

Lower Thames Crossing

6.1 Environmental Statement Chapter 11 Material Assets and Waste

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Lower Thames Crossing

6.1 Environmental Statement

Chapter 11 Material Assets and Waste

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11 Materials assets and waste

11.1 Introduction

- 11.1.1 This chapter presents the assessment of the likely significant effects of the A122 Lower Thames Crossing ('the Project') on material assets and waste during construction and operation. The assessment considers the consumption of material resources and products from primary and recycled/secondary sources; and the production, treatment and offsite management of waste.
- 11.1.2 The assessment follows the methodology set out in DMRB LA 110: Material Assets and Waste, and guidance including Environment Agency and Defra publications.
- 11.1.3 This chapter is supported by Figure 11.1 (Application Document 6.2), and additional information contained in the following appendices (Application Document 6.3):
- Appendix 11.1: Excavated Materials Assessment
 - Appendix 11.2: Mineral Safeguarding Assessment
 - Appendix 11.3: List of third-party offsite waste infrastructure receptors
 - Appendix 11.4: Material Assets Assessment Supporting Data
 - Appendix 11.5: Waste Assessment Supporting Data

11.2 Legislative and policy framework

- 11.2.1 This assessment has been undertaken in accordance with relevant legislation, together with national, regional and local plans and policies. A list of plans is provided within Table 11.3 and further details can be found in the Planning Statement (Application Document 7.2).

Legislative requirements

- 11.2.2 Current material assets and waste legislation that has been considered during the assessment is presented in Table 11.1.

Table 11.1 Legislative requirements

Scale	Description of legislation
European	<p>Directive 2008/98/EC on Waste (Waste Framework Directive)</p> <p>The Waste Framework Directive (WafD) contains the European Parliament and the Council of the European Union's legal definition of waste, which is adopted by Member States. This definition is used to establish whether a material is classified as waste or not.</p> <p>Article 2 states that '<i>uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated</i>', are excluded from the scope of the WafD.</p> <p>The WafD mandates the use of the waste hierarchy in waste management (prevention, preparation for reuse, recycling, other recovery and disposal). In addition, it sets a target for increasing the recycling of non-hazardous construction</p>

Scale	Description of legislation
	<p>and demolition waste to a minimum of 70% (measured by weight) by 2020 (Article 11).</p> <p>Annex III of Commission Decision of 18 November 2011, '<i>Establishing rules and calculation methods for verifying compliance with the targets set in Article 11(2) of Directive 2008/98/EC of the European Parliament and of the Council</i>' (2011/753/EU), sets out the methodology implemented when calculating construction waste diversion from landfill.</p>
	<p>Directive 1999/31/EC on the landfill of waste (Landfill Directive)</p> <p>The Landfill Directive establishes a framework for the management of waste across the European Union. It also defines certain terms, such as 'waste', 'recovery' and 'disposal', to ensure that a uniform approach is taken across the European Union.</p>
National	<p>Environmental Permitting (England and Wales) Regulations 2016 (as amended)</p> <p>These Regulations were created to standardise environmental permitting and compliance in England and Wales to protect human health and the environment. This includes permitting waste and recovery operations within the Order Limits and at offsite third-party facilities receiving waste.</p>
	<p>Waste (England and Wales) Regulations 2011 (as amended)</p> <p>These Regulations transpose the WaFD into English and Welsh law. The Regulations require businesses to confirm that they have applied the waste hierarchy, introduce a new waste hierarchy permit condition and a two-tier system for waste carrier and broker registration.</p>
	<p>Environmental Protection Act 1990 (Part II)</p> <p>This Act outlines the basic provisions for the management of all waste, which includes details on the definition of waste, and outlines the Duty of Care placed on those involved in managing wastes.</p>
	<p>Hazardous Waste (England and Wales) Regulations 2005</p> <p>These Regulations transpose the Hazardous Waste Directive into English and Welsh law. The Regulations prohibit the mixing of hazardous and non-hazardous waste and require that a Hazardous Waste Consignment Note is produced for each consignment of hazardous waste removed from site.</p>

National policy framework

- 11.2.3 The National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014) sets out the Government's policies to deliver the development of Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England. Major utilities diversions are required as part of the Project, and the National Policy Statements for Energy Networks 1, 4 and 5 sets out the relevant policies for these.
- 11.2.4 NSIPs are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant National Policy Statements (NPSs) for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework (NPPF)).
- 11.2.5 The NPPF, published in 2012 and updated in 2019 (Ministry of Housing, Communities and Local Government, 2019), sets out the Government's overarching planning policies for England and how these are expected to be applied. The NPPF confirms (in paragraph 5) that it does not set policy for NSIPs, and that relevant policy is to be found within the NPSs, however, the

NPPF may contain guidance considered important by the decision-making authority.

- 11.2.6 Project is required to be assessed against both the NPSNN as well as the Overarching National Policy Statement for Energy (EN-1), National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) and National Policy Statement for Electricity Infrastructure (EN-5). The NPSNN forms the “case-making” basis for the Project, and the need for nationally significant utilities diversions arises solely from the need for the road element of the Project. Notwithstanding this, the assessment principles in the NPSs have been considered with equal weight. All NPSs are designated utilising and conforming to the same legislative requirements, guidance and international obligations, and accordingly, there is consistency across them. For this reason Table 11.2, below, lists the planning policies at a national level, including those in the NPSNN but does not repeat the same policy requirements that appear in EN-1, EN-4 and EN-5. Instead, cross-references and individual responses (where necessary) to the relevant sections within the suite of Energy National Policy Statements can be seen in Appendix A2 to the Planning Statement (Application Document 7.2).

Table 11.2 National policy framework and the Project response

Reference	Requirement	Project response
National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014)		
Paragraph 5.42	<i>‘The applicant should set out the arrangements that are proposed for managing any waste produced. The arrangements described should include information on the proposed waste recovery and disposal system for all waste generated by the development. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome.’</i>	The anticipated waste arrangements proposed for construction and operation are detailed in Table 1.1 and Table 1.2 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3). Section 11.5 below outlines how the proposed arrangements have sought to minimise the volume of waste produced and the volume of waste sent for disposal.
Paragraph 5.43	<i>‘The Secretary of State should consider the extent to which the applicant has proposed an effective process that will be followed to ensure effective management of hazardous and non-hazardous waste arising from the construction and operation of the proposed development. The Secretary of State should be satisfied that the process sets out:</i> <ul style="list-style-type: none"> <i>any such waste will be properly managed, both on-site and offsite.</i> <i>the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area; and</i> <i>adequate steps have been taken to minimise the volume of waste arisings, and of the volume of waste arisings sent to disposal, except where an alternative is the most sustainable outcome overall.’</i>	An effective process has been proposed to ensure effective management of hazardous and non-hazardous waste onsite and offsite, as described in Section 11.5 of this chapter. The volumes of hazardous and non-hazardous waste arising from construction and operation have been forecast in Table 1.1 and Table 1.2 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) and compared with the local, regional and national waste infrastructure capacity in Section 11.6 of this chapter. The assessment shows that waste from the Project can be dealt with appropriately by the waste infrastructure, which is, or is likely to be, available. With regard to paragraph 5.43 of the NPSNN, which refers to the ‘adverse effect on the capacity of existing waste management facilities’, the assessment demonstrates that an adverse effect on the capacity of existing waste management facilities, as a whole, to deal with other waste arisings in the area would not occur. The Project would require non-hazardous (2.4%) and inert waste (3.8%) landfill capacity, however 82% of

Reference	Requirement	Project response
		<p>construction non-hazardous waste is calculated to be diverted from landfill. The assessment has shown this would require only 1.5% of the capacity of recycling and recovery facilities in the study area, which is unlikely to preclude the receipt of waste from other sources.</p> <p>There is one hazardous landfill which accepts asbestos waste within the study area. It is highly unlikely that project hazardous waste (contaminated soils, coal tar road planings etc) would be sent to this landfill. Should this hazardous waste require landfill disposal it would be managed outside of the study area. The Project would require 0.5% of the available national hazardous waste capacity. It is therefore unlikely to adversely affect the capacity of existing waste management facilities to deal with other waste arisings.</p> <p>Section 11.5 of this chapter also outlines the steps taken towards waste minimisation through design as well as targets to divert waste from disposal, except where an alternative is the most sustainable outcome overall.</p>
Paragraph 5.169	<i>‘Applicants should safeguard any mineral resources on the proposed site as far as possible.’</i>	<p>The Project has ensured the safeguarding of mineral resources by evaluating the likely impact on reserves in the Mineral Safeguarding Assessment Report (Application Document 6.3, Appendix 11.2) to understand the potential for extractable minerals to be present within the Order Limits.</p> <p>As outlined in Section 11.6, it is considered that MSAs would not be sterilised or precluded from future use.</p> <p>Relevant parties have been consulted to determine a suitable approach aimed at minimising the effects on, and safeguarding of, mineral resources within the Order Limits. A summary of consultation is included in Error!</p> <p>Not a valid result for table..</p>
Paragraph 5.182	<i>‘Where a proposed development has an impact on a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that the applicant has put forward appropriate mitigation measures to safeguard mineral resources.’</i>	

Reference	Requirement	Project response
National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019)		
Paragraph 8	<p>Paragraph 8 outlines the NPPF approach to sustainable development, listing economic, social and environmental objectives. The environmental objectives state:</p> <p><i>‘an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, 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>The NPPF does not contain any other specific waste policies, as these are contained in the Waste Management Plan for England (Department for Environment, Food and Rural Affairs (Defra), 2013).</p>	<p>Section 11.5 of this chapter outlines how circular economy principles have been embedded throughout the Project to manage resource use prudently and minimise waste.</p>
Paragraph 204	<p>Part 17 contains several provisions for ensuring a sufficient supply of minerals including: defining MSA, encouraging the reuse of secondary and recycled aggregates and new primary mineral sites, as well as setting out criteria for associated planning permissions. The NPPF also makes provision for local authorities to undertake aggregate assessments to measure and provide adequate mineral landbanks. Authorities are encouraged to ensure adequate restoration of associated mineral workings.</p>	<p>A Mineral Safeguarding Assessment Report has been prepared (Application Document 6.3, Appendix 11.2) to understand the potential for extractable minerals to be present within the Order Limits and, if present, the potential for them to be sterilised by the Project.</p> <p>As outlined in Section 11.6, it is considered that MSAs would not be sterilised or precluded from future use and the aggregate excavated in the course of the construction phase is anticipated to be reused on the Project to fulfil the design.</p> <p>An assessment of the Project’s impacts to the Kent and Essex landbank was provided to Kent County Council and Essex County Council (see Table 11.4). A major impact is not anticipated from the construction phase.</p>
Waste Management Plan for England (WMPE) (Defra, 2013)		
N/A	<p>The WMPE provides an analysis of the current waste management situation in England and fulfils the mandatory requirements of Article 28 of the WaFD. The plan does not introduce new policies or change</p>	<p>Table 1.1 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) outlines how construction waste would be recovered in line with</p>

Reference	Requirement	Project response
	<p>the landscape of how waste is managed in England. Its core aim is to bring current waste management policies under the umbrella of a single national plan.</p> <p>The document states that the construction, demolition and excavation (CDE) sector is the largest contributing sector to total waste generation and commits the Government to recover at least 70% by weight of construction and demolition waste by 2020.</p>	<p>the requirement of the WMPE and the forecast percentage of waste estimated to be diverted from landfill.</p> <p>Over 70% (by weight) of Construction and Demolition Waste generated by the Project shall be subjected to material recovery in accordance with the WaFD. Excess excavated material not utilised onsite is also included in this target.</p>
Our Waste, Our Resources: A Strategy for England (HM Government, 2018)		
Section 1 and 3	<p>The Strategy helps deliver the Government's 25 Year Environment Plan which sets out how the Government intends to preserve material resources by minimising waste, promoting resource efficiency and moving towards a circular economy.</p> <p>The plan identifies an outline strategy including the adoption of circular economy principles and identifies that some construction wastes in future may be subject to Extended Producer Responsibility.</p>	Section 11.5 of this chapter outlines how circular economy principles have been applied throughout the Project to manage resource use and reduce waste.
National Planning Policy for Waste (Department for Communities and Local Government, 2014)		
Section 8	<p>This document sets out the Government's waste planning policies, enabling local authorities to put forward local waste plans and strategies.</p> <p><i>'When determining planning applications for non-waste development, local planning authorities should, to the extent appropriate to their responsibilities, ensure that:</i></p> <ul style="list-style-type: none"> <i>the likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities.'</i> 	<p>The Project has demonstrated the implementation of the waste hierarchy as follows:</p> <ul style="list-style-type: none"> Elimination: Section 11.5 of this chapter outlines how the volume of waste generated has been reduced in design. Recovery (including preparing for reuse, recycling and other recovery): Table 1.1 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) shows how the Project would divert more than 70% of waste from landfill and Section 11.6 demonstrates an acceptable impact to the local recycling/recovery facility capacity. Disposal: Section 11.6 shows that the quantity of waste from the Project going to landfill would

Reference	Requirement	Project response
		reduce the capacity in England by <1% and would be likely to represent 2.4% of the landfill capacity in the study area for non-hazardous and 3.8% for inert waste. It should be noted that of the 3.8% inert capacity utilised within the study area, approximately half of this is within the Order Limits and considered to be the best overall sustainable outcome. The likely impact of the Project on third-party sites and areas allocated for waste management is acceptable and the Project does not prejudice the implementation of the waste hierarchy.

Local policy framework

- 11.2.7 Consideration has been given to local policies relating to material assets and waste within the following county councils and core local authorities: Kent County Council, Essex County Council, Medway Council, Gravesham Borough Council, Dartford Borough Council, Thurrock Council, London Borough of Havering, Brentwood Borough Council and the Greater London Authority. These are outlined in Table 11.3.
- 11.2.8 It is acknowledged that other local authorities may supply materials to the Project or receive waste, however those listed above are in proximity to the Order Limits and thus more likely to be impacted.

Table 11.3 Local policies for material assets and waste

Strategy/plan	Policy/objectives
Kent County Council Kent Minerals and Waste Local Plan 2013-2030 (Kent County Council, 2016)	CSM/CSW 1: Sustainable Development CSW 2: Waste Hierarchy CSW 3: Waste Reduction CSW 11: Permanent Deposit of Inert Waste CSW 13: Remediation of Brownfield Land CSM 5: Land-won Mineral Safeguarding DM 2: Environmental and Landscape Sites of International, National and Local Importance and Policy DM 7: Safeguarding Mineral Resources DM 9: Prior Extraction of Minerals in Advance of Surface Development
Medway Council Kent Minerals and Waste Local Plan 2013-2030 (Kent County Council, 2016)	The local authorities for Medway, Dartford and Gravesham have adopted the Kent Minerals and Waste Local Plan 2013-2030. Therefore, there are no additional objectives required by these local authorities. It is noted that consultation for the new Local Plan in Medway is underway, however the final version has not yet been published.
Gravesham Borough Council Kent Minerals and Waste Local Plan 2013-2030 (Kent County Council, 2016)	
Dartford Borough Council Kent Minerals and Waste Local Plan 2013-2030 (Kent County Council, 2016)	
Essex County Council Essex and Southend-on-Sea Waste Local Plan 2017 (Essex County Council, 2017)	SO1: Collaborative working for waste prevention SO2: Increase reuse, recycling and recovery SO3: Enhance existing waste infrastructure SO4: Self sufficiency SO6: Move waste up the hierarchy SO8: Suitable siting of waste infrastructure

Strategy/plan	Policy/objectives
Essex County Council Essex Minerals Local Plan (Essex County Council, 2014)	S1: Presumption in favour of sustainable development S2: Strategic priorities for minerals development S4: Reducing the use of mineral resources S5: Creating a network of aggregate recycling facilities S8: Safeguarding mineral resources and mineral reserves
Thurrock Council Thurrock Local Development Framework: Core Strategy and Policies for Management of Development (Thurrock Council, 2015)	CSTP29: Waste Strategy CSTP31 and CSTP32: Promote secondary aggregate and safeguard identified mineral resources Work on the proposed Minerals and Waste Local Plan is understood to have been suspended indefinitely.
London Borough of Havering Joint Waste Development Plan for the East London Waste Authority Boroughs (East London Waste Authority, 2012)	W1: Sustainable waste management W4: Disposal of inert waste by landfilling W5: General Considerations with regard to Waste Proposals B: Meet targets in London Plan and Waste Strategy for England 2007
London Borough of Havering Core Strategy and Development Control Policies Development Plan Document (London Borough of Havering, 2008)	CP13: Mineral Extraction DC41: Re-Use and Recycling of Aggregates
Brentwood Borough Council Essex and Southend-on-Sea Waste Local Plan 2017 (Essex County Council, 2017)	The Local Plan for Brentwood adopts the Essex and Southend-on-Sea: Waste Local Plan and Essex Mineral Plan. No additional objectives are required by Brentwood Borough Council. It is noted that the Brentwood Local Plan (2016-2033) was submitted to the Secretary of State for review, therefore the final version has not yet been published.
Greater London The London Plan: The Spatial Development Strategy for London Consolidated with Alterations since 2011 (The Mayor of London, 2016)	Policy 5.3 Sustainable design and construction Policy 5.16 Waste net self-sufficiency Policy 5.17 Waste capacity Policy 5.18 Construction, excavation and demolition waste Policy 5.19 Hazardous waste

11.3 Assessment methodology

Standards and guidance

- 11.3.1 The following standards and guidance documents have been used in devising the methodology for data collection and assessment of material assets and waste impacts:
- DMRB LA 110 Material assets and waste (Highways England, 2019)
 - The Definition of Waste: Development Industry Code of Practice (Contaminated Land: Applications in Real Environments (CL:AIRE), 2011)
 - Code of Practice for the Sustainable Management of Soils on Construction Sites (Defra, 2009)
 - Guidance on the legal definition of waste and its application (Defra, 2012)
 - Circular Economy: Approach and Routemap (Highways England, 2016)

Scope of the assessment

- 11.3.2 The scope of this chapter is to assess the likely significant effects on the consumption and use of material assets and management of waste during the construction and operation of the Project as described in Chapter 2: Project Description.
- 11.3.3 Material assets include primary ‘raw’ materials, such as aggregates and minerals, and mineral or industrial by-products (secondary aggregate) and recycled aggregates. Primary materials are from a non-renewable source (also referred to as virgin materials).
- 11.3.4 The term ‘aggregate’ is an umbrella term for bulk raw particulate materials used in infrastructure construction.
- 11.3.5 Materials required in significant quantities for construction of the Project include metals, aggregate, pavement, concrete and soils, among others. Most of these material resources would originate offsite, purchased as construction products. Others would arise onsite such as excavated soils/minerals (including sand and gravel) or recycled road planings.
- 11.3.6 The Project has the potential to generate large volumes of inert and non-hazardous waste and a smaller percentage of hazardous waste.
- 11.3.7 The WaFD defines waste as ‘any substance or object which the holder discards or intends or is required to discard’. Some naturally occurring soils excavated onsite would be reused within the Order Limits as part of the design proposals. This material is not considered to be waste but is discussed in the assessment to demonstrate the application of the waste hierarchy. The assessment of material assets and waste included the assessment of the use of material resources and products (from primary, secondary or recycled and renewable sources); the use of materials offering sustainability benefits and the use of excavated and other potential waste arisings; and the production, treatment and offsite management of waste during the construction and operational phases of the Project.

- 11.3.8 The assessment of material assets and waste has demonstrated how the design and proposed construction methodology were influenced by the application of circular economy principles and the waste hierarchy to manage and mitigate likely significant effects.
- 11.3.9 A circular economy is defined by the Waste and Resources Action Programme (WRAP) as ‘an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life’ (WRAP, 2020).
- 11.3.10 Embedding circular economy principles is crucial in driving sustainable development as well as meeting the policies outlined in Table 11.2
- 11.3.11 It should be noted that, following the release of the new standard DMRB LA 110 Material assets and waste (Highways England, 2019), the material asset assessment includes an assessment of the likelihood of the sterilisation of safeguarded mineral resources and existing or potential peat extraction sites.
- 11.3.12 The assessment is focused on the evaluation of likely significant effects to the identified receptors:
- a. Material assets used for Project construction (including onsite mineral and peat resources)
 - b. Local and regional waste management capacity
- 11.3.13 In the Scoping Opinion (Planning Inspectorate, 2017), the Planning Inspectorate agreed that the offsite manufacture and extraction of materials is outside of the scope of the material asset and waste assessment and is therefore excluded. No other aspects have been scoped out for the assessment of impacts on material assets and waste as a result of the Project.
- 11.3.14 This assessment has interrelationships with Chapter 10: Geology and Soils, in terms of excavated material reuse and contamination, and Chapter 15: Climate, in terms of the quantity of materials required for construction and waste management to calculate greenhouse gas (GHG) emissions.

Scoping Opinion

- 11.3.15 A Scoping Report (Highways England, 2017) was issued to the Planning Inspectorate on 2 November 2017, setting out the proposed approach to this Environmental Impact Assessment (EIA). A Scoping Opinion was received from the Secretary of State on 13 December 2017, which included comments on the scope of assessment from the Planning Inspectorate and statutory environmental bodies. These comments have been taken into account in the preparation of this chapter, and the Project response is set out in Appendix 4.1: The Inspectorate’s Scoping Opinion and Highways England’s Responses (Application Document 6.3).
- 11.3.16 No significant change to scope was required as a result of the Scoping Opinion.
- 11.3.17 In the Scoping Report (Highways England, 2017), a methodology was proposed in line with Interim Advice Note 153/11: Guidance on the environmental assessment of material resources (Highways Agency, 2011), which was the

overriding guidance at that time. This has since been superseded through the issue of the new standard DMRB LA 110 Material assets and waste (Highways England, 2019). As a result, the assessment methodology, significance criteria, study area and resulting baseline have been revised to follow LA 110.

- 11.3.18 The new DMRB standard addresses the request in the Scoping Opinion to provide a defined methodology that goes beyond professional judgement. Implementation of DMRB LA 110 Material assets and waste (Highways England, 2019) leads to the same outcome of the assessment on likely significant effects.
- 11.3.19 To support this assessment, an Excavated Materials Assessment (Document 6.3, Appendix 11.1) was developed to validate available offsite capacity at third-party potential receiver sites and determine which of these would be capable of receiving excavated materials from the Project.

Consultation

Project consultation

- 11.3.20 Statutory Consultation under Section 42 of the Planning Act 2008 was undertaken on the Project from 10 October 2018 to 20 December 2018. This provided an opportunity for consultees to comment on the Preliminary Environmental Information Report (PEIR) (Highways England, 2018). A summary of the responses can be found in the Consultation Report (Application Document 5.1). Consultees comprised statutory bodies, local authorities, people with an interest in land affected by the Project and local communities.
- 11.3.21 The Project design continued to be developed and Supplementary Consultation was undertaken from 29 January 2020 to 2 April 2020. A further Design Refinement Consultation was then undertaken from 14 July 2020 to 12 August 2020.
- 11.3.22 The Supplementary Consultation and Design Refinement Consultation both included an environmental assessment of the changes in the context of the PEIR. A summary of the responses to these consultation stages can also be found in the Consultation Report (Application Document 5.1).

Stakeholder engagement

- 11.3.23 A summary of the stakeholder engagement specific to material assets and waste is provided in Table 11.4.
- 11.3.24 Further details on the engagement regarding mineral safeguarding is described in Section 1.2 of Appendix 11.2: Mineral Safeguarding Assessment (Application Document 6.3).

Table 11.4 Stakeholder consultation

Stakeholder	Date of meeting / communication	Summary of discussions
Kent County Council	Email response 23 February 2018	Baseline information was requested and provided from Kent County Council on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives, and relevant local assessments via email. This information was incorporated into the baseline in Section 11.4.
	Meeting 27 July 2018	Meeting with Kent County Council to discuss minerals within its region and the Order Limits. Kent County Council confirmed that policy DM 7 regarding safeguarding mineral resources in the Kent Minerals and Waste Local Plan (Kent County Council, 2016) would need to be satisfied. Kent County Council's main concern was that it would be unlikely to support mineral extraction in or adjacent to the Thames Estuary and Marshes Ramsar site due to the negative impact it would likely to have on the wetlands.
	Meeting held 25 July 2019	The reuse of excavated material at the South Portal was discussed, to understand any concerns or design amendments required by Kent County Council. No significant changes were required.
	22 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).
	17 July 2020	An assessment of potential use of mineral landbanks in Essex and Kent has been provided to Kent County Council in response to Appendix 4.1: The Inspectorate's Scoping Opinion and Highways England's Responses (Application Document 6.3).
Essex County Council	Email response 15 November 2017	Baseline information was requested and provided by Essex County Council on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives and relevant local assessments via email. This information was incorporated into the baseline in Section 11.4.
	Email response 27 September 2018	Email communication with Essex County Council regarding the potential mineral resources within the Essex section of the route. Essex County Council confirmed that no mineral resources are located within their section.
	Email Response 17 February 2020	During email correspondence with Thurrock Council regarding the approach to minerals management within the Order Limits, Essex County Council confirmed that each singular area of MSA impacted is below the 5ha threshold which triggers the mineral safeguarding policy in their Minerals Local Plan.

Stakeholder	Date of meeting / communication	Summary of discussions
	21 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).
	17 July 2020	An assessment of potential use of mineral landbanks in Essex and Kent has been provided to Essex County Council in response to Appendix 4.1: The Inspectorate's Scoping Opinion and Highway England's Responses (Application Document 6.3).
London Borough of Havering	Meeting 30 August 2018	London Borough of Havering confirmed during discussions that the only minerals it wishes to safeguard are the superficial deposits of sands and gravels which are found within the MSA.
	Email response 25 September 2019	Baseline information was requested on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives, and relevant local assessments, via email. A response to each request was received and this information has been incorporated into the baseline in Section 11.4. London Borough of Havering were copied into correspondence with East London Waste Authority.
	21 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).
Dartford Borough Council	7 June 2019	Baseline information was requested from Dartford Borough Council on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives and relevant local assessments via email.
	Email response 24 November 2019	Dartford Borough Council agreed the dataset to be used in the assessment.
	22 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).

Stakeholder	Date of meeting / communication	Summary of discussions
Gravesham Borough Council	Email response 31 October 2019	Baseline information was requested from Gravesham Borough Council on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives and relevant local assessments via email. The council replied, deferring to Kent County Council on the majority of requests but also suggesting a number of third-party sites with the potential to receive excess excavated materials which were incorporated into the Excavated Materials Assessment (Application Document 6.3, Appendix 11.1).
	Meeting held 25 July 2019	The reuse of excavated material at the South Portal was discussed to understand any concerns or design amendments required. Gravesham Borough Council requested the Project ensure that the landscaping did not conflict with future expansion of residential development in subsequent Local Plans.
	22 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).
Medway Council	Contacted 7 June, 4 July, 24 July and 22 November 2019	Baseline information was requested from Medway Council on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives, and relevant local assessments, via email. A response to the request was not received. Medway Council were contacted to confirm the Local Plan objectives that were assumed to apply for waste and materials. A response was not received, however, the objectives from the Local Plan have been incorporated as the most appropriate available objectives
	22 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).
East London Waste Authority	Contacted 31 October and 22 November 2019	The East London Waste Authority was contacted, at the request of the London Borough of Havering, to provide a high-level summary of the Project's approach to waste and materials assessment and provide an opportunity for engagement. The East London Waste Authority confirmed the continued use of the targets and objectives in the Joint Waste Development Plan for the East London Waste Authority Boroughs (East London Waste Authority, 2012) and that this was currently under review. The East London Waste Authority stated that its principal concern was the management of municipal waste and therefore had no further comment.

Stakeholder	Date of meeting / communication	Summary of discussions
Environment Agency	<p>Planning Inspectorate Scoping Opinion</p> <p>Meetings: 13 June 2018 11 July 2018 15 July 2019 25 Sept 2019 24 January 2020</p>	<p>The Environment Agency responded to the Scoping Report with the comment, '<i>There should be an ambition to beneficially re-use tunnel arisings where possible</i>'.</p> <p>Meetings were held to agree the Project's approach to long-term stockpiling and reuse of excavated materials in line with the waste hierarchy. The assessment criteria utilised in the Excavated Materials Assessment (Application Document 6.3, Appendix 11.1) was presented and discussed.</p> <p>The Environment Agency supported the Project proposals to maximise reuse of excavated materials within the design and limit impacts on the capacity of local waste management infrastructure and road network.</p> <p>Discussion was held over the potential approaches with regard to appropriate permitting to achieve the Project design.</p> <p>The Project approach to the management of waste; including stockpiling, treatment, reuse and disposal of excavated materials is detailed in the Summary of Envisaged Statements of Common Ground (Application Document 7.3).</p>
Thurrock Council	Workshop 30 February 2019	<p>Baseline information was requested from Thurrock Council on the location and capacity of waste facilities and mineral sites, relevant local policies and objectives, and relevant local assessments, via email.</p> <p>Information was provided on historic and current landfills as well as several third-party sites with the potential to receive excess excavated materials. This information was considered as part of the Excavated Materials Assessment (Application Document 6.3, Appendix 11.1).</p>
	29 January 2020 17 February 2020	<p>Thurrock Council was issued the Mineral Safeguarding Assessment (Application Document 6.3, Appendix 11.2) which outlines the proposed management of minerals within its region.</p> <p>No response was received at the time of submission of the DCO application.</p>
	Email sent 31 January 2020 Email sent 17 February 2020	<p>Following comments raised at statutory consultation, two emails were sent to clarify the points of concern and to reiterate the Thurrock Council plans being used. No response was received at the time of submission of the DCO application.</p>

Stakeholder	Date of meeting / communication	Summary of discussions
	Design Narrative and Proposed Design Changes, Issued – 08 August 2019	Following the release of the proposed design at the North Portal, Thurrock Council requested that the Project explored opportunities for significant landscape enhancements and increased recreational links and open space in the long term, as well as some potential for habitat creation/restoration as this is a <i>'key part of the England Coast Access area being promoted by Natural England and part of the locally important Two Forts Way and Thames Estuary Path.'</i>
	08 April 2020	The design was subsequently developed and presented at a workshop. The council's response indicated that it was receptive to the improved design.
	21 April 2020	A meeting was held to outline the updated DMRB methodology to be used in assessment and preliminary findings of the environmental assessments (DMRB LA 110 Material assets and waste (Highways England, 2019)).
Selected landowners	May 2019 to January 2020	To obtain and verify information used in the Excavated Materials Assessment (Application Document 6.3, Appendix 11.1), third-party landowners and operators were consulted (Annex C of Appendix 11.1: Excavated Materials Assessment (Application Document 6.3)).

Study area

Construction

11.3.25 The study areas for the material assets and waste assessment have been selected in line with DMRB LA 110 Material assets and waste (Highways England, 2019):

- a. The first study area for the assessment of material assets and waste is the Order Limits (including compounds and temporary land take). This was selected as it is the area in which materials to construct and operate the Project would be consumed and waste would be generated.

The second study area is the local waste infrastructure within Essex, Kent and the local authorities comprising the East London Waste Authority (ELWA). This study area was selected based on the waste disposal authorities through which the Project passes and which could experience significant effects as a result of the Project waste arisings. As the assessment significance criteria in

- b. Table 11.5 required an assessment of impact to national infrastructure, the baseline is therefore also inclusive of waste infrastructure in England.

Operation

- 11.3.26 The same study areas for material assets and waste infrastructure proposed for the construction phase assessment have been used for the operational phase assessment.

Impact assessment methodology

- 11.3.27 The assessment follows the general approach described in Chapter 4: EIA Methodology. This section provides topic-specific information regarding the methodology used for establishing the baseline, and the methods used for the construction and operational phase assessments.
- 11.3.28 Deviations from the approach described in Chapter 4: EIA Methodology are noted for defining significance, which follows the specific requirements set out within DMRB LA 110 Material assets and waste (Highways England 2019).

Method of establishing baseline conditions

Existing baseline

- 11.3.29 The existing baseline in relation to material assets and waste was established based on data collection from published sources as well as direct engagement with the waste and minerals industry.
- 11.3.30 Local authorities and the Environment Agency were also contacted directly to request the details of their latest mineral and waste assessment reports. Where necessary this information was supplemented by other publicly available databases as presented below.
- 11.3.31 The local recycled and primary mineral aggregate reserves were determined in the baseline.
- 11.3.32 The landfill capacity and alternative recycling/recovery facility capacity were estimated in the baseline for the study area, local region and England using publicly available information, as presented below.
- 11.3.33 The mineral and peat assets were determined from the Mineral Safeguarding Assessment (Application Document 6.3, Appendix 11.2) and Chapter 10: Geology and Soils).

Desk-based studies

Material assets

- 11.3.34 The baseline conditions for material assets have been established through engagement with stakeholders, as set out in Table 11.4, and a desk-based review of the following data sources:
 - a. National and Regional Guidelines for Aggregates Provision in England 2005-2020 (Department for Communities and Local Government, 2009)

- b. Greater Essex Local Aggregate Assessment 2019 (Essex County Council, 2019) (note this assessment includes Essex and Thurrock)
- c. Local Aggregate Assessment for London 2018 (Greater London Authority, 2018)
- d. Kent Local Aggregate Assessment 2018 (Kent County Council, 2018)
- e. Medway Local Aggregate Assessment 2016 (Medway Council, 2017)
- f. Appendix 11.2: Mineral Safeguarding Assessment Report (Application Document 6.3)

11.3.35 The information collected was used to determine the aggregate resource within the Order Limits, the current local landbank and supply of available resources and the anticipated availability in the future.

Waste

11.3.36 Baseline conditions were established to support the assessment of waste arisings through desk-based research. This was used to determine the current capacity of local waste infrastructure and included a review of the following key data sources:

- a. UK Statistics on Waste 2018 (Defra, 2019)
- b. Remaining Landfill Capacity in 2018 Database (Environment Agency, 2020a)
- c. Environmental Permitting Regulations (EPR) Database 2018 (Environment Agency, 2020b)
- d. Waste Data Interrogator 2018 (Environment Agency, 2020c)
- e. Essex & Southend on Sea Waste Local Plan, Topic Paper 1: Waste Capacity Gap Update (Essex County Council, 2015)
- f. Essex and Southend-on-Sea Waste Local Plan (Essex County Council, 2017)
- g. 12th Annual Minerals and Waste Monitoring Report 2017-2018 (Kent County Council, 2019)

Future baseline ('Without Scheme' scenario)

11.3.37 The information obtained for the current baseline has been used to identify trends in the annual consumption of material assets and generation of waste. Using the sources above, the anticipated future changes to availability of material assets and waste management capacity were forecast for a 'Without Scheme' scenario, i.e. the future situation that would likely occur in the absence of the Project. The year 2027 was used as the future baseline reference as this is the assumed year of opening.

- 11.3.38 In line with the requirements of DMRB LA 110 Material assets and waste (Highways England, 2019), the future baseline forecasted the local and regional waste capacity (including landfill and recovery facilities) in the absence of the Project as well as the presence of onsite mineral and peat resources. The future baseline is reported in Section 11.4.

Method of assessment – construction

- 11.3.39 The consumption of material resources and the management of waste can give rise to environmental impacts that need to be managed and mitigated. Due to the scale of the Project, a detailed quantitative assessment, in line with DMRB LA 110 Material assets and waste (Highways England, 2019), was completed to assess the impacts on material assets and waste.

Material assets

- 11.3.40 The following information was identified to inform the assessment:
- An estimation of the types and quantities of key construction materials required for the construction and operation of the Project. These are defined as construction materials which, by weight, constitute the majority of material required to deliver the Project. For the purposes of the assessment, key construction materials were classified as those where it is expected that over 5000t would be required.
 - Details of the source/origin of materials, including site-won materials to replace virgin materials, materials from secondary/recycled sources or virgin/non-renewable sources.
 - The cut and fill balance associated with the earthworks.
 - Identification of MSAs and potential/existing peat extraction sites within the Order Limits.

Waste

- 11.3.41 The following information was collated to inform the assessment:
- The types and quantities of waste arising from the Project (demolition, excavation arisings and remediation).
 - The amount of waste (by weight) that would be recovered and diverted from landfill either onsite or offsite.
 - Details of onsite storage and segregation arrangement for waste and any supporting logistical arrangements.
 - The type and quantity of hazardous waste.
 - Documentation as to how the waste hierarchy has been applied by the Project.

- f. Completion of an Excavated Materials Assessment (Application Document 6.3, Appendix 11.1) to aid evaluation of impacts to offsite waste capacity.

- 11.3.42 All the materials identified for use in construction were designated for use in either permanent or temporary works. All materials designated for use in the temporary works were assumed to be removed from the Order Limits as waste following the completion of construction.
- 11.3.43 In addition to the estimated waste quantities, a wastage rate was also applied to all key materials used in construction (in both permanent and temporary works). The wastage factors defined in Net Waste Tool (WRAP, 2008) were applied to account for damage and defects.
- 11.3.44 All waste assumed to be leaving the Order Limits was assigned an assumed disposal or recovery route and percentage based on the document Achieving Good Practice Waste Minimisation and Management: Guidance for construction clients, design teams and contractors (WRAP, undated).

Method of assessment – operation

- 11.3.45 In order to establish operational impacts (including maintenance), a quantitative assessment was undertaken.
- 11.3.46 In line with DMRB LA 110 Material assets and waste (Highways England, 2019), the first year of operational activities is used as a proxy to establish effects on material assets and waste. This is a reasonable proxy in the absence of an established methodology or baseline, and given the wide variability in potential material demand, waste generation and unknown waste capacity in the extended future.
- 11.3.47 The approach affords a reasoned conclusion on the likely significant effects of the Project on the environment, taking into account current knowledge and methods of assessment as required by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations).

Material assets

- 11.3.48 Maintenance works completed during the operation of the Project are based on minor and major intervention cycles which have different frequencies, depending on the material. For this reason, the material demand and waste generation would typically come in cycles over the decades.
- 11.3.49 Benchmarked data were used to predict renewal frequencies of the key elements of the highways and tunnels. Estimates for the material quantities required for operational phase maintenance were calculated for 120-year design life and averaged to generate the first-year operational requirements. For example, replacement of drainage gullies, footways and manholes every 40 years, lighting columns and vehicle restraint system every 30 years and pavement every 10 years.
- 11.3.50 The assessment of the forecast operational materials demand and waste quantities/management route uses the same significance criteria as the construction phase assessment, as presented in

11.3.51 Table 11.5.

Waste

- 11.3.52 In the absence of a published method, seven years of operational waste data from the M25 were provided by Highways England to enable the prediction of operational effects. The M25 is taken as a reasonable equivalent due to its location in proximity to the Project and the inclusion of two tunnels in the route.
- 11.3.53 To enable comparison between these data and the Project, the M25 data were used to calculate an annual average per kilometre length. This could then be extrapolated to the length of the Project to calculate operational waste arisings. One year of operation was used as a representation of the first year of operation of the Project.

Determining significance of effects

- 11.3.54 Determination of the significance of environmental effects for material assets and waste has been made using the standard provided in DMRB LA 110 Material assets and waste (Highways England, 2019), which differs slightly from the approach described in Chapter 4: EIA Methodology. The assessment set out within DMRB LA 110 Material assets and waste does not use specific 'value' (sensitivity) or 'magnitude' criteria but instead adopts 'significance category' descriptors.
- 11.3.55 By virtue of the fact that 'magnitude' and 'value' are not used, the assignment of significance also differs to the matrix approach presented in Chapter 4: EIA Methodology. In its place DMRB LA 110 Material assets and waste (Highways England, 2019) has its own significance criteria that are based on the approach in DMRB LA 104 Environmental assessment and monitoring (Highways England 2019) where changes that are moderate and above should be reported as significant.
- 11.3.56

- 11.3.57 Table 11.5, taken from DMRB LA 110 Material assets and waste (Highways England, 2019), was used to determine the significance of effects related to material assets and waste.
- 11.3.58 The assessment of significance undertaken in this chapter is with regard to compliance with the EIA Regulations.

Table 11.5 Significance of effect categories for material assets and waste

Significance category	Significance criteria	Material assets	Waste
Neutral	Not significant	Project achieves more than 99% overall material recovery/recycling (by weight) of non-hazardous construction waste to substitute use of primary materials ¹ . Aggregates required to be imported to site comprise more than 99% reused/recycled content.	No reduction or alteration in the capacity of waste infrastructure within the region.
Slight	Not significant	Project achieves 70–99% overall material recovery/recycling (by weight) of non-hazardous construction waste to substitute use of primary materials. Aggregates required to be imported to site comprise reused/recycled content above relevant regional percentage target ² (31%).	No more than 1% reduction or alteration in capacity of landfills in study area. Waste infrastructure has sufficient capacity to accommodate waste from the Project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.
Moderate	Significant	Project achieves less than 70% overall material recovery/recycling (by weight) of non-hazardous construction waste to substitute use of primary materials. Aggregates required to be imported to site comprise reused/recycled content below relevant regional percentage target ² (31%).	A greater than 1% reduction or alteration in the capacity of landfills in study area as a result of accommodating waste from the Project, or 1–50% of Project waste requires disposal outside of the region.
Large	Significant	Project achieves less than 70% overall material recovery/recycling (by weight) of non-hazardous construction and demolition waste to substitute use of primary materials. Aggregates required to be imported to site comprise less than 1% reused/recycled content Project sterilises at	A greater than 1% reduction in the capacity of landfills in study area as a result of accommodating waste from the Project. More than 50% of Project waste requires disposal outside of the region.

Significance category	Significance criteria	Material assets	Waste
		least 1 mineral safeguarding site and/or peat resource ³ .	
Very large	Significant	No criteria	A greater than 1% reduction or alteration in capacity of landfills in England, as a result of accommodating waste from the Project. Construction of new (permanent) waste infrastructure is required to accommodate waste from the Project.

Notes:

¹ 'Primary materials': Materials that are from a non-renewable source (also referred to as 'virgin' materials.).

² 'The relevant regional percentage target of reused/recycled content for East England is 31%, as presented in Table E/1.2 in DMRB LA 110 Material assets and waste (Highways England, 2019).

³ Peat resource: existing or potential peat extraction sites.

11.3.59 Where specific primary materials are mandated in the relevant engineering design standards, such as the DMRB, for example, to meet safety standards for critical infrastructure such as tunnel components, they are excluded from the material recycling, recovery and reuse calculations.

Assumptions and limitations

11.3.60 The quantifications of materials required and waste arisings forecast from the Project have been derived from the emerging design.

11.3.61 To provide a robust assessment of a reasonable worst-case scenario, a conservative approach to material quantities and waste arisings has been taken to accommodate any future localised changes that may occur during detailed design.

11.3.62 To facilitate this conservative approach, the following assumptions have been made:

- a. During detailed design, consideration would continue to be paid to the principles of circular economy and the waste hierarchy (i.e. elimination of waste in design). This is reflected in Section 11.5 Project design and mitigation, eg mitigation measures (REAC Ref. MW003 and MW004).
- b. A 5% uplift has been applied to materials and inert excavated ground materials for construction of permanent works to account for changes in the detailed design.
- c. A commitment by the Project for the application of the waste hierarchy to ensure the retention and reuse of excavated materials (including uncontaminated minerals and peat) over import of fill (REAC Ref. MW007).

- d. Worst case assumptions have been made as to the usability of excavated and tunnelled ground materials. This was factored to specific geologies and based on anticipated ground contamination or geotechnical properties. If future ground investigation indicates that such made ground can be reused to deliver the Project, it would represent a reduced impact on waste infrastructure capacity outside the Order Limits.
- e. It is assumed that concrete tunnel lining segments and the majority of poured concrete would be produced onsite, as environmentally, this is the worst-case scenario in terms of materials consumption and associated wastage.

- 11.3.63 A number of external reports have been used in the collation of the baseline. The most up-to-date editions of these documents were used at the point of assessment in February 2020.
- 11.3.64 At the time of submission, the most up to date Environment Agency data was used to calculate impacts to landfill and recovery capacity.
- 11.3.65 The construction of the Project would result in the release of construction process wastewater and effluent. This falls outside the scope of the material assets and waste assessment and is assessed in Chapter 14: Road Drainage and the Water Environment.
- 11.3.66 Transportation would be required to import materials and remove waste from the Order Limits. For the purposes of the assessment, it has been assumed that all waste and material movements would be via the road network. This aspect falls outside the scope of the material assets and waste assessment. However, an assessment of the likely significant environmental effects associated with transportation are included within other ES chapters, where relevant, including:
- a. Chapter 5: Air Quality
 - b. Chapter 12: Noise and Vibration
 - c. Chapter 15: Climate
- 11.3.67 In addition, the Transport Assessment (Application Document 7.9) and Health and Equalities Impact Assessment (Application Document 7.10) have both also considered the potential traffic-related impacts.
- 11.3.68 Where peat exists within the Order Limits it does not constitute an existing or potential extraction site. Peat located within the Order Limits is anticipated to be contaminated and otherwise inaccessible as a resource as it lies under areas of historic landfill. No specific measures are proposed beyond management in line with the waste hierarchy.
- 11.3.69 To support the assessment, an Excavated Materials Assessment was completed (Application Document 6.3, Appendix 11.1). This document focuses on bulk inert excavated materials only, including stone, chalk and tunnel-related arisings. It does not include other construction-related wastes or address impacts from the operational phase of the Project.

- 11.3.70 The DCO application has been developed on the basis of a 2027 opening year. This assumes consent is granted and work commences in 2022. Construction may take up to six years, but as with all large projects there is a level of uncertainty over the construction programme, which will be refined once contractors are appointed and as the detailed design is developed. The anticipated opening date for the Project is in 2027 or 2028. The 2027 opening year has been selected for the basis of the assessments as representative of the reasonable worst case, this has been used consistently across the environmental assessments, transport assessments and the economic appraisal of the Project.

11.4 Baseline conditions

Existing baseline

Regional recycled aggregate target

- 11.4.1 The regional recycled aggregate target for alternative aggregates (which comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste) are set out in the National and Regional Guidelines for Aggregates Provision in England 2005-2020 (Department for Communities and Local Government, 2009).
- 11.4.2 The Project spans Kent and Essex, which sit in the South East and East regions respectively. The recycled aggregate target for the South East region is 26% and the target for the East region is 31%. In line with DMRB LA110, the higher target of 31% has been selected for the Project.

Current regional aggregate reserves

- 11.4.3 The tonnage of local aggregate reserves available (including sand and gravel, crushed rock, recycled and marine aggregates) have been identified by the Local Aggregate Assessments listed in paragraph 11.3.29.
- 11.4.4 Current aggregate reserves in the local area are summarised in Table 11.6. The current sum of regional production capacity for secondary/recycled aggregate is 9,553,000t/year (see baseline in Table 11.6), when the lowest capacity estimate of each region is used.

Table 11.6 Current aggregate reserves available in Kent, Medway and Greater Essex (2018–2019)

Material type	Baseline	Greater London Authority (including LB Havering)	Kent	Medway	Greater Essex (including Essex and Thurrock)
Sharp sand and gravel	Permitted reserves (t)	2,212,000	3,695,500	1,195,000	29,980,000
	Landbank (years)	3.2	24	135	6.74
	10-year sales average (t/year)	473,000	472,303	6,000	3,460,000
	3-year sales average (t)	305,000	151,165	9,000	3,230,000
Soft sand	Permitted reserves (t)	n/a	8,848,820	n/a	n/a
	Landbank (years)	n/a	17	n/a	n/a
	10-year sales average (t/year)	n/a	568,131	n/a	n/a
	3-year sales average (t)	n/a	502,097	n/a	n/a
Crushed rock (data from 2016)	Permitted reserves (t)	-	47,000,000 - 48,000,000	n/a	n/a
	Landbank (years)	-	61	n/a	n/a
	10-year sales average (t/year)	3,000,000 (import)	780,000	n/a	n/a
	3-year sales average (t)	-	-	n/a	n/a
Secondary/recycled aggregate	Sales/productive capacity (t/year)	1,400,000 (worst case) – 6,000,000	4,188,000	65,000	3,900,000
Marine aggregate	Landbank	The marine aggregate resource available in the East Coast, Thames Estuary and East English Channel, used to supply wharves in this area, is 994 million tonnes, of which 31.25 million tonnes is permitted for extraction per annum.			
	10-year sales average (t/year)	4,300,000	1,995,000	-	-
	3-year sales average (t)	-	1,866,000	-	-

Notes.

n/a – area does not contain the geology for type of reserve

(-) denotes no data

Minerals/Mineral Safeguarding Areas within Order Limits

- 11.4.5 With reference to the geological sequence described in Chapter 10: Geology and Soils, potentially extractable economic minerals are present within the Order Limits. Information is presented below with regards to MSA and potential resources. The minerals indicated could potentially be used within the Project for construction materials.
- 11.4.6 A Mineral Safeguarding Assessment Report (Application Document 6.3, Appendix 11.2) has been prepared for the Project route. This used a three-staged approach:
- a. Stage 1 – Mineral Baseline
 - b. Stage 2 – Mineral Investigation
 - c. Stage 3 – Mineral Safeguarding Assessment
- 11.4.7 The Mineral Safeguarding Assessment Report confirms the presence of mineral resources within the Order Limits. The safeguarded minerals which require investigation and their respective local authorities are presented within Section 1.3 of Appendix 11.2: Mineral Safeguarding Assessment (Application Document 6.3) and are summarised in Table 11.7.
- 11.4.8 The assessment concluded that the extraction of some mineral resources before construction is unfeasible, due to either adverse impacts on sensitive receptors such as the Thames Estuary and Marshes Ramsar site or being economically unviable. For example, practicalities such as high groundwater levels requiring significant dewatering during extraction would reduce viability.
- 11.4.9 It should be noted that Thurrock Council has no MSAs and defers to Essex County Council for its mineral protection policies.

Table 11.7 Safeguarded minerals in Order Limits

Local authority	Safeguarded mineral	Status	Impacts
Gravesham	Sub-Alluvial River Terrace Deposits River Terrace Deposits	MSA	<p>Extraction would not be possible in some areas as this would be likely to have an unacceptable adverse impact on the function of the Thames Estuary and Marshes Ramsar site. Therefore, leave <i>in situ</i> given the conservation status of the site.</p> <p>In parts of the Order Limits the works would be temporary (eg construction staging compounds, third-party infrastructure relocation) and therefore permanent sterilisation of the minerals would not occur. After construction, the temporary areas would be returned to their original land use and the mineral would be available for extraction if required. Therefore, all construction staging areas and third-party infrastructure relocations that are currently greenfield would eventually be returned to their native state.</p>
Essex, Havering and Thurrock Councils	Lynch Hill Gravel Member	MSA	<p>Close to M25 motorway - Leave <i>in situ</i> as extraction may cause damage to M25.</p> <p>Northern end of Project near the B1421 - Project limits unlikely to extend to limits of Lynch Hill Gravel.</p>
	Boyn Hill Gravel	MSA	Leave <i>in situ</i> as extraction may cause damage to M25.
	Black Park Gravel Member	MSA	Leave <i>in situ</i> . Permanent sterilisation would not occur as works in the area are temporary.
	Bagshot Formation	MSA	Located under the M25. Leave <i>in situ</i> to avoid damage.
Thurrock Council	River Terrace Deposits	Safeguarded by Thurrock Council in line with Essex Minerals Local Plan (Essex County Council, 2017), but not a formal MSA.	Ground investigation completed to date correlates with desk study information. Minerals beneath landfill sites would remain <i>in situ</i> as uneconomic/potentially hazardous to the environment to extract.
	Thanet Sand Formation		Ground investigation completed to date correlates with desk study information.
	Lambeth Group		<p>Lambeth Group is usually quite clayey but may be safeguarded/usable depending on the amount of sand present.</p> <p>Ground investigation completed to date correlates with desk study information.</p>

Local authority	Safeguarded mineral	Status	Impacts
	Harwich Formation		Located within and adjacent to the Project. Ground investigation completed to date correlates with desk study information.
	Taplow Gravel Formation		Limited quantities likely to be present based upon available mapping Ground investigation completed to date correlates with desk study information.

Peat reserves within Order Limits

- 11.4.10 Preliminary ground investigation has indicated that, to the north of the tunnel crossing, there are peat deposits associated with the Alluvium. The peat is located beneath contaminated made ground of historic landfill.
- 11.4.11 The peat deposits are not considered to constitute an existing or potential extraction site and the volume considered negligible in comparison to other excavated materials. The peat is also anticipated to be contaminated as it lies under areas of historic landfill in layers too difficult and uneconomic to excavate.
- 11.4.12 Further descriptions of the peat deposits are provided in Chapter 10: Geology and Soils.

Current construction, demolition and excavation (CDE) waste recovery

- 11.4.13 A circular economy prioritises the reuse and recovery of materials following the end of first life, reducing the need for primary materials to replace them and diverting unnecessary material from final disposal.
- 11.4.14 DMRB LA 110 Material assets and waste (Highways England, 2019) commits highways schemes to recovering (diverting from disposal) at least 70% of non-hazardous construction waste by 2020 as required by the WaFD. The latest data from 2016 indicated that UK construction projects achieved a recovery rate of 91% (Defra, 2019).

Waste

- 11.4.15 The Project would result in the production of waste arising from several sources, including damaged materials and goods, offcuts, demolition, excavation of ground, tunnelling, temporary works materials and used packaging.
- 11.4.16 In line with the requirements of DMRB LA 110 Material assets and waste (Highways England, 2019), a baseline of national, regional and local capacity is required.
- 11.4.17 Figure 11.1 (Application Document 6.2) shows the location of waste facilities within the second study area of the Project likely to accept construction materials. This is tabulated in a non-exhaustive list in Appendix 11.3 (Application Document 6.3).

- 11.4.18 While there are treatment and transfer facilities within the regions assessed, the closest merchant hazardous waste landfill with capacity is approximately 140km to the north of the Project in Peterborough.

Waste infrastructure capacity in England

- 11.4.19 To calculate the impact on national capacity in the assessment, the remaining landfill capacity in England in 2018 from Environment Agency records (Environment Agency 2020a) was reviewed as shown in Table 11.8. This is the latest year for which information is available at the time of writing.
- 11.4.20 The amount of CDE and hazardous waste capacity in the study area will fluctuate year on year based on the number, type and size of construction projects underway. This in turn is heavily influenced by factors such as the economic situation, investment levels and legislative and policy variations.

Table 11.8 Remaining landfill capacity in 2018 – England

Landfill type	Remaining landfill capacity (m ³)
Inert	124,531,134
Non-hazardous	185,159,783
Stable non-reactive hazardous waste	75,058,670
Hazardous merchant	19,120,846
TOTAL	403,870,433

Waste infrastructure capacity in second study area

- 11.4.21 To calculate the impact on the study area capacity, data on the remaining landfill capacity from the Environment Agency records (Environment Agency 2020a) were obtained, as shown in Table 11.9.
- 11.4.22 Landfill facilities within the study area are predominantly focused on accepting inert and non-hazardous waste streams. There is some capacity to manage stable non-reactive hazardous waste and hazardous waste in Kent only (Table 11.9).

Table 11.9 Remaining study area landfill capacity in 2018

Landfill type	Remaining landfill capacity 2018 (m ³)			
	Kent	Essex	ELWA	Study Area Total
Inert	6,474,205	3,190,995	1,136,600	10,801,800
Non-hazardous	39,000	11,852,108	5,787,997	17,679,105
Stable non-reactive hazardous	1,924,549	-	-	1,924,549
Hazardous restricted	13,345	-	-	13,345
Hazardous merchant	215,317	-	-	215,317
TOTAL	8,666,416	15,043,103	6,924,597	30,634,116

Notes:

Hazardous restricted landfills do not typically accept construction waste whereas hazardous merchant landfills will take European Waste Code Chapter 17.

- 11.4.23 As the Project will seek opportunities to divert waste from landfill, it is appropriate to establish the baseline capacity of alternative waste facilities.
- 11.4.24 The EPR Database (Environment Agency, 2020b) was used to establish the tonnage permitted annually at facilities likely to accept construction waste for recycling and recovery in the regions assessed. This is shown in Table 11.10.

Table 11.10 Permitted annual tonnage for regional and local facilities in 2018

Facility type		Permitted annual tonnage (t) for study area
Recycling facilities	Metal recycling	3,351,483
On/in land	Deposit to land	10,743,148
Transfer	Transfer (hazardous)	12,851,635
	Transfer (soils and CDE waste)	1,412,493
	Transfer (other)	10,307,685
Treatment	Other recycling/recovery/treatment	14,594,259
TOTAL (t)		53,260,703

- 11.4.25 To understand how these facilities are used by the market, the Waste Data Interrogator 2018 (Environment Agency, 2020c) was used to evaluate the volumes and methods of recovery/disposal of CDE waste arisings (those with a European Waste Code Chapter 17) received by different waste facility type in Kent, Essex and ELWA in 2018. This is presented in Table 11.11.
- 11.4.26 The majority of CDE waste in 2018 was received at landfill (34.2%), but this may have included reuse, for example as capping or restoration. The second most used option is treatment (28.1%) (Table 11.11).
- 11.4.27 A comparison of Table 11.10 and Table 11.11 shows the maximum permitted capacity in the study area was not being used in 2018.

Table 11.11 CDE waste arisings received by facility type in study area in 2018

Site category	Facility type	Study area		Facility type Total %
		Tonnes	%	
Landfill	Inert	2,324,093	19.9	34.2
	Non-hazardous	1,615,851	13.8	
	Hazardous merchant	17,526	0.1	
	Stable non-reactive hazardous	44,656	0.4	
Recycling	Metal recycling	209,582	1.8	1.8

Site category	Facility type	Study area		Facility type Total %
		Tonnes	%	
On/in land	Deposit of waste to land (recovery)	2,014,772	17.2	17.7
	Lagoon	53,152	0.5	
Transfer	Hazardous waste transfer	280,523	2.4	18.2
	Inert waste transfer	622,435	5.3	
	Non-hazardous waste transfer	1,226,283	10.5	
Treatment	Biological treatment	56,801	0.5	28.1
	Hazardous waste transfer/treatment	62,861	0.5	
	Inert waste transfer/treatment	219,434	1.9	
	Material recycling facility	285,940	2.4	
	Non-hazardous waste transfer/treatment	175,851	1.5	
	Physical treatment	2,490,486	21.3	
TOTAL		11,700,246	100	

Future baseline ('Without Scheme' scenario)

- 11.4.28 The future baseline identifies any anticipated changes to the existing baseline over time in the absence of the Project and is used as a basis against which to robustly predict the potential impacts of the Project.
- 11.4.29 The future baseline for material assets and waste is 2027, assumed to be the Project opening year for the purposes of this assessment.

Material resources

- 11.4.30 In line with the proximity principle, the Project would prioritise sourcing primary, secondary and recycled aggregates from Kent, Essex and Greater London where available (see REAC ref. MW002), the future baseline data have been collated from Local Aggregate Assessments issued by Kent County Council, Medway Council and Essex County Council.
- 11.4.31 Based on Table 11.6, the landbanks in Kent and Medway are in excess of nine years. The landbanks of Essex and Greater London are not only less than nine years but also below the NPPF requirement for local authorities to maintain a minimum landbank of seven years.
- 11.4.32 In the Greater Essex Local Aggregate Assessment 2019 (Essex County Council, 2019), Essex County Council state an intention to substitute shortfalls in land-won aggregate with additional permissions. The Medway Local Aggregate Assessment 2016 (Medway Council, 2017) indicated that both aggregate quarries in the area are currently non-operational (but reserves remain).
- 11.4.33 Marine aggregate sources are not considered to be restricted by physical availability or extent of permitted reserves but rather by rate of extraction and offloading. The baseline in Table 11.6 shows only a small fraction of permitted

marine reserves are used, meaning a considerable volume would remain unused by 2027.

Waste

- 11.4.34 The Kent Minerals and Waste Local Plan 2013-2030 encompasses the future baseline year of 2027 and is supported by regular capacity assessments. The latest at the time of writing, the 12th Annual Minerals and Waste Monitoring Report 1st April 2017 to 31st March 2018 (Kent County Council, 2019) determined that there is a surplus of inert CDE waste recycling and landfill capacity within Kent to the end of the plan period (2030), although it acknowledged there is regional disparity due to the uneven distribution of facilities.
- 11.4.35 The Essex and Southend Waste Local Plan, adopted 2017 (Essex County Council, 2017) runs until 2032 and again encompasses the future baseline year of 2027. It too is supported by regular capacity assessments. Essex and Southend-on-Sea Waste Local Plan, Topic Paper 1: Waste Capacity Gap Update (Essex County Council, 2015) indicates a shortfall in capacity for treatment and inert landfill, which may arise over time as time-limited planning consents expire, requiring the closure of facilities.
- 11.4.36 The Joint Waste Development Plan for the East London Waste Authority Boroughs (ELWA, 2012) does not encompass the future baseline year of 2027 as it only runs until 2020. The Plan for the current period makes provision for future inert landfill sites but does not consider that additional permanent new CDE recycling facilities are required as *‘a large portion of recycling and reuse of construction, excavation and demolition waste currently occurs on site rather than in designated licensed facilities, or is transferred out of London through inert transfer stations.’*
- 11.4.37 In addition, based on engagement with local waste operators during the completion of the Excavated Materials Assessment (Application Document 6.3, Appendix 11.1), several new landfill phases and restoration sites are in the process of permit acquisition or proposed to come on line in the period prior to the future baseline year of 2027.
- 11.4.38 Further, when the existing landfills in the region are filled, there would be a market demand for large volumes of inert and non-hazardous restoration soils to cover the previously deposited waste. It is anticipated that this would be beneficial to the Project as it could provide material to fill this demand.
- 11.4.39 Permits for treatment and transfer stations stipulate a maximum annual throughput as their capacity. Broadly, these do not change unless the permit is varied or surrendered. Providing the associated planning consent does not expire, the treatment and transfer capacity available in 2027 for waste management facilities (excluding landfill disposal) is likely to remain in line with the existing baseline for 2018 presented in Table 11.10 for the study area (53,260,703 tonnes/year).
- 11.4.40 In summary it is expected that landfill capacity across the study area may continue to decline and the focus of the relevant local plans is to prioritise waste treatment and recovery to preserve landfill void. The need to reduce offsite

waste management and incentivise contractors to opt for recovery and reuse over landfill is therefore apparent.

Mineral and peat deposits

- 11.4.41 Based on current planning applications it is unlikely that mineral and peat deposits identified in Section 11.4 would have been removed within the Project Order Limits.

11.5 Project design and mitigation

- 11.5.1 Environmental considerations have influenced the Project throughout the design development process, from early route options assessment through to refinement of the Project design. An iterative process has facilitated design updates and improvements, informed by environmental assessment and input from the Project engineering teams, stakeholders and public consultation.
- 11.5.2 The Project as submitted with the DCO application includes a range of environmental commitments. Commitments of relevance to material assets and waste are set out in this section under the following categories:
- Embedded mitigation: measures that form part of the engineering design, developed through the iterative design process summarised above.
 - Good practice: standard approaches and actions commonly used on infrastructure development projects to avoid or reduce environmental impacts, and typically applicable across the whole Project.
 - Essential mitigation: any additional Project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered to be significant in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Essential mitigation has been identified by environmental topic specialists, taking into account the embedded and good practice mitigation.
- 11.5.3 Embedded mitigation is included within the Design Principles (Application Document 7.5) or as features presented on Figure 2.4: Environmental Masterplan (Application Document 6.2). No Design Principles relevant to mitigation of effects on material assets and waste were identified. Good practice and essential mitigation are included in Appendix 2.2: Register of Environmental Actions and Commitments (REAC) (Application Document 6.3). The REAC would form part of the Code of Construction Practice (CoCP) (Application Document 7.11) if the DCO is granted. Each entry in the REAC has an alpha-numerical reference code (REAC Ref. MW0XX) to provide cross reference to the secured commitment. Relevant good practice and essential mitigation to reduce material assets and waste effects are identified below.
- 11.5.4 Mitigation measures proposed by the Project are driven by circular economy principles and ensuring that the management of waste strives to follow the waste hierarchy. The application of these principles is detailed as appropriate in the subsequent sections.

Design measures

Material assets

- 11.5.5 The opportunities with the greatest potential for improving resource efficiency and contributing to the circular economy in construction projects occur during the feasibility and early design stage as outlined in Circular Economy: Approach and Routemap (Highways England, 2016). The implementation of these principles is presented below.
- 11.5.6 The principle of '*designing out materials*' was applied throughout the design process. Design options were reviewed, and the advantages and disadvantages evaluated, including changes to material demand. Removing the bridge at Hornsby Lane, reducing the number of lanes on the Project road south of the M25, widening the existing Rectory Road rather than constructing a new highway, and reducing the span of the Tilbury Viaduct from 1.2km to 600m resulted in the net reduction in demand for aggregate, asphalt, concrete and steel.
- 11.5.7 The principle of '*identifying, securing and using materials on-site*' was applied through a review of published geology, supported by ground investigation. This identified likely suitable *in situ* aggregate, mineral and peat deposits as well as other ground materials likely to be suitable for use as engineered fill and landscaping. This resulted in a large reduction of the need to import fill materials, particularly to the north of the River Thames. Similarly, topsoil stripped during the Project would be retained within the Order Limits throughout the construction programme and reused for landscaping and restoration following construction completion.
- 11.5.8 Estimates of the materials generated within the Order Limits and used during construction are presented in Table 1.1 of Appendix 11.4: Material Assets Assessment Supporting Data (Application Document 6.3).
- 11.5.9 The principle of '*designing for long life*' was applied through the selection of materials appropriate for the design to ensure durability and increase the asset design life. Application of this principle helped to reduce the maintenance demand for materials during the operational phase.
- 11.5.10 The principle of '*designing for the future*' was implemented by considering the flexibility of future deconstruction by ensuring that materials used in construction could be easily recovered and recycled at the end of first life. As indicated in Table 1.1 of Appendix 11.4: Material Assets Assessment Supporting Data (Application Document 6.3), the materials in use in significant quantities are bulk fill, topsoil, metal, asphalt, aggregate and concrete, all of which have a robust recycling route.

Waste

- 11.5.11 At design, the top tier principle of 'elimination' was implemented in line with the waste hierarchy.
- 11.5.12 As a result of design changes, volumes of material wastage and excess excavated material generated were effectively eliminated. Approximately

11.1 million cubic metres of potential waste was eliminated through the application of this principle, as presented in Table 11.12.

- 11.5.13 Estimates of the waste arisings associated with the reference design, and in light of mitigation measures presented below, are presented in the assessment of waste in Section 11.6.

Table 11.12 Waste elimination in design

Design change	Estimated waste reduction (m ³)
Changes to the auxiliary lanes at junction 29 on the M25	11,500
Reduction of the Project road from three lanes to two between the M25 and A13	15,000
Moving the South Portal 350m south	623,000
Narrowing M2/A2	15,000
Mardyke embankment viaduct	320,000
Reduction of extent of tunnel box and ramp	155,000
Reuse within the Order Limits of excavated materials and treated tunnel boring machine slurry to fulfil Project need for fill and landscaping (including topsoil)	9,959,169
Reuse of demolition and waste concrete materials as recycled aggregate within the Order Limits	2,922
Vertical alignment of Muckingford Road and side roads near Tilbury Loop Trenchless methodology for some utility work instead of open trenching Re-routing alignment at Hornsby Lane/Chadwell St Mary to avoid long run of pylons and allow retention Compound size and location adjusted to reduce site clearance required and vegetation waste	Not quantified

Embedded mitigation

Construction phase – material assets and waste

- 11.5.14 The design measures (including circular economy principles) that are described above have been applied throughout the development of the Project. These measures are therefore considered fundamental to the Project as described in the DCO application.

Operational phase – material assets and waste

- 11.5.15 The design measures (including circular economy principles) that are described above have been applied throughout the development of the Project and are considered to minimise the materials required for maintenance and waste generated during the first year of operation.

Good practice

- 11.5.16 The following mitigation measures would be implemented for works under the control of Highways England and its Contractors.

Construction phase – material assets

- 11.5.17 Construction phase good practice of relevance to material assets is as follows (REAC Ref. MW001):
- a. **Minimising use of primary materials** – during detailed design, specify materials that are renewable, reclaimed or have a recycled content:
 - i. Where design specification permits, key construction materials used would include a measurable recycled or secondary content.
 - ii. In line with the target set out in DMRB LA 110, 31% of aggregates used in construction would be recycled or secondary, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates. To facilitate compliance with this target, the Contractor would calculate the total aggregate required to achieve the detailed design, and the total where design specification dictates only primary aggregate is used. During construction, the Contractor would record the amount of primary and secondary/recycled aggregate by weight and calculate compliance with the target (offsetting the amount excluded by design specification).
 - iii. In line with the target set out in DMRB LA 110, 70% recycling and reuse on site of suitable, uncontaminated concrete from demolition activities to substitute use of primary material.
 - iv. Suitable uncontaminated concrete from demolition and construction activities would be processed to achieve non waste status eg in accordance with the Aggregates from Inert Waste Quality Protocol (WRAP, 2013).
 - b. **Responsible sourcing (REAC Ref. MW002):**
 - i. Priority would be given to sourcing primary, secondary and recycled aggregates from facilities in Kent, Essex and Greater London whenever the design specification permits and supply is available to embody to the proximity principle.
 - ii. The Contractor would use BRE Framework Standard for Responsible Sourcing (BES 6001) (BRE Global, 2016) to verify imported materials are sustainably sourced and managed, to reduce the impacts throughout the supply chain.

- c. **Design for materials optimisation** – the Contractors would be required to review the design and investigate opportunities to standardise (where practicable) construction components such as such as beam depths, abutment sizes and piers to increase efficiency of materials use in production and reduce waste production. This initiative would be progressed through detail design and documented in a material efficiency design report submitted to Highways England prior to construction (REAC Ref. MW003).
- d. **Design for offsite construction** – While the Environmental Statement (Application Document 6.1) has evaluated the impacts from a segment plant within the Order Limits associated with the tunnelling, the procurement process would not prevent Contractors from offsite manufacture. The Contractors would be required to review the design to investigate the use of pre-fabricated structures and components and encourage a process of assembly rather than construction on site where economically and technically feasible (REAC Ref. MW004).
- e. **Demolition audits** – The composition of residential and commercial properties and structures is variable. However, the structures subject to demolition largely comprise concrete structures and steel gantries. Contractors would undertake pre-demolition surveys of any structures and buildings. Demolition materials would be identified and quantified including potential sources of recycled aggregate to be reused on site, as well as hazardous materials such as asbestos requiring additional waste management controls (REAC Ref. MW005).

Construction phase – waste

11.5.18 Construction phase good practice of relevance to waste is as follows:

- a. Excavated material (and all wastes) will be managed in line with the waste hierarchy. Preference is given to appropriate reuse, where feasible and permitted by the design.
- b. Clean, naturally occurring soils will be reused within the Order Limits in line with WaFD Article 2.
- c. Contractors would implement the necessary environmental permits, exemptions and complete Materials Management Plan (as per the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011)) for the reuse of made ground and contaminated soils.
- d. Material that is not suitable for reuse or is excess to requirements is likely to be considered waste. In such event, the material will require waste classification and offsite disposal or recovery at an appropriately permitted facility (REAC Ref. MW007).

- e. The Contractors would produce a Site Waste Management Plan (SWMP) or equivalent to set out procedures for the characterisation, management and monitoring of waste arisings (REAC Ref. MW009). The document would contain:
 - i. Initial forecast of construction waste listed by waste type, waste code, source and anticipated weight from detailed design.
 - ii. Real-time calculation of construction waste listed by waste type, waste code and source.
 - iii. Keeping records for waste arisings including final destination and, where relevant, off-site destination i.e. reuse, recycling, recovery or disposal.
 - iv. Calculation of the reuse of site won materials.
 - v. Calculation of on-site recycling and reuse of demolition materials for reuse as recycled aggregate.
 - vi. Calculation of off-site reuse of inert excavated materials.
 - vii. Calculation of overall construction waste diverted from landfill.
 - viii. Keeping records of relevant Duty of Care documentation (waste carrier registration, receiving site environmental permit number, waste transfer documentation reference) associated with the waste movement.
 - ix. The SWMP would be compatible with materials tracking element required as part of a MMP to allow the full traceability of all materials excavated during construction.
- f. During both the detailed design and construction, Contractors would appoint a Materials and Waste Manager to ensure that the waste hierarchy is implemented and opportunities to reduce waste generation or improve recovery/recycling rates are identified. The Materials and Waste Manager would be responsible for ensuring compliance with waste mitigation requirements set out in the REAC and ensuring the SWMP is written and updated (REAC Ref. MW006).
- g. Contractors would implement the following measures during construction in order to enhance recovery and recycling rates and minimise the quantities of waste (REAC Ref. MW010):
 - i. All waste arisings would be characterised and monitored via the SWMP (or equivalent in substance) during construction.

- ii. All wastes would be classified, with mirror entry code wastes sampled to determine classification, in line with the prevailing technical guidance (currently Waste Classification: Guidance on the classification and assessment of waste, WM3 (SEPA, NIEA, NRW and Environment Agency 2018).
- iii. Waste management offsite would be completed under the Duty of Care established under Section 34 of the Environmental Protection Act 1990. All waste would be transported using licensed carriers and taken only to appropriately permitted facilities. All waste movements would be accompanied by waste documentation such as Waste Transfer or Consignment Notes (dependent on waste class) which would be retained for the appropriate legal period.
- iv. Satisfy the legal need under the Waste (England and Wales) Regulations 2011 (as amended) for pre-treatment of waste, and confirm this in a written declaration on the associated waste documentation.
- v. Demonstrate and document how sufficient space has been allowed within the construction working areas for stockpiles for topsoil, contaminated material (for later offsite management), materials to be reused, excess clean material and imported materials for construction. This would enable the segregation of waste types, prevent the mixing of hazardous and non-hazardous wastes and enhance recovery rates by minimising degradation, damage and loss. Initial calculations are presented in Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) to demonstrate sufficient space has been provided within the Order Limits.
- vi. Segregate hazardous and non-hazardous waste, separating waste at source by type where practicable; providing separate skips for general waste, metal, dry recycling and timber as a minimum at each compound. Suitable provision would also be made for common hazardous wastes, eg used absorbents, aerosol cans, oily rags and waste electronics.
- vii. Provide impermeable surfaces with sealed drainage for remediation, quarantine and hazardous waste storage areas to prevent cross-contamination of other waste streams and surrounding ground.
- viii. Label stockpiles and skips with contents to prevent the mixing of hazardous and non-hazardous wastes.
- ix. Comply with any legislative specific waste storage and handling requirements, eg for asbestos or waste electronics.

- x. Vegetation waste should be reused within the Order Limits wherever possible, eg for ecological mitigation (unless contaminated by invasive species).
- xi. Where possible agree with material suppliers to reduce the amount of packaging on materials or to participate in a packaging take-back scheme.
- xii. Implement a material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste.
- xiii. Monitor material quantity requirements to avoid over-ordering to reduce opportunity for oversupply and damage whilst stored which would generate waste materials.
- xiv. Prioritise off-ground storage, eg on pallets, retention of materials in original packaging, protection from rain and collision by plant or vehicles.
- xv. Ensure that the storage of lightweight or liquid/sludge waste materials will prevent dispersion by wind and precipitation.
- xvi. Seal stockpiles in place for over 30 days to maintain integrity of material.
- xvii. Seed topsoil stockpiles to reduce soil loss and maintain soil quality.
- xviii. Prohibit the burning of waste and unwanted materials within the Order Limits.
- xix. In line with the requirements of DMRB LA 110 Material assets and waste (Highways England, 2019), enhancement opportunities shall be identified, reported and implemented during detailed design and construction to reduce the Project's material demand and amount of waste sent for final disposal in landfill.

Operational phase

- 11.5.19 No specific good practice mitigation measures are presented for material assets or waste. As shown in Section 11.6, no likely significant effects are anticipated from the first year of operation.

Essential mitigation

Potential significant effects

- 11.5.20 An iterative appraisal of the Project design taking into account the design principles and good practice was undertaken to identify any potentially

significant effects that would require essential mitigation. Potentially significant effects on material assets and waste were identified as follows:

- a. Depletion of material resources impacting material availability.
- b. The permanent loss or sterilisation of locally designated MSAs.
- c. The temporary capacity utilisation of waste management facilities or permanent reduction of landfill capacity.

Construction phase – material assets

11.5.21 Construction phase essential mitigation of relevance to material assets is as follows:

- a. Ground investigation would be used to identify material that would be excavated within the Order Limits that could be used as class I-IV fill materials or construction aggregate to further offset the need to import equivalent materials (REAC Ref. MW008).

Construction phase – waste

11.5.22 Construction phase essential mitigation of relevance to waste is as follows:

- a. Offsite excavated material management:
 - i. The Contractor would seek to achieve a target that 95% (by weight) of inert excavated materials destined for off-site waste management outside the Order Limits would be diverted from final disposal in landfill (REAC Ref. MW011).
 - ii. The Contractors would utilise the methodology in the Excavated Materials Assessment (Application Document 6.3, Appendix 11.1) to identify reuse sites that score positively against the sustainability scoring system presented in that document (REAC Ref. MW012).
- b. Recycling and recovery of materials offsite – where reuse is not practical, this the next preferred option. To facilitate this, the Contractor would use the methodology in the WaFD to demonstrate the recovery of non-hazardous construction waste, with a target of 90%. The Contractors shall achieve a minimum recovery of 70% (by weight) of non-hazardous construction waste. (REAC Ref. MW013).
- c. The Contractor would seek to achieve a target of 70% (by weight) of hazardous construction waste to be diverted from landfill. It is anticipated that this would be achieved by undertaking remediation or treatment within the Order Limits or offsite at third-party facilities. It is acknowledged that the nature of some hazardous construction waste may preclude this. Where a hazardous construction waste cannot be diverted from landfill, the

justification and evidence will be provided by the Contractor and logged by the Contractor in the SWMP (or equivalent) (REAC Ref. MW015).

Operational phase

- 11.5.23 No specific essential mitigation measures are proposed in relation to the assessment of material assets or waste. As shown in Section 11.6, no likely significant effects are anticipated from the first year of operation.

11.6 Assessment of likely significant effects

- 11.6.1 This section presents the assessment of likely significant effects on material assets and waste receptors resulting from the construction and the first year of operation of the Project. This is based on the design of the Project and takes into account the mitigation as presented in Section 11.5 of this chapter.
- 11.6.2 The significance of effects has been determined in accordance with the matrix provided in DMRB LA 110 Material assets and waste (Highways England, 2019). As presented within Section 11.3, this methodology is bespoke to the assessment of material assets and waste and does not use the approach described in Chapter 4: EIA Methodology as there are no separate criteria for the value/sensitivity of a receptor and magnitude of change.
- 11.6.3 The assessment of direct impacts is presented in this chapter. The indirect effects relating to material assets and waste are assessed in Chapter 15: Climate.

Construction phase

Material assets

- 11.6.4 The key construction materials anticipated to be required in construction of the Project are presented in Table 1.1 of Appendix 11.4: Material Asset Assessment Supporting Data (Application Document 6.3). Where these are supplemented by sources within the Order Limits, this is noted within the table. The calculations include the enabling works (including utility diversions), demolition and main construction works (including temporary works, highway and tunnelling).
- 11.6.5 Table 1.1 of Appendix 11.4: Material Asset Assessment Supporting Data (Application Document 6.3) shows that the greatest material demand would be during the construction works and would include fill materials, topsoil, steel, concrete, cement, bentonite, aggregate and asphalt.

Receptor effect: permanent reduction/depletion of material assets – material recovery

- 11.6.6 To reduce the import of fill materials, naturally occurring excavated materials will be reused within the Order Limits (REAC Ref. MW007), resulting in the reuse and recovery of an estimated 20.4 million tonnes of earthworks (including 2 million tonnes of topsoil). This material is not waste and in line with the WaFD methodology, is not included in waste calculations.
- 11.6.7 In addition, a target of 70% recycling and reuse within the Order Limits of suitable, uncontaminated concrete from demolition is estimated to result in the

reuse of approximately 7,000 tonnes of recycled aggregate for recovery (REAC Ref. MW001).

11.6.8 By reusing vegetation in ecological mitigation (eg through mulching or hibernacula construction etc), an additional 26,000 tonnes of vegetation would also be recovered (REAC Ref. MW010).

11.6.9 Where recovery and reuse are not possible within the Order Limits, the Contractor would be required to demonstrate that they have intended for 90% (by weight) of non-hazardous construction waste managed at third-party facilities to be subject to recovery. The Contractor shall achieve a minimum recovery of 70% (by weight) of non-hazardous construction waste (REAC Ref. MW013).

11.6.10 With the mitigation proposed above, the assessment shows an estimated 7,248,186 tonnes (82%) of non-hazardous Project waste would likely be recovered and diverted from landfill (see Table 11.13).

11.6.11 Assessment against the significance criteria in Table 11.15 demonstrated that by achieving 82% non-hazardous waste recovery, the effects on permanent depletion of material assets for material recovery are judged to be slight and **not significant**.

Receptor effect: permanent reduction/depletion of material assets – recycled and secondary aggregate

11.6.12 In line with the requirements set out in DMRB LA 110 Material assets and waste (Highways England 2019), a commitment is in place to ensure that 31% of imported aggregate is from recycled or secondary sources (where design specification permits). This is in line with the relevant regional percentage target (REAC Ref. MW001).

Assessment against the significance criteria in

- 11.6.13 Table 11.5 indicates as the relevant regional percentage target will be met. The effects on the depletion of material assets for recycled and secondary aggregate are judged to be slight and **not significant**.

Receptor effect: permanent loss or sterilisation of MSAs and/or peat resources within the Order Limits

- 11.6.14 As outlined in Appendix 11.2: Mineral Safeguarding Assessment (Application Document 6.3), the Project route dissects several geologies that are identified as potential MSAs due to their potential extractive and economic value.
- 11.6.15 While some of these MSAs and non-designated mineral reserves are extensive in area within the Order Limits, much of the mineral resources fall within areas of temporary land take or proximity to existing land use that renders future exploitation unlikely (eg proximity to M25). Therefore, it is not considered that the linear nature of the permanent land take would result in sterilisation of such resources. The alignment is also unlikely to substantially constrain/prevent existing and potential future use and extraction of these materials in the wider area.
- 11.6.16 Minerals excavated during the construction phase would be reused within the Order Limits as required. Currently, the use of borrow pits is not proposed, as a net excess and export offsite of excavated material is anticipated from areas likely to support sands and gravels.
- 11.6.17 As discussed in the baseline in Section 11.4, it is considered that peat within the footprint of the Project does not constitute an existing or potential extraction site due to its location under historic and active landfill sites which render exploitation unlikely.
- 11.6.18 As outlined above, no MSAs or peat deposits are anticipated to be sterilised. Assessment against the significance criteria in Table 11.4 indicates the threshold for a large (significant) effect is not met. The effects are therefore judged as **not significant**.

Waste

- 11.6.19 The waste arisings likely to be generated during the construction phase of the Project have been forecast in Table 1.1 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3). The calculations include the enabling works (including utility diversions), demolition and main construction works (including temporary works, highway and tunnelling).
- 11.6.20 Table 1.1 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) shows that the largest contributor to waste arisings is associated with the earthworks, particularly excess excavated inert materials and potentially hazardous excavated materials.
- 11.6.21 Hazardous waste is anticipated from excavation in areas of potential contamination in historic landfills, made ground deposits, demolition materials, asbestos-containing materials and in situ coal tar bearing road surfacing. As more data become available from progressive ground investigations, the conservative estimate of hazardous waste will be refined further. Until this

refinement, the conservative estimate has assessed a worst-case scenario, and the conclusions are therefore robust.

Receptor effect: generation of waste leading to permanent reduction of landfill capacity and temporary capacity utilisation at waste management facilities

- 11.6.22 The Project is predicted to generate 8,892,627 tonnes of non-hazardous waste (including inert waste), of which 7,214,441 tonnes is expected to be subject to recovery at waste management facilities (see Table 1.1 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) (excluding hazardous wastes and uncontaminated soils reused within the Order Limits).
- 11.6.23 As outlined in Table 1.1 of Appendix 11.4: Material Asset Assessment Supporting Data (Application Document 6.3, an estimated 20.4 million tonnes of excavated ground materials and topsoil would be reused within the Order Limits. In line with the methodology set out in the WaFD, these are not subject to the waste assessment methodology.
- 11.6.24 Table 11.13 demonstrates that 82% of the waste, subject to assessment, would be diverted from landfill. This shows the Project would comply with the legal minimum diversion rate of 70% set within the WaFD.

Table 11.13 Summary of waste tonnage and volumes anticipated during construction

	Calculated tonnes (t)	Management route by weight (%)	Calculated volume (m ³)
Total non-hazardous and inert waste	8,892,627	100	4,397,839
Estimated disposal	1,644,441	18	
Estimated recovery (diversion from landfill) ¹	7,248,186	82	N/A
Of which, offsite recovery required	7,214,441		
Of which, annual average in nine-year period	801,605		
Total hazardous waste ²	707,875	N/A	329,766
Estimated disposal	207,378	N/A	96,161
Estimated recovery (diversion from landfill)	500,497	N/A	N/A

Notes:

¹ This figure includes 26,014 tonnes vegetation and 7,013 tonnes demolition materials recovered and reused within the Order Limits

² In line with WaFD methodology, hazardous waste is excluded from calculations of compliance with legal targets.

- 11.6.25 Table 11.14 summarises the waste landfill capacity remaining in 2018 (as presented in the baseline in Table 11.8 and Table 11.9).

- 11.6.26 Based on likely European Waste Catalogue codes, forecast waste streams arising from the Project were classed as hazardous, non-hazardous or inert and compared against the relevant landfill capacity in Table 11.14.
- 11.6.27 The waste generated during the construction phase (which is assumed to be sent for disposal in landfill), would likely represent less than 1% of the landfill capacity in England for all waste types (non-hazardous, inert and hazardous waste).
- 11.6.28 The waste generated during the construction phase (which is assumed to be sent for disposal in landfill), would likely represent 2.4% of the landfill capacity in the study area for non-hazardous (418,957m³), 3.8% for inert waste (413,698m³) and 44.7% for hazardous waste (96,161m³).
- 11.6.29 It should be noted that approximately half of the total inert landfill capacity used by the Project is within the Order Limits (211,280m³). This was considered to be the best overall environmental outcome as it negates the need to transport the waste.

Table 11.14 Landfill capacity assessment

	Landfill type	Study area total capacity (m ³)	Project waste forecast (m ³)	Used capacity (%)
England	Inert	124,531,134	413,698	0.3
	Non-hazardous	185,159,783	418,957	0.2
	Hazardous	19,120,846	96,161	0.5
Study area	Inert	10,801,800	413,698	3.8
	Non-hazardous	17,679,105	418,957	2.4
	Hazardous	215,317	96,161	N/A ¹

Notes:

¹There is one hazardous landfill which accepts asbestos waste within the study area. It is highly unlikely that Project hazardous waste (contaminated soils, coal tar road planings etc) would be sent to this landfill. Should this hazardous waste require landfill disposal it would be managed outside of the study area.

² Hazardous waste landfill capacity excludes "restricted" capacity

- 11.6.30 By comparing the Project's annual average estimated non-hazardous and inert waste arisings that would require recovery, presented in Table 11.13 (801,605 tonnes) with the annual waste infrastructure recovery capacity in Table 11.10 (53,260,703 tonnes/year), it is demonstrated that the Project would use 1.5% of the recovery capacity in the study area.
- 11.6.31 The largest single waste stream (by weight) leaving the Order Limits is inert excavated material. An Excavated Materials Assessment (Application Document 6.3, Appendix 11.1) has been undertaken to validate available offsite capacity at third-party potential receiver sites and to determine which of these would be capable of receiving excavated materials from the Project. This exercise supports the commitment to divert 95% (by weight) of inert excavated materials destined for offsite waste management outside the Order Limits, from final disposal in landfill (REAC Ref. MW011).

- 11.6.32 To mitigate impacts to hazardous waste landfill, a commitment to divert 70% (by weight) of hazardous waste from final disposal in landfill is proposed (REAC Ref. MW015).
- 11.6.33 As outlined in the baseline assessment, the waste recovery and recycling market is not operating at full capacity. It is considered the market can absorb the Project waste recycling/recovery demands and that waste could remain in the region defined by the second study area.
- 11.6.34 Assessment against the significance criteria in

Table 11.5 indicates the Project would use less than 1% of the landfill capacity in England, which would be below the threshold to trigger a very large significant effect. The Project would use more than 1% of inert, hazardous and non-hazardous landfill capacity in the study area. This is above the threshold outlined within DMRB LA 110 Material assets and waste (Highways England 2019), however, in line with

- 11.6.35 Table 11.5, as less than 50% of all waste types are likely to leave the study area, the effects on waste receptors are judged to be **moderate adverse** and therefore **significant**.
- 11.6.36 The assessment of significance noted above uses the criteria set out within DMRB LA 110 (Highways England 2019), which only reports against landfill capacity, not recovery, recycling or re-use within the study area. With regard to paragraph 5.43 of the NPSNN, which refers to the '*adverse effect on the capacity of existing waste management facilities*', the assessment demonstrates that an adverse effect on the capacity of existing waste management facilities, as a whole, to deal with other waste arisings in the area would not occur.
- 11.6.37 The Project would require non-hazardous (2.4%) and inert waste (3.8%) landfill capacity, however 82% of construction non-hazardous waste is calculated to be diverted from landfill. The assessment has shown this would require only 1.5% of the capacity of recycling and recovery facilities in the study area, which is unlikely to preclude the receipt of waste from other sources.
- 11.6.38 There is one hazardous landfill which accepts asbestos waste within the study area. It is highly unlikely that hazardous waste from the Project (contaminated soils, coal tar road planings etc) would be sent to this landfill. Should this hazardous waste require landfill disposal it would be managed outside of the study area. The Project would require 0.5% of the available national hazardous waste capacity. It is therefore unlikely to adversely affect the capacity of existing waste management facilities to deal with other waste arisings.

Operational phase

Material assets

- 11.6.39 It is anticipated that during the operational phase of the Project maintenance works would involve significantly lower quantities of materials than during construction, and would therefore have a lesser impact on mineral resources and product supply.
- 11.6.40 DMRB LA 110 Material assets and waste (Highways England, 2019) requires the material assets and waste assessment to evaluate impacts from the first year of operation.
- 11.6.41 Maintenance works are based on minor and major intervention cycles which have different frequencies depending on the asset type, eg the renewal frequency of the road surface of the running lane is 10 years, but the renewal frequency of timber fencing is 30 years. For this reason, the material demand would typically come in cycles over the decades. An annual average calculated from a 120-year design life is therefore taken as a proxy for the first operational year.
- 11.6.42 The anticipated material demand for operation over the lifetime of the asset is detailed in Table 1.2 of Appendix 11.4: Material Asset Assessment Supporting Data (Application Document 6.3).
- 11.6.43 Based on the annual average calculated for materials, the material most in demand during the first-year operation would be asphalt (32,221 tonnes).

Highways England maintenance contracts would implement the requirements in DMRB LA 110 Material assets and waste (Highways England, 2019) for aggregates imported into the Order Limits to comprise reused/recycled content in line with the relevant regional percentage target. Assessment against the significance criteria in

- 11.6.44 Table 11.5, indicates the effects on the depletion of material assets for recycled and secondary aggregate are therefore predicted to be slight and not significant.
- 11.6.45 Based on the data collected for maintenance activities completed on the nearby M25, similar contractual requirements for the operation of the Project are expected to result in similar rates of recycling and recovery. A total of 96% was achieved and is assumed for the Project. Assessment against the significance criteria in

- 11.6.46 Table 11.5, indicates the effects on permanent depletion of material assets for material recovery are therefore predicted to be slight and not significant.
- 11.6.47 Once construction is complete, no further effects on MSAs or peat deposits are anticipated. Assessment against the significance criteria in

- 11.6.48 Table 11.5 indicates the threshold for a large or very large effect would not be met. The effects are therefore predicted as **not significant**.

Waste

- 11.6.49 It is anticipated that, during the lifetime of the Project, minor quantities of operational waste would be produced from site staff in offices associated with the portal structures and from maintenance repairs over the operational lifetime of the asset.
- 11.6.50 As outlined in the materials assessment, given the maintenance cycles required for the Project, the majority of construction wastes would be produced every 10 to 30 years.
- 11.6.51 Table 1.2 of Appendix 11.5: Waste Assessment Supporting Data (Application Document 6.3) summarises the quantities of waste estimated to be generated as an annual average. This has been used as a proxy for the first-year forecast.
- 11.6.52 Wastes would typically comprise street cleanse, mixed municipal waste, mixed construction waste and sewage.
- 11.6.53 Based on current Highways England waste management practices, approximately 350 tonnes of waste is anticipated in the first year of operation. This equates to less than <0.1% of landfill capacity in England and in the study area assessed.
- 11.6.54 Assessment against the significance criteria in

- 11.6.55 Table 11.5 indicates the effects on permanent depletion of landfill capacity are therefore predicted to be slight and **not significant**.
- 11.6.56 Approximately 336 tonnes of waste is expected to be managed through recycling and recovery which would utilise <1% of local and regional recycling/recovery capacity, assuming current rates of recycling/recovery are maintained.
- 11.6.57 It is considered that waste infrastructure therefore has sufficient capacity to accommodate waste from operation, without compromising the integrity of the receiving infrastructure (design life or capacity) within the region.

Assessment against the significance criteria in

- 11.6.58 Table 11.5 indicates the effects on the reliance on disposal outside of the region are therefore predicted to be slight and **not significant**.

11.7 Cumulative effects

Intra-project effects

- 11.7.1 Cumulative effects of the Project can occur as a result of interrelationships between different environmental topics, which are referred to as ‘intra-project effects.’ For material assets and waste, interrelationships are identified with Chapter 10: Geology and Soils and Chapter 15: Climate and are summarised below:
- The value of topsoil and excavated materials as resources for reuse in the Project have been outlined in Chapter 10: Geology and Soils.
 - The indirect effects relating to material assets and waste are assessed in Chapter 15: Climate.

- 11.7.2 The above interrelationships have been considered as part of the assessment reported in this chapter, and the relevant topic chapters identified above.

Inter-project effects

- 11.7.3 In addition to intra-project effects, cumulative effects can also occur due to the Project in combination with other proposed developments. These are known as ‘inter-project’ effects and are considered separately in Chapter 16: Cumulative Effects Assessment.

11.8 Monitoring

Construction

- 11.8.1 Likely significant effects have been identified, and specific monitoring is required for material assets and waste receptors.
- 11.8.2 Section 11.5 presents the mitigation proposed for the construction phase alongside how the action would be measured.
- 11.8.3 The Register of Environmental Actions and Commitments (REAC) (Application Document 6.3, Appendix 2.2) secures this monitoring and summarises the monitoring that would be undertaken during the construction phase.

Operation

- 11.8.4 The road operator would provide a summary of materials used and waste generated during the first year of operation in line with requirements of DMRB, LA 110, Material Assets and Waste (Highways England 2019). This information would be reviewed against the forecast presented in ES Chapter 11, Material assets and waste (Application Document 6.3) and used to update the Environmental Management Plan for future operational years (REAC Ref. MW014).

- 11.8.5 This monitoring commitment is also captured within the Register of Environmental Actions and Commitments within the CoCP (Application Document 7.11).

11.9 Summary

- 11.9.1 The use of material assets and the generation of waste during construction is an inevitable consequence of all forms of development, and as such, there will be unavoidable impacts.
- 11.9.2 The assessment of effects on material assets and waste considered the construction and operational effects on material resources and waste infrastructure capacity. Assessments were undertaken in accordance with DMRB LA 110 Material assets and waste (Highways England, 2019) and professional judgement.
- 11.9.3 Receptors considered as part of the material assets and waste assessment include local, regional and national material resources and local waste infrastructure capacity.
- 11.9.4 The potential significant effects considered were depletion of finite primary material resources and the generation of waste leading to temporary capacity utilisation at waste management facilities or permanent reduction of landfill capacity.
- 11.9.5 Mitigation, including designing out material use, sustainable material sourcing, application of the waste hierarchy, contract commitments and targets, has been proposed.

- 11.9.6 Table 11.5 summarises effects on material assets and waste. This table takes into consideration the agreed mitigation measures outlined above in Section 11.5.

Table 11.15 Material assets and waste impact summary table

Impact description	Effect	Significance
Construction		
Materials – Impacts on the availability and depletion of material resources – material recovery	Slight	Not significant
Materials – Impacts on the availability and depletion of material resources – recycled/secondary aggregate	Slight	Not significant
Materials – MSAs and peat resources	Slight	Not significant
Waste – temporary capacity utilisation at waste management facilities or permanent reduction of landfill capacity	Moderate	Significant
Operation		
Materials – Impacts on the availability and depletion of material resources – material recovery	Slight	Not significant
Materials – Impacts on the availability and depletion of material resources – recycled/secondary aggregate	Slight	Not significant
Waste – temporary capacity utilisation at waste management facilities or permanent reduction of landfill capacity	Slight	Not significant

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