment Agency data in **Figure 16-2** and **Figure 16-3**⁴⁵ show that the volume of waste recovered, including treatment and incineration, was more than seven times the volume of waste sent to landfill in the London region in 2022; while in the South East region recovered waste was more than double the volume of landfilled waste in the same period.
- 16.6.19. These findings are supported by data⁴⁵ provided in **Table 16-10** and **Table 16-11** which show that, in 2022, an average of 74% of waste received was diverted from landfill through waste management and recovery methods. Data includes the total waste received from both within the London and South East regions and from other regions in the UK. Waste generated within the London or the South East regions may have travelled into each other for management, or to other regions.

Table 16-10: London CDE Waste Management Routes (2022)

Waste Management Route	Inert ^a and Non-Hazardous ^c Waste (Tonnes)	Hazardous Waste ^b (Tonnes)	Total Waste (Tonnes)	Percentage (%)
Recovery	6,930,203	40,598	6,970,801	88%
Landfill	986,169	31	986,200	12%
Other Fate	-	--	-	0%
Total	7,916,371	40,630	7,957,001	100%

^a Inert waste is defined as waste:

- that does not undergo any significant physical, chemical or biological transformations;
- that does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter from which it comes into contact in a way likely to give rise to environmental pollution or harm to human health; and
- where its total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater (see Directive 1999/31/EC 'The Landfill Directive')⁴⁸.

^b Hazardous waste describes any waste that displays one or more of the hazardous properties listed in Annex III of the Waste Directive (2008/98/EC)¹⁸.

^c Non-hazardous waste describes waste that is neither classified as inert nor hazardous.

Table 16-11: South East CDE Waste Management Routes (2022)

Waste Management Route	Inert and Non-Hazardous Waste (Tonnes)	Hazardous Waste (Tonnes)	Total Waste (Tonnes)	Percentage (%)
Recovery	11,181,560	35,268	11,216,829	67%
Landfill	5,394,034	69,416	5,463,450	33%
Other Fate	558	-	558	<0%
Total	16,576,152	104,685	16,680,837	100%

- 16.6.20. The London Plan³ establishes CDE waste and material recovery targets, including to achieve 95% reuse/recycling/recovery of construction and demolition waste, and 95% beneficial use of excavation waste within the 20 to 25 year timeframe of the Plan. Furthermore, London Plan policy SI 8³ promotes capacity increases at waste management facilities where appropriate to maximise their use.
- 16.6.21. The availability of materials recovery infrastructure in London and the South East (mindful of the financial and environmental benefits that can be achieved by applying the proximity principle) suggests that there is good potential to divert site arisings generated by the Proposed Scheme from disposal to landfill. CDE wastes will fluctuate subject to the extent of new developments across the region. This will further be compounded through changing waste management and environmental regulation that will impact the design of new developments and the sustainable management of waste. Therefore, it is reasonable to conclude that the market will respond to provide additional waste treatment capacity to meet demand.

Commercial and Industrial Waste Management: UK & Regional Perspective

- 16.6.22. The baseline for waste:
- is determined by the waste generated and disposed of by the existing land use and current assets; and
 - provides regional and national information and data for landfill capacity currently available.

Waste Generated and Disposed

- 16.6.23. Commercial and industrial (C&I) waste is generated by business and industrial activity and will therefore occur widely within the region with a particular concentration in more urbanised areas. Certain elements of the C&I waste stream, such as mixed ordinary C&I waste, can be very similar to household waste and can often be dealt with through similar treatment and disposal processes. C&I waste can also contain hazardous substances which require management at specialist facilities.

- 16.6.24. Information on C&I waste generation in England is currently provided in the UK Statistics on Waste report⁴⁴. Whilst this report does not provide a regional breakdown of C&I arisings, it estimates that approximately 33.9 million tonnes of C&I waste was generated in England in 2021. C&I waste accounted for 19% of total waste generation in the UK in 2018.
- 16.6.25. The London Plan³ states that 5.0 million tonnes of C&I waste was produced in London in 2015.
- 16.6.26. C&I waste is currently collected within the Expansive Study Area by a large number of private waste companies. There is also a considerable network of waste facilities that are used to bulk, transfer, treat and dispose of C&I waste, including the Applicant's river-based transfer and recycling facilities and Riverside 1 and Riverside 2 (once operational).

Remaining Landfill Capacity

- 16.6.27. The London Plan³ recommends that projects intending to dispose of waste to landfill, should ensure that the receiving facility has capacity to accept waste over the lifetime of a given development.
- 16.6.28. The London Plan also states that no further landfill proposals are identified or anticipated within the Plan period (20-25 years); if proposals do come forward, for new or extended landfill capacity, or for land-raising, boroughs should ensure that the resultant void-space has regard to the London Environment Strategy⁹.
- 16.6.29. At the end of 2022, 59 landfill sites in London and the South East were recorded as having 55 Mm³ of remaining capacity; these data are presented in **Table 16-12**⁴⁶.

Table 16-12: Remaining Landfill Capacity in London and South East (2021-2022)

Landfill Type	Capacity in 2021 (m ³)	Remaining Capacity in 2022 (m ³)	2021 to 2022 Change in Capacity (Mm ³)	2021 to 2022 Change in Capacity Percentage
Hazardous (merchant)	121,318	91,524	0.3	-24.6%
Hazardous (restricted ^a)	98,187	173,335	0.1	76.5%
Inert	21,820,265	22,010,023	0.2	0.9%
Non-hazardous (including stable hazardous waste cells)	35,476,911	32,717,652	-2.8	-7.8%
Total	57,516,681	54,992,534	-2.5	-4.4%

Note:

^a Restricted landfill sites only accept waste from restricted sources and producers, e.g. site operator/managing site.

16.6.30. Baseline regional landfill capacity⁴⁶ is detailed in **Figure 16-4**. Statistical forecasting has been used to demonstrate (in the absence of further provision) long term void availability beyond the earliest operational date for the Proposed Scheme, 2030 (see **Chapter 2: Site and Proposed Scheme Description (Volume 1)**).

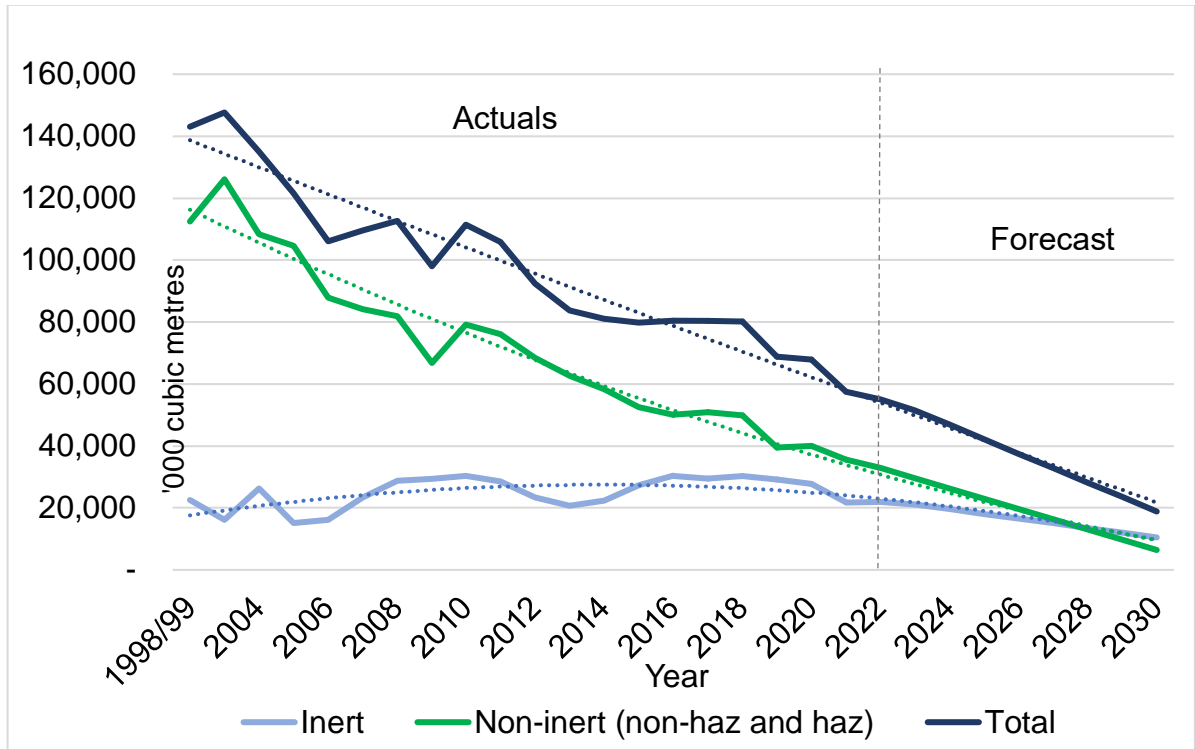


Figure 16-4: Remaining Landfill Capacity in London and South East England

16.6.31. Baseline data indicates that inert, non-inert and total landfill capacity is likely to become an increasingly sensitive receptor throughout the duration of the construction phase and in operation of the Proposed Scheme. **Figure 16-4** shows that in the absence of future provision, waste capacity in London and the South East is forecast to reduce from 2022 to 2030 by as much as:

- **Inert Waste:** 52% to 10.4 Mm³;
- **Non-inert Waste (non-hazardous and hazardous):** 80% to 6.4 Mm³; and
- **Total Waste:** 66% to 18.8 Mm³.

16.6.32. Further to the data provided in **Table 16-12**, and to comply with the assessment criteria requirements of the IEMA Guide³⁰, hazardous waste data is presented in **Table 16-13** confirming that at the end of 2022, England had 8Mm³ of remaining merchant landfill capacity (i.e. capacity that is open to the market) for hazardous waste⁴⁶.

Table 16-13: Remaining Hazardous Waste Landfill Capacity in England

Landfill Type	Remaining Capacity in 2022 (Mm ³)
Hazardous Merchant	8
Hazardous Restricted*	0.9
Total Hazardous	8.9

*Restricted landfill sites only accept waste from restricted sources and producers, e.g., site operator/managing site.

Energy from Waste Capacity and Other Treatment Facilities

16.6.33. **Table 16-14** demonstrates the available capacity in energy from waste facilities in London and the South East regions.

Table 16-14: Permitted capacity of Energy from Waste (EfW) facilities in London and South East Region

Location of EfW	Total Permitted Capacity in 2022 (Tonnes per annum)
London	2,281,000
South East England	3,402,000

16.6.34. It has not been possible to quantify treatment capacity for solvents however London sites include Fourth Way WTF, WasteCare London and Ferry Lane South WTF with more than 15 other sites located in the South East region. **Table 16-15** presents the amount of solvent wastes (classified as 14* 06 03: other solvents and solvent mixtures) received at treatment sites in London and the South East regions in 2022. This demonstrates the potential breadth and availability of suitable facilities that can manage solvent wastes from the Proposed Scheme.

Table 16-15: Total volume of treated solvent waste in the London and South East Regions

Location of Treatment Sites	Total Treated 2022 (Tonnes)
London	74
South East England	771

FUTURE BASELINE

16.6.35. Existing commercial business within the Site would remain at their current locations should the Proposed Scheme not proceed. These include Riverside 1, including

Middleton Jetty and Munster Joinery. Riverside 2 would also be operational in the future baseline.

- 16.6.36. In the future baseline (in the absence of the Proposed Scheme) it is considered that the current land use within the Site would be influenced by the operation of Riverside 2, which is currently under construction. The ES for Riverside 2⁴⁹ concluded that there would be no significant effects for materials and waste from the construction or operation of this facility. Consequently, no significant changes to the baseline for materials and waste are anticipated in the future as a result of Riverside 2.

16.7. EMBEDDED DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 16.7.1. This section sets out the embedded design, mitigation and enhancement measures which are relevant to the materials and waste assessment for the construction phase and operation phases. The **Design Principles and Design Code (Document Reference 5.7)** are commitments which will govern the design of the Proposed Scheme during the detailed design stage. The **Design Principles and Design Code (Document Reference 5.7)** are considered to be embedded mitigation for the purposes of the assessment presented in this chapter.
- 16.7.2. The measures in the **Outline CoCP (Document Reference 7.4)** will form the basis of the full CoCP(s) brought forward post-consent, to be in substantial accordance with that outline, as secured by DCO requirement.

CONSTRUCTION PHASE

- 16.7.3. To minimise as far as possible the effects of material use, waste generation and disposal, the full CoCP, the Materials Management Plan or the full Site Waste Management Plan (as appropriate) will provide that/for:
- the Contractor(s) will reuse excavated arisings on the Proposed Scheme where suitable. If not suitable, it will be taken offsite for reuse, unless circumstances dictate it must be disposed to landfill;
 - the dredged arisings will be managed in accordance with relevant legislation and will be disposed of offsite (via vessel and only if dredged arisings are deemed suitable for this disposal method and conform with the permits for disposal sites). The removal of the dredged arisings will be undertaken by an appropriately licenced waste carrier. The removal of the dredged arisings will be undertaken by an appropriately licenced waste carrier;
 - all surplus steel used for reinforcement (rebar) and sheet piling during construction will be taken offsite for recycling;
 - The following actions to be applied to the demolition of Munster Joinery:
 - Steel framework from the demolition of Munster Joinery may be suitable for reuse on the Proposed Scheme. If not suitable, it will be taken offsite for recovery or recycling.

- Profiled metal sheeting (from the walls and roof) and glass (windows) of Munster Joinery are not suitable for reuse on the Proposed Scheme, these items will be taken offsite for recovery or recycling.
- The existing concrete yard slab will be lifted and crushed onsite for reuse; any metal rebar within the concrete yard slab will be removed and taken offsite for recycling.
- The drainage pipework is not suitable for reuse on the Proposed Scheme and will be taken offsite for recycling, unless circumstances dictate it must be disposed to landfill.
- Existing palisade fencing will be retained onsite during the construction phase and the potential to align new fencing to this existing fencing is currently being explored. Any fencing that is to be removed will be taken offsite for recycling.
- The electronic gate will be retained onsite for the duration of the construction phase. This may be retained onsite following construction if suitable to meet security requirements.
- Existing galvanised steel wheel guides and ram protection bollards will be removed and taken offsite for recycling.

OPERATION PHASE

- 16.7.4. The operation of the Proposed Scheme will seek to minimise material consumption and waste generation.
- As set out in **Chapter 2: Site and Proposed Scheme Description (Volume 1)**, arisings associated with the Proposed Scheme (during maintenance dredging) will be managed in accordance with relevant legislation and will be disposed of offsite (via vessel and only if dredged arisings are deemed suitable for this disposal method and conform with the permits for disposal sites). The removal of the dredged arisings will be undertaken by an appropriately licenced waste carrier.
 - Riverside 1 and/or Riverside 2 would be used for the treatment of residual wastes; subject to waste composition and acceptance criteria and operational availability. If capacity is not available, alternative recovery facilities will be considered.
- 16.7.5. Operational procedures, including maintenance, will be set out in an Operational Environmental Management Plan (Operational EMP), which will be prepared prior to the Proposed Scheme commencing operation which is secured by a requirement in the **Draft DCO (Document Reference 3.1)**.

16.8. ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

16.8.1. This section details the assessment of impacts and effects for the Proposed Scheme during both the construction and operation phases, considering the embedded design, mitigation and enhancement measures detailed in **Section 16.7**.

CONSTRUCTION PHASE

16.8.2. The likely significant effects for materials and waste associated with the construction phase are set out below.

16.8.3. The potential impacts associated with material consumption and waste generation and disposal during construction are summarised in **Table 16-16**.

16.8.4. Indirect impacts have been assessed in the following chapters: **Chapter 6: Noise and Vibration (Volume 1)**; **Chapter 7: Terrestrial Biodiversity (Volume 1)**; **Chapter 10: Townscape and Visual (Volume 1)**; **Chapter 12: Climate Resilience (Volume 1)**; **Chapter 13: Greenhouse Gases (Volume 1)**; **Chapter 14: Population, Health and Land Use (Volume 1)**; **Chapter 17: Ground Conditions and Soils (Volume 1)**; **Chapter 18: Landside Transport (Volume 1)** and **Chapter 19: Marine Navigation (Volume 1)**.

Table 16-16: Potential Environmental Impacts

Element	Direct Impacts	Indirect Impacts
Materials	Consumption of natural and non-renewable resources.	<ul style="list-style-type: none"> ● release of greenhouse gas emissions (through transportation); ● water consumption; ● visual impacts, noise, vibration and other nuisance issues; and ● human health.
Waste	Reduction in landfill capacity.	<ul style="list-style-type: none"> ● release of greenhouse gas emissions (through transportation and management); ● ecological impacts; and ● visual impacts, noise vibration and other nuisance issues.

Consumption of Material Resources

16.8.5. Key construction materials estimated to be required for the Proposed Scheme are presented in **Table 16-17**. The information provided describes the material type, estimated quantity (based on two Carbon Capture Plants constructed under programme Option 1) and any available information relating to the use of the material in the construction of the Proposed Scheme.

Table 16-17: Material Resources Required for Construction

Material Assets	Quantity (Tonnes)	Use of Material in the Proposed Scheme
Aggregate	60,120	Comprises granular sub-base material for pavement, footways and landscaping areas and surface chippings.
Asphalt (Bituminous mixtures)	5,290	For surfacing.
Concrete	74,890	This includes reinforced concrete for structures, foundations, piling and pre-cast concrete for drainage.
Earthworks (imported material)	254,960	Engineered fill material for ground raising and topsoil.
Gravel	1,750	For drainage bedding.
Steel	16,690	Used in concrete reinforcement, sheet piling and drainage equipment.
Plastics (excluding packaging)	1,200	Drainage pipework and lining membrane; cable ducts, flue gas ducting and geotextile sheeting.
Steel (carbon and stainless)	11,100	Specialist plant and equipment, including Absorber Column(s) and Stack(s) for the Carbon Capture Facility.
Steel piping	1,700	Piping.

- 16.8.6. The specification of materials is anticipated to be confirmed prior to the commencement of the construction of the Proposed Scheme. Using professional judgement to apply the criteria set out in **Table 16-3**, the sensitivity of material resources is therefore considered medium.
- 16.8.7. Further to the information detailed in **Paragraphs 16.6.8** and **16.6.9**, based on the baseline data on availability of bulk material resources within the London and South East regions and nationally at the time of writing, there are currently no significant issues regarding supply and stock.
- 16.8.8. Where data are available, as reported in the Baseline (**Section 16.6**), the percentage of material resource consumption for the Proposed Scheme has been calculated and presented in **Table 16-18**. This is based on current data rather than future trends.

Table 16-18: Construction Material Resource Consumption

Material	Production/Sales Data for the Region ^a (Million Tonnes)	Proposed Scheme Requirements (Tonnes)	Percentage of Available Resource Consumed by Proposed Scheme (%)
Primary aggregate	16.1	316,830	2
Ready-mix concrete	5.5	74,890	1.4
Asphalt	4.6	5,290	1.4
Steel	7.2*	29,490	0.4
^a nationally where regional data unavailable.			

- 16.8.9. Based on the criteria set out in **Table 16-4** using professional judgement and considering the nature and scale of the Proposed Scheme, the magnitude for material resources consumption is considered minor as one or more materials (primary aggregate and ready-mix concrete) is between 1-5% by volume of the regional baseline availability.
- 16.8.10. The significance of effect for material resource consumption is therefore currently considered to be **Slight Adverse (Not Significant)**.

Recovery and Disposal of Waste

Waste Recovery

- 16.8.11. The estimated quantity of earthworks cut, and identified for reuse, and the recovery of site arisings within the Proposed Scheme is summarised in **Table 16-19**.

Table 16-19: Forecast Waste Management of Site Arisings

Arisings	Quantity (Tonnes Unless Otherwise Stated)	Comments
Construction of the Carbon Capture Facility		
Site preparation, clearance and groundworks	43,770	It is assumed that 100% of excavated arisings will be reused on the Proposed Scheme, where suitable, to level the Site and use in soft landscaping areas including the Mitigation and Enhancement Area.

Arisings	Quantity (Tonnes Unless Otherwise Stated)	Comments
Steel (from construction)	700	It is assumed that all surplus steel used for reinforcement (rebar) and sheet piling will be taken offsite for recycling (quantity based on a best practice wastage rate of 5%).
Construction of the Proposed Jetty		
Capital dredged arisings	44,880 ⁵⁰	The dredged arisings associated with the Proposed Scheme (during capital dredging) will be managed in accordance with relevant legislation and will be disposed of offsite (via vessel and only if dredged arisings are deemed suitable for this disposal method and conform with the permits for disposal sites). The removal of the dredged arisings will be undertaken by an appropriately licenced waste carrier. An allowance of 80% has been allocated, as there may be contamination present within the top layer of sediment. A contingency allowance (20%) has been made for disposal to landfill in Table 16-8 .
Demolition of Munster Joinery premises		
Steel (building framework)	220	Recovered and taken offsite for recycling.
Profiled metal sheeting	50	Recovered and taken offsite for recycling.
Glass (windows)	1	Recovered and taken offsite for recycling.
Concrete yard slab	1,690	The concrete slab will be lifted and crushed onsite for reuse. Any metal rebar will be removed and taken offsite for recycling.
Palisade fencing	5	Retained onsite during the construction phase.
Drainage pipework	9	Excavated pipework will be taken offsite for recycling.
Electronic gate	1 no.	Retained onsite during construction.

Arisings	Quantity (Tonnes Unless Otherwise Stated)	Comments
Mixed metals (steel and aluminium)	<1	Galvanised steel wheel guides and ram protection bollard will be taken offsite for recycling.
Demolition of Belvedere Power Station Jetty (disused)		
Steel reinforcement	300	Recovered and taken offsite for recycling (depending on condition)
Concrete decks and piles	6150	Recovered and taken offsite for recycling.
Timber fenders and cladding	510	Recovered and taken offsite for recycling.
Bricks	350	Recovered and taken offsite for recycling.
Mixed metals (steel and aluminium)	Quantity unknown at this stage	This comprises the access trestle and suspended walkway; quay furniture, e.g. fencing, stairs, poles, ladders, piping, bollards, equipment etc. This would be recovered and taken offsite for recycling.

- 16.8.12. All excavation arisings generated from the cut are anticipated to be reused during construction (43,770 tonnes) for site levelling and landscaping. This figure may alter depending on the suitability of the resource for reuse once it has been excavated and tested. Excavation arisings that cannot be reused on the Proposed Scheme will be managed by the appointed waste management Contractor(s), as specified in the **Outline CoCP (Document Reference 7.4)**.
- 16.8.13. Where suitable, the reuse of earthworks from excavated arisings represents a reduction in the adverse impacts of waste generation by the Proposed Scheme. The resulting diversion of this waste from landfill will reduce adverse effects on landfill as a sensitive receptor.

Waste Disposal

- 16.8.14. Forecasts for waste are given in **Table 16-20**. Additional waste types (hazardous waste and general construction waste) have been included in the list as, based on professional judgement, they are likely to be generated.

Table 16-20: Forecast Waste Disposal

Type of Material	Quantity for Disposal (Tonnes)	Reuse/Recovery/Disposal Process
Concrete (poured)	1,520	Based on a best practice wastage rate of 2%. At this stage it is not known how waste derived from poured concrete used in structures, foundations etc. will be managed. Therefore, a worst case scenario, where this will be disposed to landfill, has been applied for the purposes of the assessment.
Capital dredged arisings	11,220	A contingency of 20% of the total dredged arisings has been allocated as potentially contaminated. This would be disposed to landfill.
Hazardous and contaminated waste	Undefined	Contaminated arisings would be sent to landfill if it was not possible to treat them for reuse on the Proposed Scheme. Hazardous waste has not (to date) been identified in the data provided, however, it is best practice that any such waste would be disposed of by being sent to a licensed hazardous landfill.
General construction waste (packaging, surplus materials/ off-cuts)	Quantity unknown at this stage	General construction waste will be reused on the Proposed Scheme, where possible, or sent to an offsite recycling facility. Riverside 1 and/or Riverside 2 would be used for the treatment of residual wastes; subject to waste composition and acceptance criteria and operational availability. If capacity is not available, alternative recovery facilities will be considered. If the nature of the waste is not suitable for recovery, it will be disposed of to landfill.

- 16.8.15. Previous ground investigations have identified contaminants of concern, including elevated concentrations of metals, metalloids, organics and asbestos. Although no hazardous waste has been identified or confirmed at this stage, this will be verified as part of ground investigations that will be undertaken to inform the detailed design. It is anticipated that contaminants found during the construction phase will be appropriately remediated in adherence to applicable legislation and guidance. This is described in **Chapter 17: Ground Conditions and Soils (Volume 1)**.
- 16.8.16. National hazardous landfill capacity is currently 8Mm³. The volume of hazardous waste that would need to be generated to have a significant effect on current available capacity is 0.5% which equates to 40,000m³ (as set out in the significance criteria of **Section 16.4**). Professional judgement can be used to assert that this volume of hazardous waste is unlikely to be generated by the Proposed Scheme.
- 16.8.17. The use of arisings would be subject to their classification under reuse criteria through the implementation of a MMP. Onsite temporary storage arrangements for arisings will be considered in the design of the Site construction layout to allow stockpiling of materials for onsite reuse, or prior to offsite recovery or disposal.
- 16.8.18. As stated in **Section 16.6**, the availability of remaining landfill capacity (non-inert waste) within the London and South East England regions is forecast to decrease by 80% to 6.4Mm³ between 2022 and 2030 (latest construction completion year). Inert waste landfill capacity is forecast to reduce by 52% to 10.4Mm³ in the same timeframe. Therefore, using the criteria set out in **Table 16-3**, the sensitivity of non-hazardous waste is considered to be Very High, as available capacity would be expected to reduce by over 10%.
- 16.8.19. Waste anticipated to be disposed of to landfill comprises surplus poured concrete (1,520 tonnes/640m³), as well as hazardous wastes and general construction wastes of unknown quantity.
- 16.8.20. Using the criteria in **Table 16-3**, the disposal of waste generated by the Proposed Scheme (using a reasonable worst case scenario) would result in a negligible magnitude of impact, as waste generated by the Proposed Scheme will reduce regional landfill void capacity baseline by <1% (this equates to <630,000m³).
- 16.8.21. Although there is limited data for anticipated hazardous waste generated through construction of the Proposed Scheme, a contingency sum of potentially contaminated dredged arisings which may require disposal to hazardous landfill equates to 22,000m³. Using professional judgement and the scale of the Proposed Scheme against the criteria in **Table 16-3**, it is considered that national hazardous landfill capacity would be reduced by <0.1-0.5%, resulting in negligible magnitude of impact.
- 16.8.22. For the assessment of effects on remaining landfill capacity, the sensitivity of remaining landfill capacity is Very High. The magnitude of change is Negligible. Therefore, there is likely to be a direct, permanent, long term **Slight Adverse (Not Significant)** effect on remaining landfill capacity.

OPERATION PHASE

16.8.23. The likely significant effects for materials and waste associated with the operation phase are summarised below.

Consumption of Amine-based Solvents

16.8.24. It has been calculated that the Proposed Scheme carbon capture system will require 499 tonnes per annum of amine-based solvents (based on worst case scenario).

16.8.25. The amine-based solvents are considered to be widely available with no known issues regarding supply, stocks and production. Therefore, the sensitivity is low.

16.8.26. The magnitude is moderate based on a worst case scenario that the quantity of amine-based solvents required is between 6-10% by volume of the national baseline availability. Therefore, impacts on the availability of this resource as a result of the Proposed Scheme are assessed to be **Slight Adverse (Not Significant)**.

Recovery and Disposal of Waste

16.8.27. It is assumed that operational waste will be generated from the plant and operation buildings (Gatehouse, Control Room, Welfare, Stores and Workshop).

16.8.28. **Table 16-21** estimates the likely waste generation from the operations buildings. These estimates are based upon floor area and appropriate benchmark metrics from BS 5906:2005 Waste Management in Buildings – Code of Practice³² unless otherwise stated.

16.8.29. To quantify estimated potential wastes, a metric of 50 litres is applied to each employee expected per 8 square metres of floorspace across operational areas. Potential wastes are also quantified using metrics appropriate to the building use, with estimates generated on a building split of 40% Industrial Unit and 60% Office including maintenance storage.

Table 16-21: Estimated Operational Waste Arisings from the Proposed Scheme Buildings (Gatehouse, Control Room, Welfare, Stores and Workshop)

Description	Indicative Gross Internal Area (GIA) (m ²)	Weekly General Waste Arisings (Tonnes)	Annual General Waste Arisings (Tonnes)	Weekly Recycling Waste Arisings (Tonnes)	Annual Recycling Waste Arisings (Tonnes)
Office ^a	166	0.52	27	0.67	35.1
Industrial Unit ^b	110	0.28	14.3	0.36	18.6
Total	266	0.8	41.3	1.03	53.7

16.8.30. **Table 16-22** identifies the estimated operational waste arisings from the Proposed Scheme, based upon information from the Design Team.

Table 16-22: Estimated Operational Waste Arisings from the Proposed Scheme

Operational Waste	Quantity	Unit
Amine-based solvent	499	Tonnes per annum
Desiccants for dehydration – silica gel or mol sieve	7.8	Tonnes per annum
Lubricant oils	1	Tonnes per annum
Activated carbon for filtration	128	M ³ per annum
Filter disposal cartridges	4	Cartridges per annum
Filter media	Unknown	N/A
Capture Plant Filtration – activated carbon – filter cake or disposable cartridges	140	M ³ per annum
Dredged arisings	9,000	M ³ per annum
	4,590	Tonnes per annum
Recyclable materials	53.7	Tonnes per annum
General waste	41.3	Tonnes per annum
Waste Electrical and Electronic Equipment (WEEE)	1	Tonnes per annum

- 16.8.31. Operational maintenance dredging will amount to 9,000m³ per annum of dredged arisings. The typical frequency of the operational maintenance dredging is approximately 12 months; however, this may vary depending on the intensity of coastal processes and frequency of berth usage.
- 16.8.32. Maintenance dredged arisings will be managed in accordance with relevant legislation and will be disposed of offsite (via vessel and only if dredged arisings are deemed suitable for this disposal method and conform with the permits for disposal sites). If contaminated, the removal of the dredged arisings will be undertaken by an appropriately licenced waste carrier. For the assessment, a contingency allowance (20%) has been made for disposal to landfill.
- 16.8.33. **Table 16-12** and **Table 16-14** present remaining landfill capacity in the London and South East regions, and the total permitted capacity of energy from waste facilities in the London and South East regions in 2022 respectively.
- 16.8.34. **Table 16-4** sets out the criteria for assessing the magnitude of impact from materials and waste. For the purposes of this assessment, Method W1 (void capacity), as set out in the IEMA Guide³⁰ is used. **Table 16-5** sets out the criteria for assessing the significance of impact from materials and waste.

Waste Recovery

16.8.35. Based upon the anticipated operational waste arisings outlined in this chapter and taking into consideration the receptors of energy from waste facilities and landfill facilities, **Table 16-23** shows the magnitude and sensitivity that the operational wastes would have on London waste infrastructure. The assessment considers the percentage depletion of remaining landfill capacity or remaining permitted capacity in other final management capacity (energy from waste facilities). The assessment includes use of landfill, and energy from waste, for general wastes simply to demonstrate the negligible impact upon either option given the small volumes of general wastes.

Table 16-23: Sensitivity and Magnitude of Operational Wastes on London Infrastructure

Operational Waste	Assumed Waste Fate	2022 Available Capacity (%)	Sensitivity (%)	Magnitude
Amine-based solvent	Energy from waste	99.978 (remaining permitted capacity)	0.022 Low	Negligible
Desiccants for dehydration	Hazardous landfill (merchant)	99.987 (remaining capacity)	0.013 Low	Negligible
Activated carbon for filtration	Hazardous landfill (merchant)	99.860 (remaining capacity)	0.140 Medium	Minor
Capture Plant Filtration – activated carbon	Hazardous landfill (merchant)	99.847 (remaining capacity)	0.153 Medium	Minor
Dredged arisings (20% contingency for potentially contaminated arisings)	Hazardous landfill (merchant)	99.61 (remaining capacity)	0.004 Low	Negligible
Dredged arisings (80% recovery)	Suitably licenced offshore facility	99.839 (permitted capacity)	0.002 Low	Negligible
General waste	Energy from waste	99.998 (remaining permitted capacity)	0.002 Low	Negligible

Operational Waste	Assumed Waste Fate	2022 Available Capacity (%)	Sensitivity (%)	Magnitude
General waste	Non-hazardous landfill	99.999 (remaining capacity)	0.001% Low	Negligible

- 16.8.36. **Table 16-24** shows the magnitude and sensitivity that operational wastes would have on baseline energy from waste infrastructure in the South East region.
- 16.8.37. At the time of writing, it has not been possible to determine the remaining capacity of such sites. However, when the Proposed Scheme is operational the Contractor(s) will engage with all relevant recycling, energy from waste or disposal sites to determine opportunities suitable to the Proposed Schemes' composition and frequencies of waste, which can be treated at sites in either the London or South East regions.
- 16.8.38. For the purpose of this assessment, the nominal 1 tonne of lubricant oils will have negligible effect on energy from waste capacity. This is because the Contractor(s) will divert these materials to appropriately licenced recycling facilities.
- 16.8.39. Recyclable materials and general waste will be similar in composition to household waste and the quantities generated from the Proposed Scheme is deemed to have a negligible effect on local waste infrastructure.

Table 16-24: Significance and Magnitude of Operational Wastes on South East Region Energy from Waste Infrastructure

Operational Waste Type	Assumed Waste Fate	Remaining 2022 permitted capacity once operational wastes are considered (%)	Sensitivity	Magnitude
Amine-based solvent	Energy from waste	99.978	0.022% Low	Negligible
General waste	Energy from waste	99.999	0.001% Low	Negligible
Dredged arisings (80% recovery)	Suitably licenced offshore facility	99.892	0.001% Low	Negligible

16.8.40. Based upon the magnitude of impact, and sensitivity of receptors, the operational wastes from the Proposed Scheme will have an overall **Neutral or Slight Adverse (Not Significant)** effect upon baseline energy from waste infrastructure within London and the South East.

Waste Disposal

16.8.41. Based upon the anticipated operational waste arisings outlined in this chapter, and taking into consideration the receptors of remaining landfill void **Table 16-25** presents the effect that operational wastes would have on South East landfill infrastructure. There are no hazardous waste landfill sites within the London area.

Table 16-25: Significance and Magnitude of Operational Wastes on South East Landfill Infrastructure

Operational Waste	Assumed Waste Fate Other Than Efw	Remaining capacity once operational wastes are considered	Sensitivity (%)	Magnitude
Desiccants for dehydration	Hazardous landfill	99.995	0.005 Low	Negligible
Activated carbon for filtration	Hazardous landfill	99.952	0.048 Low	Negligible
Capture Plant Filtration – Activated carbon	Hazardous landfill	99.947	0.053 Low	Negligible
Dredged arisings (20% contingency for potentially contaminated arisings)	Hazardous landfill (merchant)	99.864	0.136	Negligible
*General waste	Non-hazardous landfill	100.000	0.000 Low	Negligible

Note:

*Utilising conversion factor of 0.27 Tonnes per m³,⁵¹.

- 16.8.42. Amine-based solvents, i.e. liquid waste, cannot be disposed of to landfill as defined in Environmental Permitting Guidance: The Landfill Directive⁴⁸. Amine-based solvents are likely to be managed at energy from waste facilities. There are, however, opportunities for this to be treated in facilities with the potential to valorise and recycle amine-based solvents instead. These facilities do not fall within the magnitude and sensitivity criteria set out earlier in this chapter however given the small volumes of such wastes that will be generated from the Proposed Scheme, it can confidently be assumed that adequate capacity remains within existing facilities – and the market will respond to offer new facilities should the demand exist.
- 16.8.43. Based upon the magnitude of impact, and sensitivity of receptors, the operational wastes from the Proposed Scheme will have an overall **Neutral or Slight Adverse (Not Significant)** effect upon landfill capacity within the London and South East regions.

16.9. ADDITIONAL DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 16.9.1. The assessment has concluded that the effects of material consumption and waste generation during the construction phase are not significant. However, best practice design and construction measures to minimise impacts are outlined below and in the **Outline CoCP (Document Reference 7.4)**.

CONSTRUCTION PHASE

Materials

- the specification of recycled and secondary content in imported materials (such as earthworks, aggregate, concrete and asphalt), is set out during detailed design;
- careful estimation and ordering of the material needed on Site at any given time to be undertaken, to minimise the likelihood of surplus materials. This will also reduce the risk of material being stored on Site for long periods of time with the risk of damage or decay;
- maximising where reasonably practicable the use of offsite construction and pre-fabrication methods to encourage a process of assembly rather than construction;
- sourcing where reasonably practicable reusable plant, assets, and other aspects from local reuse networks or locally decommissioned projects to maximise use of secondary materials and to minimise transport mileage;
- seeking to lease plant, assets, and other aspects, where reasonably practicable, which can then be returned to the supplier for reuse, rather than to procure new components which then have to be sold, recycled or disposed when no longer required;
- the capture and communication of actions already undertaken (or planned) within the design for deconstruction and disassembly, to encourage reuse and recycling at the assets' end of life. For example, consideration of material passporting to

capture and retain information concerning the composition of materials and plant, with instructions on how these can be decommissioned, reused, recovered or recycled; and

- identifying opportunities to promote materials and products that afford higher sustainability performance than typical industry standards e.g., closed loop plasticised cable ducting; low carbon materials (timber), or technology that is powered through renewable energy sources.

- 16.9.2. Additionally, the measures set out in the **Outline Site Waste Management Plan (Document Reference 7.10)** ensure that wastes will be correctly segregated to maximise recycling. Wastes will be responsibly managed in full adherence to local and national policy and legislation. The Site Waste Management Plan will be prepared in substantial accordance with the Outline SWMP.
- 16.9.3. A Materials Management Plan (MMP) will also be prepared prior to construction commencing (post-consent).

Waste

- The Contractor(s) will develop and implement a SWMP (to be prepared in substantial accordance with the **Outline SWMP (Document Reference 7.10)**) and MMP (to be prepared prior to commencement of construction of the Proposed Scheme), to drive performance in the highest tiers of the Waste Hierarchy, thereby maximising recovery, reuse and recycling. As a requirement of the MMP, testing of Site arisings will be a critical step in validating suitability for reuse in different structural and non-structural applications.
- The full SWMP will report on progress and/or set out how the Proposed Scheme will seek to progress the following matters:
 - identifying possible enhancement and other opportunities to reduce waste through collaboration and regional synergies with third parties that are able to valorise wastes into new products;
 - engaging with local third parties, such as educational establishments, to divert surplus or spent materials into use elsewhere as supplies in local projects or as use in college courses. This will move waste up the hierarchy from recycling to reuse; and
 - consideration, where suitable and reasonably practicable, use of small-scale technologies to segregate treat or valorise wastes onsite or offsite, such as onsite composters for organic materials.
- The full CoCP will provide that: site arisings will be suitably stockpiled to maximise reuse. Stockpiles will be designed to minimise quality degradation, damage and loss of resource:
 - Soil and stockpiles will not be located within 10m of surface waterbodies or drainage lines without appropriate cut-off features or flow barriers.

- Stockpiles will be appropriately managed through use of tarpaulins and jute matting to mitigate release of sediment load, and damping down exposed surfaces using water spray.

OPERATION PHASE

- 16.9.4. Although no significant effects have been identified, the Applicant will operate the Proposed Scheme using existing onsite waste prevention, minimisation and management processes and procedures to drive good practice behaviour and contracts, to maximise action in the highest tiers of the Waste Hierarchy and adherence to the proximity principle. Circular Economy practices will be identified and considered to design out wastes, reduce wastes and to divert materials from landfill, into other productive uses. **Section 2.2 of Chapter 2: Site and Proposed Scheme Description (Volume 1)** presents the solvent regeneration and processing systems to recover, manage and reduce waste from the carbon capture process, including amine-based solvent.
- 16.9.5. Examples of mitigation measures that will be considered to reduce operational materials and operational waste may include the following:
- The Applicant will engage early with Contractor(s) to identify opportunities to move wastes up the hierarchy through, for example, valorising of municipal and industrial wastes into new and valuable materials using collaboration and regional synergies.
 - Exploring opportunities to move the treatment of hazardous wastes up the hierarchy from landfill to recovery or recycling once compositions and tonnages are known. For example, this ES has modelled the significance of impacts of operational wastes by considering the treatment of materials within energy from waste recovery plants (e.g. amine-based solvents) or landfill sites. Once the composition and tonnages are better known, the Applicant will explore opportunities to move these wastes up the hierarchy using alternative recovery, valorisation or recycling methods.
 - Ensuring that consumables and other materials include a high level of recycled and secondary content where technically and economically feasible.
 - Careful estimation and ordering of the operational material needed onsite at any given time to minimise the likelihood of surplus materials. This will also reduce the risk of material being stored onsite for long periods of time, with a risk of damage or decay.
 - Source reusable leased plant, assets and other aspects for temporary periods which can then be returned to the supplier for reuse, rather than to procure new components which then have to be sold, recycled or disposed when no longer required.
 - The Applicant will engage with suppliers to identify opportunities to procure materials and supplies that afford higher sustainability performances than typical industry standards.

- The Applicant will engage with suppliers to ensure that, where feasible, procurement agreements include takeback schemes wherein suppliers are obliged to take back any packaging as well as surplus or spent materials;
- The Applicant will engage with local third parties, such as educational establishments, to divert suitable waste materials into use as supplies for local projects or into use within local college courses. This will move wastes up the hierarchy from recycling to reuse.

16.10. MONITORING

CONSTRUCTION PHASE

- 16.10.1. As detailed in **Section 16.9**, a full SWMP will be prepared by the Contractor(s) (in accordance with the **Outline SWMP (Document Reference 7.10)**) and will include management and monitoring of site waste to reduce associated impacts, including potential harm to the environment during the construction phase.
- 16.10.2. A MMP will also be produced by the Contractor(s) and used to monitor the maximum reuse of both natural soils and made ground (contaminated or otherwise).

OPERATION PHASE

- 16.10.3. The Operational EMP will outline a mechanism to collate all waste arisings data across all operations of the Proposed Scheme and will demonstrate the fate of operational wastes, e.g. reuse and recycling routes, waste treatment routes or disposal routes.

16.11. RESIDUAL EFFECTS

- 16.11.1. **Table 16-26** below summarises the residual effects associated with the Proposed Scheme.

Table 16-26: Materials and Waste Summary of Residual Effects

Description of the Effect	Sensitive Receptor	Significance of Effect with Embedded Mitigation	Additional Design, Mitigation, Enhancement measure	Residual Effect
Construction Phase				
Consumption of material resources	Material resources	Slight Adverse (Not Significant)	No mitigation required (but Section 16.9 outlines measures being taken in any event)	Slight Adverse (Not Significant)
Disposal and recovery of waste	Landfill void capacity	Slight Adverse (Not Significant)	No mitigation required (but Section 16.9 outlines measures being taken in any event)	Slight Adverse (Not Significant)
Operation Phase				
Consumption of amine-based solvents	Material resources	Slight Adverse (Not Significant)	No mitigation required (but Section 16.9 outlines measures being taken in any event)	Slight Adverse (Not Significant)
Disposal and recovery of waste	Landfill void capacity and Energy from Waste facility permitted capacity.	Neutral or Slight Adverse (Not Significant)	No mitigation required (but Section 16.9 outlines measures being taken in any event)	Neutral or Slight Adverse (Not Significant)

16.12. LIMITATIONS AND ASSUMPTIONS

16.12.1. This section outlines the limitations, uncertainties, and assumptions made in undertaking the materials and waste assessment reported in this chapter:

- This assessment has been undertaken as a desk based study, using the most recent publicly available information which is up to and including 2022 (unless stated otherwise). Updated data which has been published during the preparation of this ES has been included.
- No quantified data was available for materials currently required for maintenance at the Site.
- No information on steel production is currently available at a regional level.
- The data to be used on the Proposed Scheme is based on a BoQ provided which was refined as the design progressed and has been updated accordingly in this ES. The BoQ data is based on the design information provided at the time of writing and is subject to change as the design progresses, but the information utilised is considered to be a reasonable worst case assumption.
- The resources that are expected to be consumed and waste that is expected to arise during the operation phase of the Proposed Scheme have been assessed based on the information provided and the current design. Accurate estimates of likely waste generation volumes during operation of the Proposed Scheme will, to a significant extent, be dictated by the system processes to be utilised by the Proposed Scheme.
- Both quarry and 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 baseline presented in this chapter. However, this is not likely to affect this assessment.
- In line with the IEMA Guide³⁰, a lifecycle assessment (including embodied carbon and water) of materials will not be part of this assessment process. Embodied carbon has been assessed in **Chapter 13: Greenhouse Gases (Volume 1)**.

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