A66 Northern Trans-Pennine Project
TR010062

3.2 Environmental Statement
Chapter 11 Material Assets and Waste

APFP Regulations 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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3.2 ENVIRONMENTAL STATEMENT CHAPTER 11 MATERIAL ASSESTS AND WASTE

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11 Material Assets and Waste

11.1 Introduction

11.1.1 This chapter assesses the likely significant Material Assets and Waste effects of the construction and operation of the Project, following the methodology set out in the Design Manual for Roads and Bridges (DMRB) *LA 110 Material Assets and Waste (DMRB LA 110)* (Highways England, 2019)[1] and other relevant guidance as identified in section 11.2.4. It details the methodology followed, summarises the legislation and policy framework relevant to the Materials Assets and Waste assessment and describes the existing environment in the area surrounding the Project. It then considers the design, mitigation and residual effects of the Project, including taking account of relevant characteristics of the future baseline environment. Any key assumptions and limitations applicable to the assessment are also identified.

11.1.2 Any Material Assets and Waste effects predicted to be significant are identified in section 11.9 of this chapter. Effects identified in the course of the assessment but not predicted to be significant are presented in ES Appendix 11.5: Non-Significant Effects (Application Document 3.4).

11.1.3 The Material Assets and Waste assessment is supported by a number of figures (Environmental Statement Volume 2) and Technical Appendices (Environmental Statement Volume 3) as listed on the contents page.

11.1.4 This Environmental Impact Assessment (EIA) has been undertaken by competent experts with the relevant and appropriate experience in their respective topics. The lead author of this chapter has:

- Three academic qualifications
- Two professional qualifications
- 17 years of experience in professional practice

Key assessment parameters

11.1.5 The following key assessment parameters, shown in Table 11-1: Key Assessment Parameters, have been used in order to enable flexibility in the assessment and to ensure that a reasonable worst case has been assessed.

Table 11-1: Key Assessment Parameters

Key Assessment Parameters
The Key Assessment Parameters for the Material Assets and Waste assessment are provided below: • The horizontal limits of deviation by up to three metres relating to the Project's design, when assessing the sterilisation of mineral safeguarding sites

[1] Highways England (2019a) Design Manual for Roads and Bridges LA 110 Material assets and waste

Key Assessment Parameters
• Worst case scenario earthworks estimates data, not taking into account the potential for additional re-use across the Project (i.e. maximum amount that could be generated and taken off site)

11.2 Legislation and policy framework

Legislation

11.2.1 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 require that proposed developments must identify, describe and assess the direct and indirect significant effects of the use of natural resources and the production of waste.

11.2.2 The United Kingdom has now left the European Union (EU) on 31st January 2020 however existing EU environmental laws will continue to operate in UK law including the Waste Framework Directive. The Waste Framework Directive, as it has been incorporated into UK legislation, sets out the necessary measures to ensure that waste is recovered or disposed of without endangering human health or causing harm to the environment and includes permitting, registration and inspection requirements. The Directive as incorporated into UK Law also requires the UK to take account of the Waste Hierarchy (see Plate 11-1: Waste hierarchy) including appropriate measures to encourage firstly the prevention of waste production, and secondly the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials, or the use of waste as a source of energy. The requirements of the Directive include a target for the construction industry to re-use, recycle and recover 70% of construction and demolition waste.

11.2.3 The principles of the European Commission Circular Economy (CE) Package (CEP) (European Commission, 2020)[2] shall also be applied where relevant during assessment and reporting. Despite the UK leaving the EU, the government has implemented the CE measures.

11.2.4 The other following key legislation is also applicable to the Materials Assets and Waste assessment (the assessment):

- The Environmental Protection Act 1990 imposes a Duty of Care on any person who imports, produces, carries, keeps, treats or disposes of controlled waste or, as a broker, has control of such waste. The assessment identifies how the Project will comply with the Environmental Protection Act and the Duty of Care.
- The Hazardous Waste (England and Wales) Regulations 2005 (as amended) establish the regime for the control and tracking of the movement of hazardous waste. The Project will produce hazardous waste during construction and operation and the management of hazardous waste streams are outlined in the assessment to comply with the Regulations.

[2] European Commission (2020) A new Circular Economy Action Plan for a cleaner and more competitive Europe

- The Waste (England and Wales) Regulations 2011 (as amended) implement the Waste Framework Directive in England and Wales and require waste producers to take account of the waste hierarchy (refer to Plate 11-1: Waste hierarchy) which is a key element of the assessment.
- The Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 (as amended) regulate the collection, treatment and disposal of WEEE. The Project will produce WEEE during construction and operation and the management of these waste streams are outlined in the assessment.
- The Environmental Permitting (England and Wales) Regulations 2016 (as amended) identity some activities such as waste operations and installations and mobile plant operations require an environmental permit. The Project will potentially require materials and waste related environmental permits and the key permits expected to be required are outlined Consents and Agreements Position Statement in the EMP. In addition the ES outlines the requirement that waste produced by the project will be taken to appropriately permitted waste management facilities to comply with the Regulations.

National level policy

National Policy Statement for National Networks

11.2.5 The primary basis for the Secretary of State in determining whether or not to grant a Development Consent Order (DCO) for the Project is the *National Policy Statement for National Networks (NPSNN)* (Department for Transport, 2014)[3]. The *NPSNN* sets out policies on how DCO applications for national networks nationally significant infrastructure projects will be decided and how their effects will be considered by the Secretary of State as the decision maker. The policies for waste management include statements that:

"Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible, waste management regulation ensures that waste is disposed of in a way that is least damaging to the environment and to human health." (*NPSNN* paragraph 5.39).

11.2.1 Table 11-2: Relevant *NPSNN* policies identifies the *NPSNN* policies relevant to the material assets and waste assessment and provides a reference to where in this Environmental Statement (ES) information is provided to address each policy.

[3] Department for Transport (2014) National Policy Statement for National Networks

Table 11-2: Relevant *NPSNN* policies

***NPSNN* paragraph reference**	**Requirement**	**Applicant response**	**Where addressed?**
5.40	Sustainable waste management is implemented through the "waste hierarchy": • prevention; • preparing for reuse; • recycling; • other recovery, including energy recovery; and • disposal	Sustainable waste management and the waste hierarchy are key elements of the Materials Assets and Waste assessment (the assessment).	Section 11.3
5.41	Large infrastructure projects may generate hazardous and non-hazardous waste during the construction and operation. The Environment Agency's environmental permitting regime incorporates operational waste management requirements for certain activities. When an applicant applies to the Environment Agency for an environmental permit, the Agency will require the application to demonstrate that processes are in place to meet all relevant permit requirements.	A list of anticipated required consents (including Environmental Permit for the management and disposal of waste from site, to protect the environment against contamination) is included in the EMP.	Section 4 of EMP
5.42	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	Waste prevention is a key part of the assessment and is promoted through the implementation of the waste hierarchy. The arrangements for managing waste generated from the Project are also included in the mitigation section as well as the Environmental Management Plan (EMP)	Section 11.3 Sections 11.8.47 to 11.8.65

NPSNN paragraph reference	Requirement	Applicant response	Where addressed?
	demonstrated that the alternative is the best overall environmental outcome.	and Site Waste Management Plan (SWMP) being submitted as part of the DCO application.	
5.43	The SoS should be satisfied that the process sets out: • any such waste will be properly managed, both on-site and off-site • the waste can be dealt with appropriately by the waste infrastructure. Such arisings should not have an adverse effect on the capacity of existing waste management facilities	Waste will be managed in line with the waste hierarchy. Waste and materials management addressed in the SWMP and MMP. The assessment of materials and waste has illustrated there will be no significant impacts on waste infrastructure capacity in the study area.	SWMP and MMP
5.44	The SoS should use requirements or planning obligations to ensure that appropriate measures for waste management are applied	Appropriate measures for waste management have been set out in the EMP, SWMP and MMP.	EMP, SWMP, MMP
5.45	Where the project will be subject to the Environment Agency's environmental permitting regime, waste management arrangements during operations will be covered by the permit	The Project will ensure any Environment Agency permitting requirements are met.	EMP and SWMP
5.169	Applicants should safeguard any mineral resources on the proposed site as far as possible.	The safeguarding of mineral resources is a key element of the assessment and methodology. Avoidance mitigation and other mitigation has been considered, so as to safeguard mineral resources on the proposed site as far as possible.	Section 11.3, section 11.7.7 and section 11.8.36
5.182	Where a proposed development has an impact	The safeguarding of mineral resources is a	Section 11.3,

NPSNN paragraph reference	Requirement	Applicant response	Where addressed?
	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	key element of the assessment and mitigation measures have been developed to prevent and reduce sterilisation and to safeguard mineral resources .	section 11.7.7 and section 11.8.36

National Planning Policy Framework

11.2.2 The *National Planning Policy Framework (NPPF)* (Ministry of Housing, Communities & Local Government, 2021)[4] originally published in March 2012 and most recently updated in July 2021, sets out the government's planning policies for England and provides a framework within which locally prepared plans can be produced. The NPPF is an important and relevant matter to be considered in decision making for Nationally Significant Infrastructure Project (NSIP).

Regional and local level policy

11.2.3 Other regional and local level policies have been considered as part of the Material Assets and Waste assessment where these have informed the identification of receptors and resources and their sensitivity; the assessment methodology; the potential for likely significant environmental effects; and required mitigation. These policies include:

- *Cumbria Minerals and Waste Local Plan* (Cumbria County Council, 2017)[5]
- *Eden Local Plan 2014 to 2032* (Eden District Council, 2018)[6]
- *Joint Local Aggregates Assessment 2019* (Cumbria County Council and the Lake District National Park, 2019a)[7]
- *Joint Cumbria Waste Needs Assessment* (Cumbria County Council and the Lake District National Park, 2019b)[8]
- *County Durham Plan* (Durham County Council, 2020)[9]
- *Joint Local Aggregates Assessment for County Durham, Northumberland and Tyne and Wear 2018* (Durham County Council, 2018)[10]

[4] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework
[5] Cumbria County Council (2017) Cumbria Minerals and Waste Local Plan
[6] Eden District Council (2018) Eden Local Plan 2014 to 2032
[7] Cumbria County Council and the Lake District National Park (2019a) Joint Local Aggregates Assessment 2019
8 Cumbria County Council and the Lake District National Park (2019b) Joint Cumbria Waste Needs Assessment
[9] Durham County Council (2020) County Durham Plan
[10] Durham County Council (2018) Joint Local Aggregates Assessment for County Durham, Northumberland and Tyne and Wear 2018

- *Annual Aggregates Monitoring Report 2020 (North East England Aggregates Working Party, 2021) Minerals and Waste Joint Plan* (North Yorkshire County Council, 2021)[11]
- The North Yorkshire County Council The Minerals and Waste Joint Plan 2015 - 2030 (North Yorkshire County Council, 2022) and relevant saved policies[12]
- *Local Aggregates Assessment for the North Yorkshire Sub-region 2017* (North Yorkshire County Council, 2017)[13]

Table 11-3: Regional and local level policies

Policy document	Policy wording	Applicant response	Where addressed?
Cumbria Minerals and Waste Local Plan	The Plan establishes the policies for minerals development and waste management within Cumbria. The Plan includes a number of relevant strategic and development control policies. Policy SP8 and DC15 for Minerals Safeguarding identify existing and planned mineral resources, will be safeguarded from sterilisation.	The assessment has applied the relevant strategic and development control policies identified in the *Cumbria Minerals and Waste Local Plan*. Cumbria County Council (CCC) has been consulted in relation to minerals and waste policy, local aggregate supplies, mineral safeguarding sites, peat resources, and waste infrastructure. The Project has implemented SP8 and DC15 by using the existing and future mineral sites identified by CCC for baseline data and assessing these areas for potential sterilisation. During consultation CCC were satisfied with the assessment of sterilisation of mineral safeguarding sites in the ES for the schemes located in Cumbria.	Section 11.6.8 Table 11-7 ES Figure 11.1 Table 11-31 Table 11-32 Table 11-33 Table 11-34
County Durham Plan	The *County Durham Plan* provides policies relating to the minerals sector and waste. Policy 48 for Safeguarding Minerals Sites, Minerals Related Infrastructure and Waste Management Sites identifies that existing and planned mineral sites will be safeguarded from sterilisation.	The assessment has applied the principles of the policies in the *County Durham Plan*. The Project has implemented Policy 48 by using the existing and future mineral sites identified by Durham County Council (DCC) for baseline data and assessing these areas for potential sterilisation. DCC have been consulted throughout the	Section 11.6.9 Table 11-7 ES Figure 11.1 Table 11-35 Table 11-36 Sections 11.9.15 to 11.9.17

[11] North East England Aggregates Working Party (2021) Annual Aggregates Monitoring Report 2020
[12] North Yorkshire County Council (2022) The North Yorkshire County Council The Minerals and Waste Joint Plan 2015 - 2030 Adopted 2022
[13] North Yorkshire County Council (2017) Local Aggregates Assessment for the North Yorkshire Sub-region 2017

Policy document	Policy wording	Applicant response	Where addressed?
		development of the ES and are aware of the findings from the assessment including the moderate adverse impact that has been identified as a result of the sterilisation of a mineral safeguarding site in the Cross Lanes to Rokeby scheme which constitutes a large significant effect.	
North Yorkshire County Council Minerals and Waste Joint Plan	The Plan identifies planning policies for minerals and waste developments across North Yorkshire and guide decisions on planning applications up to the end of 2030. Policy S01: Safeguarded surface mineral resources identifies mineral resources and associated buffer zones identified on the policies map will be safeguarded from sterilisation. Policy S02: Safeguarded surface mineral resources identifies mineral resources and associated buffer zones identified on the policies map will be safeguarded from sterilisation.	The assessment has applied the principles of the policies in the *North Yorkshire County Council The Minerals and Waste Joint Plan*. North Yorkshire County Council (NYCC) has been consulted in relation to minerals and waste policy, local aggregate supplies, mineral safeguarding sites, peat resources, and waste infrastructure. The Project has implemented policy S01 by using the existing and future mineral sites identified by NYCC for baseline data and assessing these areas for potential sterilisation.	Section 11.6.10 Table 11-7 ES Figure 11.1 Table 11-37 Table 11-38

Other Relevant Policy and Guidance

11.2.4 In addition to compliance with the *NPSNN* and *NPPF*, this assessment has been compiled in accordance with other relevant policy and guidance. The other relevant policy and guidance which relate to the assessment are:

- European Commission Circular Economy (CE) Package (European Commission, 2020)[14]
- *Waste strategy* (H.M. Government, 2018)[15]

[14] European Commission (2020) A new Circular Economy Action Plan for a cleaner and more competitive Europe
[15] H.M. Government (2018) Our Waste Our Resources: A Strategy for England

- *National planning policy for waste 2014* (Ministry of Housing Communities and Local Government, 2014)[16]
- NPPF
- *DMRB LA 110*
- Waste duty of care: code of practice (Department for Environment, Food & Rural Affairs, 2018)[17]
- Definition of Waste: Code of Practice (CL:AIRE DOW COP) (Contaminated Land: Applications in Real Environments (CL:AIRE), 2011)[18]
- *National and regional guidelines for aggregates provision in England 2005-2020* (Ministry of Housing, Communities & Local Government, 2009)[19]
- *DMRB GG 103 Introduction and general requirements for sustainable development and design (DMRB GG 103)* (Highways England, 2019b)[20]
- *Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements (Advice Note Seven) (The Planning Inspectorate, 2020)[21]*

11.3 Assessment methodology

11.3.1 The methodology for the Material Assets and Waste assessment follows the guidance set out within *DMRB LA 110* and the assessment scope includes:

"1) The consumption of materials and products (from primary, recycled or secondary, and renewable sources), the use of materials offering sustainability benefits and the use of excavated and other arisings that fall within the scope of waste exemption criteria; and

2) The production and disposal of waste."

11.3.2 The impacts associated with these activities have been assessed in the context of relevant legislation, policies, standards and guidance (referenced in section 11.2) relating to materials and waste management at the Project, local, regional and national level.

11.3.3 The effects associated with the transportation of materials (Greenhouse gas (GHG) emissions, air quality, noise etc) are not covered within this methodology and are addressed in Chapter 5: Air Quality, Chapter 7: Climate and Chapter 12: Noise and Vibration of the ES.

[16] Ministry of Housing Communities and Local Government (2014) National planning policy for waste 2014
[17] Department for Environment Food & Rural Affairs (2018) Waste duty of care: code of practice
[18] Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) Definition of Waste: Code of Practice (CL:AIRE DOW COP)
[19] Ministry of Housing, Communities & Local Government (2009) National and regional guidelines for aggregates provision in England 2005-2020
[20] Highways England (2019b) DMRB GG 103 Introduction and general requirements for sustainable development and design
[21] The Planning Inspectorate (2020) Advice Note Seven: Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements

11.3.4 An In Combination Climate Impacts (ICCI) assessment has been conducted to assess likely changes to the significance of effects when considering the combined impact of the Project in a future changed climate on Material Assets and Waste receptors in the surrounding environment. The assessment considers whether climate change could impact the likelihood and magnitude of the effects of the Project on the receptors, or affect the susceptibility, vulnerability, value or importance of the receptors themselves.

11.3.5 The ICCI assessment has been undertaken based on the latest UK Climate Change Projections and considers a range of climatic hazards including rising temperatures, higher and lower rainfall, and the increased frequency and magnitude of extreme events such as heat waves and flooding. For further detail on this assessment see Chapter 7: Climate.

11.3.6 Mitigation measures to reduce the impacts of material assets and waste impacts from the Project follow the principles of sustainable resource and waste management in accordance with the waste hierarchy as described in *DMRB LA 110* (refer to Plate 11-1: Waste hierarchy).

11.3.7 The assessment considers the impact on the environment as a result of the consumption of material assets and the generation and management of waste. The following quantitative information is provided in the ES:

- Key materials – material use has been estimated and include asphalt, concrete, precast concrete and steel.
- Demolition waste – Although much of the area surrounding the existing A66 is undeveloped land, there are buildings and existing infrastructure, including services, roads, and drains which will need to be removed prior to construction. These are likely to consist of hard and inert materials, soils, rock and stones, wood (including vegetation), asphalt, brick, concrete, and miscellaneous metals.
- Construction and excavation waste – Waste will arise from the construction and excavation phases which will consist of hard and inert materials, soils and stones, wood, plastics, packaging (wooden and plastic), insulation material, miscellaneous metals, canteen and office waste.

11.3.8 *DMRB LA 110* Section 2.3 identifies that the application of the waste hierarchy can require specific waste streams to depart from the hierarchy where it is suitably justified by lifecycle thinking and delivers the best overall environmental outcome. Regulation 12 of the Waste (England and Wales) Regulations 2011 (see section 11.2.4) also provides for a similar departure from the waste hierarchy.

11.3.9 Following the requirements of *DMRB LA 110* confirmed that a material assets and waste assessment is necessary for the Project. *DMRB LA 110, section 3.9* requires that the following information on material assets and waste is identified:

- Types and quantity of material use associated with operation of the existing road/site

- Types and quantities of waste associated with operation of the existing road/site
- Information on availability of key construction materials required for the Project
- Types and quantities of materials required to construct the Project
- Information on materials that contain secondary aggregate or recycled content
- Information on any known sustainability credentials of materials to be consumed
- The type and volume of materials that will be recovered from offsite sources for use on the Project
- The cut and fill balance
- Details of onsite storage and stockpiling arrangements, and any supporting logistical details

11.3.10 The EIA Regulations also require the consideration of effects arising in relation to resources and waste and *DMRB LA 110, section 1.3* states that it aligns with these Regulations.

11.3.11 In addition, *DMRB LA 110, section 3.10* requires information regarding the current and likely future state (in the absence of the Project) of the following:

- Regional (or other relevant geographic scale) presence and capacity of landfill facilities to be utilised by the Project
- Regional (or other relevant geographic scale) presence and capacity of material recovery/recycling facilities to be utilised by the Project
- The location of mineral sites and peat resources (this is defined as commercial peat extraction) in relation to the Project

11.3.12 For waste *DMRB LA 110 section 3.12*, requires the assessment to identify the following:

- The amount of waste (by weight) that will be recovered and diverted from landfill either onsite or offsite (i.e. for use on other projects)
- Types and quantities of waste arising from the Project (demolition, excavation, construction arisings and remediation) requiring disposal to landfill
- Details of onsite storage and segregation arrangements for waste and any supporting logistical arrangements
- Potential for generation of hazardous waste (type and quantity)

11.3.13 To minimise the effects from material assets usage and waste production the assessment identifies the location of sensitive receptors (e.g. designated sites identified in other environmental topics).

11.3.14 Table 3.13 in *DMRB LA 110* describes the significance category descriptions for material assets and waste. The significance of effects on material assets and waste is reported in accordance with the significance criteria taken from Table 3.14 in *DMRB LA 110*.

Targets and Key Performance Indicators

11.3.15 There are two material assets and waste targets included in *DMRB LA 110* for the Project. The Ministry of Housing, Communities and Local Government Communities and Local Government[22] guidance identifies aggregates required to be imported to site will have re-used/recycled content target of at least 31%. At least 70% (by weight) of Construction and Demolition Waste (CDW) will be subjected to material recovery in accordance with the Waste Framework Directive[23].

11.3.16 In addition, the Project will aim to achieve at least 90% (by weight) material recovery of non-hazardous CDW as set out in the *DMRB LA 110*.

Scoping

11.3.17 Table 11-4: Summary of scoping opinion and response sets out the key points from the Planning Inspectorate (PINS) (on behalf of the Secretary of State) Scoping Opinion relevant to the Material Assets and Waste assessment. The Scoping Opinion Section ID is given in Table 11-4: Summary of scoping opinion and response and the full Scoping Opinion is provided in ES Appendix 4.2: EIA Scoping Opinion (Application Document 3.4).

11.3.18 Where the assessment has been undertaken in accordance with the Scoping Opinion, the wording of each point raised with a response and reference to the relevant ES section is provided. Where further discussion has taken place that has evolved the approach this has been agreed with the relevant stakeholders and the Planning Inspectorate, this is noted and an explanation is provided.

[22] Ministry of Housing, Communities and Local Government (2009) National and regional guidelines for aggregates provision in England 2005-2020

[23] The Waste Framework Directive target excludes naturally occurring materials (specifically European Waste Catalogue category 17 05 04 in the list of waste defined as non-hazardous soils and stones)

Table 11-4: Summary of scoping opinion and response

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
PINS 4.7.1	The Inspectorate agrees that materials resource use and waste arisings during operation (beyond the first year of operation) can be scoped out of the assessment.	Materials use and waste are expected to be limited beyond the first year of operation (refer to section 11.7.11). Only the first year of operation has been scoped into the assessment in accordance with the Scoping Opinion and para 5.11 of PINS Advice Note Seven.	Section 11.7.11
PINS 4.7.2	Where possible, the results of the investigation into restoration (receiver sites) should be included within the ES, as they may have both beneficial and adverse impacts to materials and waste, and other EIA aspect chapters.	The ES identifies investigation will be made to use excess materials arising from the Project in local restoration sites. Durham County Council (DCC) has provided details of restoration sites and shared with the Project team. Cumbria County Council (CCC) and North Yorkshire County Council (NYCC) were also approached for restoration sites but none were provided. These measures are included as requirements within the Site Waste Management Plan (SWMP) and will be included in the Materials Management Plan (MMP), to be implemented by the Principal Contractor (PC) after the submission of the ES.	Section 11.8.38
PINS 4.7.2	The ES should advertise the scheme as a Donor site under the Contaminated Land: Applications in Real Environments -Definition of Waste: Code of Practice (CL:AIRE DOW COP, 2011)[24] scheme where excess materials are likely to be present that cannot be re-used within the scheme.	The CL:AIRE DOW COP Definition will be considered to optimise the amount of excavated materials that can be re-used and recycled across the Project. These measures are included as requirements within the ES, SWMP and will be included in the MMP, to be implemented by the PC after the submission of the ES.	Section 11.8.38

[24] Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) Definition of Waste: Code of Practice (CL:AIRE DOW COP)

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
PINS 4.7.3	The most up to date baseline information should be used for minerals and waste allocations. The ES should confirm whether waste management, transfer and recovery facilities other than landfills are included in the baseline dataset.	The ES includes the most recent baseline data. CCC), DCC and NYCC have been consulted to obtain the most recent data. Data on waste management transfer and treatment facilities are also available.	Section 11.6 Section 11.6.15
PINS 4.7.4	The ES should include a figure clearly showing the exact location of Mineral Safeguarding Areas (MSAs) and the mineral types present within the Order Limits and study buffer zone.	The ES identifies MSAs as well as existing and future mineral sites within the Order Limits. These are clearly demonstrated in the Baseline section which includes a number of figures.	ES Figure 11.1
PINS 4.7.4	The ES should also ensure that sites where planning permission has been granted but the sites are not operational, as well as identified safeguarding sites. The ES should include the Minerals and Waste Joint Plan that has been produced by NYCC.	The assessment accounts for a full list of sites routewide including those which are proposed or where planning permission has been granted. The assessment has followed the policies in The North Yorkshire County Council The Minerals and Waste Joint Plan.	Section 11.6
PINS 4.7.5	Any waste arisings of made ground, soils and sub soil should be classified as per Environment Agency (EA) Waste Management 3 (WM3) (2015) guidelines[25] for waste classification. The ES should reference the testing and classification regime for these materials to ensure the correct waste sentencing or possibility of reuse.	Any waste arisings of made ground, soils and sub soil will be classified and managed as per the EA guidelines for waste classification. This classification and management of such wastes will be outlined in the SWMP and provided in further detail in the MMP, to be implemented by the PC.	Section 11.8.61 Also included in the SWMP and MMP
PINS 4.7.6	There is likely to be hazardous waste such Waste Electrical and Electronic Equipment (WEEE) and non-hazardous waste will arise from re-surfacing and other activities. The ES should consider the possibility of resurfacing or other operational activities producing hazardous waste, for example resurfacing following a	Hazardous waste such as hazardous WEEE. The possibility of resurfacing or other operational activities producing hazardous waste is considered in the operational waste section.	Section 11.7.11

[25] Environment Agency (2021) Guidance on the classification and assessment of waste (1st Edition v1.2.GB)

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
	diesel or oil spill or the emptying of any interceptors / pollution control systems etc.		
PINS 4.7.7	The ES should also include an assessment of the potential for liquid wastes such as from dewatering and contaminated land and any groundwater remedial works.	An assessment of the potential for liquid wastes such as from dewatering and groundwater have been included in the ES in Chapter 9: Geology and Soils and Chapter 14: Road Drainage and Water Environment.	See ES Chapter 9: Geology and Soils and ES Chapter 14: Road Drainage and Water Environment
PINS 4.7.8	The ES should explain the requirement for any borrow pits to be used, their dimensions, any assumptions made around quantity of materials to be 'won' and assess the impacts of such features across relevant aspects of the EIA. Figures indicating the location of borrow pits should be provided.	The scheme development and materials management strategy identify the requirement for borrow pits. The environmental effects arising from the use of the borrow pits have been considered in the assessment of relevant topic chapters within this ES. The earthworks estimates do not include the excavated materials arising from the borrow pits nor the materials excavated from the M6 Junction 40 to Kemplay Bank and Penrith to Temple Sowerby schemes to subsequently restore the borrow pits. This will not affect the robustness of the assessment as excavated materials will be re-used on the Project.	See Figures 2.17 to 2.24 of Chapter 2: The Project See ES Chapter 9: Geology and Soils and ES Chapter 14: Road Drainage and Water Environment
PINS 4.7.9	The ES should include, an estimate of material requirements including aggregates (by mineral type) and of waste. This information should be broken down by scheme but also considered and assessed for the Project.	The ES provides an estimate of the material requirements for each scheme and for the whole Project including fill, aggregate and sand. The ES also provides an estimate of the inert, non-hazardous and hazardous waste generated by each scheme and for the whole Project.	Table 0-19: Key Materials estimates
Cumbria County Council	Should the Applicant wish to balance earth movements across the schemes of the Project, then the consequential environmental impacts of doing so (traffic,	The effects associated with the transportation of materials are addressed in the relevant environmental topic chapters (Chapter 5: Air	See the Chapters for, Chapter 5: Air Quality, Chapter 7:

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
	noise, contamination, etc) should be included within the assessment in the ES.	Quality, Chapter 7: Climate Change, Chapter 12: Noise and Vibration) of the ES.	Climate and Chapter 12: Noise and Vibration
Cumbria County Council	The Local Aggregates Assessment (LAA) for 2019/2020 will be prepared by CCC shortly and the information provided in the LAA should be incorporated in future EIA deliverables.	The information from the Joint LAA 2019[8] from CCC has been incorporated into the ES.	Section 11.2.3 and section 11.6.8
Environment Agency	If recycled aggregates have not met the end of waste criteria, they will still be considered to be waste. Therefore, a suitable waste permit or waste exemption will be required to cover their use.	The Project will ensure that the potential requirement for an environmental permit or waste exemption associated with the use of recycled aggregates that have not met the end of waste criteria is identified.	Section 11.8.5 Also included in the SWMP and MMP
Environment Agency	The Project may need to use a combination of Quality Protocol, CL:AIRE DOW COP, exemptions and / or permits. A MMP needs to be produced and the correct determination is made. A Verification Plan needs to be set out in the MMP and must identify the recording method of materials being placed, as well as the quantity of materials to be used. It should also contain a statement on how the use of the materials relate to the remediation or design objectives.	The Project will use all the relevant tools to comply with waste legislation and guidance including the Quality Protocol *CL:AIRE DOW COP*, exemptions and / or permits. The MMP will be prepared by the appointed contractor pre-construction and will include the proposals for the handling of waste material following the protocols within the *CL:AIRE DOW COP*. The purpose of the MMP is to outline the procedures to be followed to manage material resources during the construction of the Project. The PC) will use the MMP to ensure materials are handled efficiently and managed appropriately. Procedures will be adopted by the PC during construction to control the use of materials and further reduce the impact.	Section 11.8.62 Included in the SWMP and section MMP
Environment Agency	Evidence of suitability and certainty e.g. testing carried out, contaminants present, remediation strategy, volumes	The Project will provide evidence of suitability and certainty once detailed design and on-site testing	Included in the SWMP and MMP

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
	required onsite and whether there will be a requirement to re-use soils onsite or directly transfer them to site will be required to demonstrate efficient use of waste arisings.	is completed. This will be outlined in the MMP produced by the PC to comply with the Quality Protocol *CL:AIRE DOW COP.*	
Environment Agency	Demolition waste may be re-used and recycled for use in the development. Any treatment of waste will require either a registered waste exemption or an environmental permit. The use of demolition waste on the development could be done under the CL:AIRE DOW COP so long as the material is produced from ground based infrastructure. Any material produced from the demolition of above ground structures would not be included.	The Project will ensure that the potential requirement for a suitable waste environmental permit or waste exemption associated with the re-use and recycling of demolition waste within the Project is identified. The Project will also use the *CL:AIRE DOW COP* to record demolition waste arising from below ground infrastructure.	Section 11.8.5 Included in the SWMP
Environment Agency	The removal of excess material from the development would be considered waste and this would need to be transferred to a suitably licensed facility by authorised waste carriers, accompanied by waste transfer notes. Prior to this, any waste produced would also need to be assessed and classified in accordance with the WM3 guidelines.	The Project will ensure that the requirement for material to be classified prior to disposal off- site in accordance with *WM3 guidelines* is followed. The Project will also ensure that the removal of excess materials are considered waste and would be transferred to a suitably permitted facility to comply with waste legislation including the Duty of Care.	Section 11.8.53 and section 11.8.61 Also included in the SWMP
Durham County Council	Should the chapter also include an assessment of the potential for prior extraction as dependent on the design of the scheme i.e. levels, grading and underpasses there may be opportunities for aggregate to be extracted which could be used onsite.	The Project will consider the potential for the extraction of aggregates before construction.	Section 11.8.36
Durham County Council	It would be beneficial for the ES to include an overall forecast 'routewide' material requirement for aggregates and waste for each scheme to understand how minerals reserves and landfill may be affected.	The ES includes a forecast for material requirements. In addition, the inert, non-hazardous and inert waste generated by the Project and for each scheme has been estimated and reported in this chapter.	Table 0-19: Key Materials estimates

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
Durham County Council	It is expected that the next LAA for DCC will be available by November and will include both 2019 and 2020 based information. The North East Aggregates Working Party[11] has also published its Annual Aggregates Monitoring Report for 2019.	The information from the LAA 2018 from DCC[10] has been incorporated into the ES. The information from the LAA 2019 and 2020 from DCC will be incorporated into the ES once it is available. The Aggregates Monitoring Report has also been considered in the ES.	Section 11.6
Durham County Council	2019 data for sites that could potentially accept CD&E waste is now available. Some of these sites would be unlikely to take large volumes of inert material as they may be dedicated non-hazardous or hazardous landfill sites.	The ES includes consideration of inert, non-hazardous and hazardous landfill capacity data for 2020 in the North West, North East and Yorkshire and The Humber provided by the Environment Agency. Also a non-exhaustive list of permitted landfill sites that could potentially accept Construction, Demolition and Excavation (CD&E) waste generated during the construction phase of the Project is also presented.	Section 11.6
Durham County Council	DCC will be consulting upon its Minerals and Waste Policies and Allocations Document towards the end of September. This document is likely to allocate two sites for mineral working. Further proposals which have been proposed by mineral operators as allocation including a eastward extension to Hulands Quarry and a potential new site to both the west and east of Cross Lanes Junction.	The mineral sites identified DCC have been used as baseline data for the assessment. In addition, there has been further consultation with DCC during the development of the material assets and waste chapter in February 2022.	Section 11.6 Section 11.9.5
Durham County Council	It is important that the environmental impacts of any mineral extraction associated with the development will need to be assessed in the relevant chapters of the proposed ES.	The assessment identifies the key materials including aggregates, consumed by the Project and each scheme. The effects associated with the extraction of minerals on site (GHG emissions, air quality,	Table 0-19: Key Materials estimates See the Chapters for, Chapter 6: Air Quality, Chapter 6:

Consultee/ respondent	Scoping opinion comment	Applicant response	Where addressed?
		noise, ecology etc) is also addressed in the relevant environmental topics of the ES.	Biodiversity, Chapter 7: Climate and Chapter 12: Noise and Vibration
Durham County Council	The eastern part of the Bowes Bypass scheme and the entirety of Cross Lanes to Rokeby scheme lies within a MSA for carboniferous limestone. Policy 56 states that permission will not be granted for non-mineral development that would lead to the sterilisation of mineral resources within a MSA, unless it meets one of a number of exceptions set out by the policy, including that there is an overriding need for the non-minerals development which outweighs the need to safeguard the mineral. However in both cases the existing road layout also overlaps the MSA.	The mineral sites and MSAs identified by DCC have been used as baseline data for the assessment. In addition, there has been further consultation with DCC during the development of the material assets and waste chapter in February 2022.	Section 11.6 Section 11.9.5
North Yorkshire County Council	Within the Stephen Bank to Carkin Moor scheme there are a number of sites identified for safeguarding of the building stone that may potentially be affected. This scheme also lies within a limestone MSA as does the A1 (M) Junction 53 Scotch Corner area and the former Green Bank Quarry lies to the north-west of Ravensworth 210 metres from the existing route of the A66. A small area in the vicinity of Fox Well to the northeast of Ravensworth lies within a sand and gravel MSA.	The mineral sites and MSAs identified by NYCC have been used as baseline data for the assessment.	Section 11.6 Section 11.9.5

Consultation

11.3.19 Table 11-5: Summary of key consultation comments received sets out comments raised by statutory consultees relevant to the Material Assets and Waste assessment in response to the preliminary environmental information provided at statutory consultation. Table 11-5: Summary of key consultation comments received also sets out the key points from direct consultation with Cumbria County Council, Durham County Council and North Yorkshire County

Council relevant to the Material Assets and Waste assessment. Where the assessment has been informed by the consultation this is explained and there is a reference to the relevant ES section.

11.3.20 The wording of each point raised in the PEIR feedback is set out, with a response and reference to the relevant ES section provided. Where further discussion and/or an alternative approach has been agreed with the relevant stakeholders, an explanation is provided.

Table 11-5: Summary of key consultation comments received

Consultee/ respondent	Comment	Applicant response	Where addressed?
Cumbria County Council	The column titled 'Additional Information' is amended to describe the most likely waste management methods to be used.	The column has been amended to Most Likely Waste Management Methods.	Table 11-21: Types of CD&E waste arisings generated by the Project
Cumbria County Council	The Eden Local Plan 2014-2032 has not been referenced.	The Eden Local Plan -2014-2032 has now been referenced in the ES.	Section 11.2.3
Eden District Council	In Paragraph 11.3.14 include reference to the Waste Directive target excludes naturally occurring materials (specifically European Waste Catalogue category 17 05 04 in the list of waste defined as non-hazardous soils and stones).	The ES includes the following footnote 'The Waste Directive target excludes naturally occurring materials (specifically European Waste Catalogue category 17 05 04 in the list of waste defined as non-hazardous soils and stones).	Section 11.2
Eden District Council	Paragraph 11.6.13 it is stated that "The last published data from 2016 indicated that England was achieving a recovery rate of 92.1%'. Thus meeting the DMRB LA 110 target to achieve at least 90% recovery of non-hazardous construction waste appears to be achievable for the project. It is recommended that this assertion is qualified using reference to SMARTWaste.	The ES includes new information on the recovery of construction and demolition waste. Although SMARTWaste data has not been referenced, new data released by the UK government identifies in 2018, England generated 61.4 million tonnes of non-hazardous construction and demolition waste, of which 57.5 million tonnes was recovered. This represents a recovery rate of 93.8%, exceeding the target of 70%.	Section 11.6.16

Consultee/ respondent	Comment	Applicant response	Where addressed?
Eden District Council	Table 11-3 the target for North West region (30%) is missing. Please checks are made to ensure that the data used in Table 11-11 of the PEIR uses the most up-to-date information, as data in the previous tables is based on data from 2019.	The Highways England DMRB LA 110 recycled aggregate target for North West has been added. Table 11.11 was updated in the PEI Report using published by the EA in September 2021 for the year 2020. New data is usually released in September on an annual basis.	Section 11.6.17
Eden District Council	Paragraph 2.5 of LA110 Material Assets and Waste, and is requested to make suitable (proportionate) reference to the circular economy as part of the mitigation and enhancement measures proposed.	The ES includes reference to the circular economy as part of the mitigation measures proposed. Much of the designing out waste mitigation proposed is linked to the circular economy.	Section 11.8
Eden District Council	The movement of fill material should be quantified, especially if this would involve the use of the public highway and further to comments raised with regard to air quality and noise, any effects upon sensitive receptors needs to be considered.	The non-waste environmental effects associated with the transportation of materials (including the quantification of the movement of fill materials) are addressed in the relevant environmental topics of the ES (Chapter 5: Air Quality and Chapter 12: Noise and Vibration).	Section 5.3.10 of Air Quality and section 12.10 of Noise assessments
Environment Agency	Ensure that the EMP acknowledges the need for the appropriate disposal of waste off-site.	The EMP and SWMP acknowledge the need for the appropriate disposal of waste off-site.	See EMP and SWMP
Environment Agency	Ensure that the EMP acknowledges the requirements of the CL:AIRE code of practice.	The EMP and SWMP acknowledge the requirements of the CL:AIRE code of practice.	See EMP and SWMP
Environment Agency	Ensure that the EMP confirms that recycled aggregates that are imported from off-site and have not met the end of	The EMP and SWMP state that recycled aggregates that are imported from off-site and have not met the end of waste criteria will require a suitable waste permit or waste exemption.	See EMP and SWMP

Consultee/ respondent	Comment	Applicant response	Where addressed?
	waste criteria will require a suitable waste permit or waste exemption.		
Environment Agency	The plans need to detail how waste water (including silt laden water) will be treated and disposed of, taking into account the estimated amount of contaminated water to be treated/disposed of.	The Material Assets and Waste assessment covers solid waste. The Water assessment includes the treatment and disposal of liquid waste.	See Chapter: 14 Road Drainage and the Water Environment
Cumbria County Council	Cumbria County Council has been consulted in relation to minerals and waste policy, local aggregate supplies, MSAs, peat resources, and waste infrastructure. Information regarding MSAs was provided. Cumbria County Council also identified there are no existing peat resources sites (commercial peat extraction) within study area 1.	The MSAs provided by Cumbria County Council have been used as baseline data for the assessment. Cumbria County Council were satisfied with the assessment of sterilisation of mineral safeguarding sites in the ES for the schemes in Cumbria.	Section 11.6 Section 11.9.5
Durham County Council	Durham County Council has been consulted in relation to minerals and waste policy, local aggregate supplies, MSAs, peat resources, and waste infrastructure. Durham County Council identified MSAs for carboniferous limestone, glacial sands and gravel as well as river sands and gravel in across the Project area (study area 1). Durham County Council also identified existing and proposed quarries close to the Project. Durham County Council	The MSAs identified by Durham County Council have been used as baseline data for the assessment. Where excess material cannot be reused as part of the Project, the PC will be required to fully investigate opportunities to use excess materials at local restoration sites (REAC commitment in the EMP). Durham County Council were satisfied with the assessment of sterilisation of mineral	Section 11.6 Section 11.9.5

Consultee/ respondent	Comment	Applicant response	Where addressed?
	identified there are no existing peat resources sites (commercial peat extraction) within study area 1. Durham County Council have identified a number of restoration sites importing inert materials including Kilmond Wood Quarry (192,000m3) which situated on the A66, Low Harperley Quarry at Wolsingham (180,000 m3) and Birtley Quarry (270,000 m3).	safeguarding sites in the ES for the Bowes Bypass scheme. Durham County Council strongly hope to protect the mineral safeguarding area for the Cross Lanes to Rokeby scheme.	
North Yorkshire County Council	North Yorkshire County Council has been consulted in relation to minerals and waste policy, local aggregate supplies, Mineral Safeguarding Areas, peat resources, and waste infrastructure. North Yorkshire County Council identified Mineral Safeguarding Areas for limestone, building stone as well as sand and gravel across the Project area (study area 1). North Yorkshire County Council also identified a former quarry close to the Project. North Yorkshire County Council identified there are no existing peat resources sites (commercial peat extraction) within study area 1.	The Mineral Safeguarding Areas identified by North Yorkshire County Council have been used as baseline data for the assessment. The former quarry identified by North Yorkshire County Council has been used as baseline data for the assessment.	Section 11.6 Section 11.9.5

11.4 Assumptions and limitations

11.4.1 This material assets and waste assessment is based on information available at the time of writing.

11.4.2 The assessment of material assets and waste is based on relevant design and construction information provided by design teams and buildability contractors, e.g. construction material quantities as set out in Chapter 2: The Project. Due to ongoing design development and the current stage of construction programming, the assessment in relation to material assets and waste has been based on appropriate 'reasonable worst case' assumptions, based on information available at the time of assessment, including the materials and earthworks estimates and estimates cost of the Project.

11.4.3 Assumptions have been made to establish estimations of the operational materials use and waste generation for the existing A66 using data provided by National Highways Area Managers and are available in ES Appendix 11.1 Operational Materials Consumption and Waste Generation Estimation (Application Document Number 3.4).

11.4.4 During operation of the Project, materials use and waste generation is expected to be limited. Therefore, only the first year of operational activities are included in the assessment which is consistent with the approach set out in *DMRB LA 110.*

11.4.5 The environmental impacts associated with the third party extraction of raw materials and manufacture of products are excluded from the scope of the assessment. These impacts occur offsite and may occur outside the UK, and the effects of these activities are assessed separately as part of the consenting and permitting process for such activities. Impacts include the depletion of non-renewable resources and the production of waste at the point of extraction and during manufacturing. This is considered to be an appropriate approach and was outlined and agreed in the Environmental Scoping Report (ESR) and confirmed through the Scoping Opinion (ES Appendix 4.1: A66 NTP Scoping Report and 4.2: Scoping Opinion respectively, ES Volume 3 Appendices, Application Document Number 3.4).

11.5 Study area

11.5.1 Two interrelated study areas have been identified and defined as per *DMRB LA 110*.

- Study area 1 is the area within the Order Limits, as within these areas construction materials will be consumed (used, re-used and recycled) and this includes any temporary storage and compound areas.
- Study area 2 is related to the area where the main construction materials will be sourced and construction waste will be treated or disposed of, and comprises waste infrastructure in the regions of the North East (consisting of the local authority areas set out in Table 11-9: Summary of transfer, treatment and metal recycling capacity within the North East in 2020), the North West (consisting of the local

authority areas set out in Table 11-11: Transfer, treatment and metal recycling site input in the North West in 2020) and Yorkshire and The Humber (consisting of the local authority areas set out in Table 11-13: Transfer, treatment and metal recycling site input Yorkshire and The Humber in 2020) likely to be suitable to accept waste arisings generated by the Project, should this be required. In addition, the location of Mineral Safeguarding Sites (this is the term used in *DMRB LA 110* for Mineral Safeguarding Areas (MSAs) and operational or non-operational mineral sites identified within strategic planning documents for the extraction of minerals) in the second study area are included. Peat resources (this is the term used *DMRB LA 110* for existing or future peat resources for commercial peat extraction) are also identified in the second study area. These three regions have been selected following *DMRB LA 110* as the Project is located within these areas.

11.5.2 The Project comprises eight individual schemes that will be delivered at different times within the 5 year construction period and across a large geographic area. Each scheme will have a cut/fill balance resulting in materials and potential waste generation. The cut and fill assessment will be at scheme and route wide levels. The design will seek to achieve a balance of cut and fill at an individual scheme and project level, taking into account the complexity of the phasing of delivery. The Scoping Opinion highlighted the importance of the re-use of material within the scheme, through achieving a cut and fill balance. This remains a focus of the design, and the extent to which it can be achieved, and the effects that would be expected to arise from the earthworks strategy is set out in sections 11.7.16 to 11.7.25. The earthworks estimate, including the anticipated volumes of excavation, for the Project based on the preliminary design are presented in Table 11-23: Earthworks estimate.

11.6 Baseline conditions

Routewide

Existing baseline

11.6.1 *DMRB LA 110* requires the assessment to describe the current and future baseline for the for the following:

- The types and quantities of materials use associated with the operation of the existing road / site (these materials would be consumed in Study area 1)
- The types and quantities of waste produced associated with the operation of the existing road (this waste would be produced in Study area 1)
- Information on the availability of key construction materials required for the Project (these materials would be sourced from within and outside study areas 1 and 2)

11.6.2 The materials consumed by the existing road are associated with routine maintenance of the highway, highway infrastructure and road-side technology, such as surfacing asphalt, replacement fencing and barriers

and replacement electronic equipment. Waste arisings from operation of the existing road will include waste asphalt from re-surfacing activities, verge clearance waste and WEEE from replacing lighting and other equipment.

11.6.3 Detailed records are not currently maintained for the materials used and waste generated with the operation of the existing A66. From the available information, assumptions have been made to estimate the operational materials use and waste generation for the existing A66. Table 11-6: Existing A66 annual operational materials consumption and waste generation below outlines the annual operational materials used and waste generated associated with renewals and maintenance of the existing A66 route. The full set of assumptions and estimations are presented in ES Appendix 11.1 Operational Materials Consumption and Waste Generation Estimation (Application Document Number 3.4).

Table 11-6: Existing A66 annual operational materials consumption and waste generation

Element Type	Material	Material Volume (m3)	Material Mass (tonnes)	Waste Volume (m3)	Waste Mass (tonnes)
Renewals					
Pavement	Asphalt	8.8	18	0.2	0.5
Traffic Sign (Non-Electric)	Aluminium	0.8	2.2	0.8	2.2
Vehicle Restraint	Steel	6	49	6	49
Maintenance					
Pavement Pothole Repair	Asphalt	10	21	0.3	0.5
Pavement Patches Repair	Asphalt	420	882	11	22
Vehicle Restraint System (VRS) Posts	Steel	37	292	37	292
Vehicle Restraint System (VRS) Beams	Steel	5	39	5	39
Drainage Gullies	Cast Iron	0.2	1	0.2	1

Material assets required for construction

11.6.4 Material assets used during construction of the Project in study area 1 will include primary raw materials, such as aggregates and minerals, and manufactured construction products which include recycled and secondary aggregates. The term ‘aggregate’ is an umbrella descriptor for bulk raw materials used in large development and infrastructure construction projects. These materials can be further defined as primary, secondary or recycled aggregate as follows:

- Primary aggregate - is the term used for aggregate produced from naturally occurring mineral deposits which are used for the first time.

- Secondary aggregates - as defined by the Waste and Resources Action Programme (WRAP) Aggregain Programme (Waste and Resources Action Programme, 2008)[26] - are derived from a very wide range of materials that may be used as aggregates.
- Recycled aggregates - as defined by Aggregain - can be sourced from a variety of materials arising from construction and demolition (concrete, bricks, and tiles), highway maintenance (asphalt planings), excavation and utility operations.

11.6.5 Due to the large-scale earthworks across the scheme and minimal structures, the percentage of site won fill material is likely to be over 98% by volume.

11.6.6 Most of the other material resources required for construction of the Project, such as metals, some aggregate, pavement, concrete and soils, will originate offsite purchased as construction products. Some, such as excavated soils, will originate onsite. The Project will seek to utilise as much soil sourced from within study area 1 (the Order Limits) as possible.

11.6.7 The Project will consume large quantities of materials increasing demand on the existing UK supply chain. Regardless of where new materials are sourced from, material usage is reported within study area 1 as that is the location in which they are consumed. The anticipated volumes of key material products used by the Project are identified in section 11.7 meeting the requirements of *DMRB LA 110* and are contextualised with the volumes of aggregate reserves available within study area 2.

Mineral Safeguarding Sites and peat resources

11.6.8 MSAs are areas of mineral resources that are of economic value to protect. An MSA is also a planning designation which is required to be identified in Local Plans as an area to be protected from non-mineral development. In order to characterise the baseline for the purposes of assessing effects on mineral resources we need to identify the location of designated MSAs in each local authority area. The *Cumbria Minerals and Waste Local Plan 2015-2030* shows that there are several MSA for sand and gravel extraction in the vicinity of and crossing the A66 as shown in ES Figure 11.1 Mineral Safeguarding Areas (Application Document 3.3). There is also an MSA for gypsum deposits in the Long Marton and Kirkby Thore area where British Gypsum operates an existing mine and plasterboard factory. For the purposes of this assessment, Cumbria County Council elected not to provide data on MSA locations, instead providing locations of Mineral Consultation Areas (MCA). An MCA is a geographical area, based on a MSA, "*where the district or borough council should consult the Mineral Planning Authority for any proposals for non-minerals development*" (Ministry of Housing, Communities and Local Government, 2014)[27].

[26] Waste and Resources Action Programme (2003) AggRegain Programme
[27] Ministry of Housing, Communities and Local Government (2014) Guidance on the planning for mineral extraction in plan making and the application process]

11.6.9 Durham County Council has established an MSA for carboniferous limestone around the A66 near Bowes which includes two existing quarries: Hulands Quarry operated by Aggregate Industries and Kilmond Wood Quarry operated by Kearton Farms Ltd. There are also proposals for the working of carboniferous limestone from land to the east of Hulands Quarry. In addition, Durham County Council have identified a potential new carboniferous limestone site to both the west and east of Cross Lanes Junction. The carboniferous limestone MSA follows the A66 from east of Bowes to Lane Head. Durham County Council has also identified an MSA for both glacial and river sands and gravel close to the A66. However, there are no working sites in the area. The Durham County Council MSA in proximity to the A66 are shown in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 7 of 10 and Sheet 8 of 10 (Application Document Number 3.3).

11.6.10 North Yorkshire County Council has limestone, building stone as well as sand and gravel MSAs established at the eastern extent of the Project around Scotch Corner near Darlington. The Stephen Bank to Carkin Moor scheme lies within the limestone MSA area as does the A1 (M) Junction 53 Scotch Corner scheme. The former Green Bank Quarry (NZ 13738 09300) lies to the north-west of Ravensworth approximately 210m south from the existing route of the A66. A small area in the vicinity of Fox Well (NZ 14859 09040) to the north-east of Ravensworth lies within the sand and gravel MSA. These areas are illustrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 9 of 10 (Application Document Number 3.3).

The potential impacts of the sterilisation of existing or future peat resources for commercial extraction has been assessed in the ES in line with *DMRB LA 110*. The attributes of MSAs present throughout the Project are described on a scheme by-scheme basis below in Table 11-7: Baseline Mineral Safeguarding Areas and Minerals Allocations for each scheme

Table 11-7: Baseline Mineral Safeguarding Areas and Minerals Allocations for each scheme

Scheme	Authority	Mineral Safeguarding Area / Allocation Site	Description	Locations and Grid Reference
M6 Junction 40 to Kemplay Bank	Cumbria County Council	Mineral Consultation Area (BGS) Mineral sites suggests Sand and Gravel resource)	Cumbria County Council have a designated Mineral Consultation Area (MCA) which lies within and in proximity to the scheme, likely designated for sand and gravel resource. The scheme would partly lie within this MCA. There are no existing or proposed mineral extraction sites in the proximity of the scheme.	Along entire southern boundary of scheme and to the north of the River Eamont. Extending from approximately NY 50766 29219 to NY 53262 29454
Penrith to Temple Sowerby	Cumbria County Council	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel resource)	Cumbria County Council have a designated MCA which lies within and in proximity to the scheme, likely designated for sand and gravel resource. The scheme would partly encroach into this MCA. There are no existing or proposed mineral extraction sites in the proximity of the scheme.	Along western alignment of scheme, to the north and south, extending from approximately the River Eamont (NY 53968 29113) until Whinfell Park (NY 56750 28862)
Temple Sowerby to Appleby	Cumbria County Council	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel and Gypsum resource) British Gypsum Minerals Extraction Site at Kirkby Thore	Cumbria County Council have a number of MCAs which lie within or in proximity to the scheme, likely designated for sand and gravel and gypsum resources. The largest of these areas lies to the north and to the east of Kirkby Thore and also around Crackenthorpe. The scheme would encroach into a large area of these MCAs. The British Gypsum plant at Kirkby Thore lies to the north of the scheme. British Gypsum have been consulted throughout the ongoing design process.	An MCA starts at Temple Sowerby (approximately NY 61434 26929) and extends to the east and north of the existing A66 alignment and to the north of Kirkby Thore, around British Gypsum. The MCA also extends to the southeast of Kirkby Thore (approximately NY 64262 25459) to around south of Long Marton (approximately NY 66638 23660) There is also an MCA around Crackenthorpe (approximately NY 65981 22107)

Scheme	Authority	Mineral Safeguarding Area / Allocation Site	Description	Locations and Grid Reference
Appleby to Brough	Cumbria County Council	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel resource)	CCC have a number of MCAs which lie within or in proximity to the scheme, likely designated for sand and gravel resources. The scheme would encroach into these MCAs along its entire route alignment, mostly to the south. There are no existing or proposed mineral extraction sites in proximity to this scheme.	An MCA starts around Appleby in Westmorland (approximately NY 69903 19186) and extends along the entire route alignment, predominately to the south of the existing A66 to Brough (approximately NY 78999 14795).
Bowes Bypass	Durham County Council	Carboniferous Limestone MSA. Additional mineral allocation sites are likely to be included in the Durham County Council Minerals and Waste Policies Allocations. Mineral operators are proposing an allocation an eastward extension to Hulands Quarry (over and above the County Durham Plan Preferred Area).	Durham County Council has a Carboniferous Limestone MSA and mineral sites within proximity to the scheme. The Order Limits of the scheme would involve small and localised encroachment into the MSA. The scheme would not encroach or impact the potential eastward extension to Hulands Quarry and additional minerals allocation as the scheme ends before reaching the western extent of the site.	MSA around Southwest of Bowes, directly south of existing A66 near Swinholme Farm (approximately NY 98544 13189) and directly east of Bowes along existing A66 (extending from approximately NY 99709 13522 to NZ 00292 13856). Hulands Quarry lies beyond the western end of the scheme boundary.
Cross Lanes to Rokeby	Durham County Council	Carboniferous Limestone, River Sand and Gravel and Glacial Sand and Gravel MSA sites.	The Carboniferous Limestone MSA extends along entire alignment of scheme. There are small pockets of river sand and gravel MSA to the south of the scheme and glacial sand and gravel MSA to the east. The scheme will encroach along the full length into carboniferous limestone and in limited areas of other MSAs.	The Carboniferous Limestone MSA along entire route alignment extending from approximately NZ 04111 13858 to NZ 08190 13752 around Greta Bridge.

Scheme	Authority	Mineral Safeguarding Area / Allocation Site	Description	Locations and Grid Reference
		A mineral operator is proposing a new site to both the west and east of Cross Lanes Junction however this site has not been allocated by DCC. (Boldron Cross Lanes Proposed New Site)	The scheme would lie within the unallocated Boldron Cross Lanes proposed mineral site. The design alteration since the PEIR has reduced the scheme footprint in this area, to the betterment of the MSA.	River sand and gravel MSA to the south, around NZ 04435 13524. Glacial sand and gravel MSA to the north of Greta Bridge, approximately NZ 07736 14196. The Boldron Cross Lanes proposed allocation lies to the north of the A66(T) both to the west and east of the B6277 Cross Lanes Junction. Boldron lies 700 metres to the west.
Stephen Bank to Carkin Moor	North Yorkshire County Council	Limestone, Sand and Gravel and Building Stone MSA sites. Former Green Bank Quarry.	There is a Limestone MSA extending along entire alignment of the scheme. The scheme will therefore encroach along its full length into this area. There are pockets of Sand and Gravel MSA and of Building Stone MSA that the scheme would also encroach into. Green Bank Quarry (GR 413738 509300) lies to the north-west of Ravensworth approximately 210 metres from the existing route of the A66.	Limestone MSA along entire route alignment, extending from approximately NZ 11887 10978 to NZ 17146 07657. Sand and Gravel MSA at NZ 14859 09040 and building stone MSA located at the bridleway with Carkin Moor.
A1 (M) Junction 53 Scotch Corner	North Yorkshire County Council	Limestone MSA	Limestone MSA ubiquitous surrounding scheme.	Around entire scheme alignment.

11.6.12 Consultation with Cumbria County Council, Durham County Council and North Yorkshire County Council identifies there are no existing or future peat resources sites (commercial peat extraction) within study area 1. The extent of peat within study area 1 has been identified in Chapter 9: Geology and Soils using desk-based information supplemented by intrusive ground investigations along the route. The GHG emissions associated with any required removal of peat has been identified in Chapter 7: Climate.

Recycled content targets

11.6.13 *DMRB LA 110* regional recycled aggregate targets provided in Table 11-8: DMRB regional recycled aggregate targets has been used to inform the baseline for this Material Assets and Waste chapter. Where a project is located in more than one region, the highest regional target is adopted (in this case a target of at least 31% recycled content, reflecting the target set by the Yorkshire and The Humber region). There is a total aggregate provision of 193 million tonnes in the North East, 392 million tonnes in the North West and 431 million tonnes in Yorkshire and The Humber. The Project has therefore adopted the target of minimum 31% recycled content, and this is reflected in the ES.

Table 11-8: DMRB regional recycled aggregate targets

Region	Recycled content target	Total aggregate provision (million tonnes)
Yorkshire and The Humber	31%	431
North East	26%	193
North West	30%	392
England Average	25%	3,908

11.6.14 The targets outlined in Table 11-8: DMRB regional recycled aggregate targets are applicable from 2005 until 2020, and updated targets are not currently available. Therefore, if these targets were updated by National Highways, as a result of the expiry of their validity period, the Project would make every effort to increase the recycled content target accordingly.

Construction, demolition and excavation waste arisings

11.6.15 The Project will result in the production of waste arising from CD&E activities. The Project will generate large quantities of CD&E which if not recovered would increase demand on existing waste infrastructure. The data on CD&E waste generated by the Project has been assessed in the ES.

11.6.16 The UK had a commitment to recovering (e.g. diverting from disposal) at least 70% of non-hazardous construction waste by 2020 as required by the EU Framework Directive on Waste (European Commission, 2008). This target has not yet been reported against or amended for future years, and was reiterated in the Waste Management Plan for England, published by Defra in 2020. The Project is expected to exceed this target as *DMRB LA 110* states that the Project should aim to achieve at

least 90% recovery of non-hazardous construction waste. The last published data from 2018 indicated that England was achieving a recovery rate of 93.8% for non-hazardous construction waste (Department for Environment, Food and Rural Affairs, 2021)[28]. Therefore, meeting the *DMRB LA 110* target to achieve at least 90% recovery of non-hazardous construction waste is considered to be achievable for the Project.

Waste capacity

11.6.17 Information from the Environment Agency has been used to inform the baseline with respect to waste infrastructure capacity in the North East (Environment Agency, 2021a)[29], North West (Environment Agency, 2021b)[30], and Yorkshire and The Humber (Environment Agency, 2021c)[31], former planning regions in 2020. In addition, the baseline landfill capacity has also been identified for England in 2020.

11.6.18 The Environment Agency provides landfill capacity data in volume (cubic metres) and this has therefore been converted to mass (tonnes) using the following conversion factors identified in the High Speed Rail ES[32] :

- 1.5 tonnes per cubic metre for hazardous waste landfill.
- 0.83 tonnes per cubic metre for non-hazardous waste landfill.
- 1.5 tonnes per cubic metre for inert waste landfill.

11.6.19 These conversion factors have been applied as they are considered robust and originate from the Environment Agency. The approach to using these conversion factors was outlined in the ESR and confirmed through the Scoping Opinion (ES Appendix 4.1: EIA Scoping Report and 4.2: EIA Scoping Opinion respectively, ES Volume 3 Appendices, Application Document Number 3.4).

11.6.20 Table 11-9: Summary of transfer, treatment and metal recycling capacity within the North East in 2020 provides a summary of the transfer, treatment and metal recycling capacity within the North East in 2020.

[28] Department for Environment, Food and Rural Affairs (2021) UK Statistics on Waste
[29] Environment Agency (2021a) Waste Management Information 2020 Former North East Planning Region
[30] Environment Agency (2021b) Waste Management Information 2020 Former North West Planning Region
[31] Environment Agency (2021c) Waste Management Information 2020 Former Yorkshire and Humber Planning Region
[32] High Speed Rail (2015) High Speed Rail London to West Midlands Environmental Statement

Table 11-9: Summary of transfer, treatment and metal recycling capacity within the North East in 2020

Facility type	County Durham (tonnes)	Northumberland (tonnes)	Tees Valley Unitary (tonnes)	Tyne and Wear (tonnes)	North East Capacity (tonnes)
Waste transfer	474,000	329,000	563,000	1,106,000	2,472,000
Waste treatment	344,000	387,000	2,301,000	656,000	3,688,000
Metal recycling	128,000	1,000	237,000	298,000	664,000
Total treatment and waste transfer	946,000	717,000	3,101,000	2,060,000	6,824,000

11.6.21 Table 11-10: Summary of the landfill capacity in the North East in 2020 below provides a summary of the landfill capacity in the North East in 2020.

Table 11-10: Summary of the landfill capacity in the North East in 2020

Facility type	County Durham (tonnes)	Northumberland (tonnes)	Tees Valley Unitary (tonnes)	Tyne and Wear (tonnes)	North East Capacity (tonnes)
Inert waste landfill	11,419,500	169,500	0	1,434,000	13,023,000
Non-hazardous landfill	2,082,470	1,006,790	4,932,690	168,490	8,190,440
Hazardous landfill	0	0	6,966,000	0	6,966,000

11.6.22 Table 11-11: Transfer, treatment and metal recycling site input in the North West in 2020 below provides a summary of the transfer, treatment and metal recycling capacity in the North West in 2020.

Table 11-11: Transfer, treatment and metal recycling site input in the North West in 2020

Facility type	Cheshire (tonnes)	Cumbria (tonnes)	Greater Manchester (tonnes)	Lancashire (tonnes)	Merseyside (tonnes)	North West (tonnes)
Waste transfer	363,000	483,000	2,216,000	971,000	1,728,000	5,761,000

Facility type	Cheshire (tonnes)	Cumbria (tonnes)	Greater Manchester (tonnes)	Lancashire (tonnes)	Merseyside (tonnes)	North West (tonnes)
Waste treatment	2,194,000	1,170,000	7,272,000	3,050,000	3,967,000	17,653,000
Metal recycling	43,000	34,000	736,000	161,000	3,305,000	4,279,000
Total treatment and waste transfer	2,600,000	1,687,000	10,224,000	4,182,000	9,000,000	27,693,000

11.6.23 Table 11-12: Summary of the landfill capacity in the North West in 2020 below provides a summary of the landfill capacity in the North West in 2020.

Table 11-12: Summary of the landfill capacity in the North West in 2020

Facility type	Cheshire (tonnes)	Cumbria (tonnes)	Greater Manchester (tonnes)	Lancashire (tonnes)	Merseyside (tonnes)	North West (tonnes)
Inert waste landfill	1,140,000	1,576,500	2,088,000	2,670,000	771,000	8,245,500
Non-hazardous landfill	6,325,430	2,548,930	4,795,740	6,795,210	0	20,465,310
Hazardous landfill	6,433,500	0	0	2,791,500	0	9,225,000

11.6.24 Table 11-13: Transfer, treatment and metal recycling site input Yorkshire and The Humber in 2020 provides a summary of the transfer, treatment and metal recycling capacity in Yorkshire and The Humber in 2020.

Table 11-13: Transfer, treatment and metal recycling site input Yorkshire and The Humber in 2020

Facility type	Former Humberside (tonnes)	North Yorkshire (tonnes)	South Yorkshire (tonnes)	West Yorkshire (tonnes)	Yorkshire and The Humber (tonnes)
Waste transfer	1,570,000	563,000	1,602,000	1,286,000	5,021,000
Waste treatment	4,113,000	826,000	2,536,000	5,405,000	12,880,000
Metal recycling	590,000	38,000	746,000	355,000	1,729,000
Total treatment and waste transfer	6,273,000	1,427,000	4,884,000	7,046,000	19,630,000

11.6.25 Table 11-14: Landfill capacity Yorkshire and The Humber in 2020 below provides a summary of the landfill capacity within Yorkshire and The Humber in 2020 for the disposal of CDW arising from the Project.

Table 11-14: Landfill capacity Yorkshire and The Humber in 2020

Facility type	Former Humberside (tonnes)	North Yorkshire (tonnes)	South Yorkshire (tonnes)	West Yorkshire (tonnes)	Yorkshire and The Humber (tonnes)
Inert waste landfill	23,520,000	1,657,500	8,503,500	3,879,000	37,560,000
Non-hazardous landfill	19,119,050	14,594,720	1,395,230	834,980	35,943,980
Hazardous landfill	1,258,500	0	0	2,322,000	3,580,500

11.6.26 The objective for the Project will be to minimise the volume of waste that is sent to landfill, and for the waste that has to be disposed of via this route, to send to a landfill site as close as possible to study area 1. If sufficient capacity is not available within study area 2, there may then be a requirement for waste to be sent further afield. Table 11-15: Landfill Capacity in England in 2020 below provides a summary of the wider landfill capacity within England in 2020.

Table 11-15: Landfill Capacity in England in 2020

Facility type	England (tonnes)
Inert waste landfill	210,288,000
Non-hazardous landfill	192,389,020
Hazardous landfill	24,570,000

11.6.27 A non-exhaustive list of permitted landfill sites within study area 2, published by the Environment Agency[33], that could potentially accept CD&E waste generated during the construction phase of the Project is presented in Table 11-16: Non-exhaustive list of landfill sites that could potentially accept CD&E waste arisings in 2020.

Table 11-16: Non-exhaustive list of landfill sites that could potentially accept CD&E waste arisings in 2020

Facility Name	Facility Type*	Permit Number	Post code	Remaining capacity (tonnes)
Augean North Limited Approximate distance from the centre of the Project: 90km	L01 - Hazardous Merchant Landfill	BV1399IT	TS2 1UE	3,952,425
Whitemoss Landfill Ltd Approximate distance from the centre of the Project: 143km	L01 - Hazardous Merchant Landfill	DP3639LM	WN8 8BW	2,792,450
Bostock Landfill Approximate distance from the centre of the Project: 183km	L01 - Hazardous Merchant Landfill	AP3238GH	CW10 9JQ	2,148,863
Flusco Pike Landfill Approximate distance from the centre of the Project: 43km	L02 Non-hazardous stable non-reactive waste (SNRHW) landfill	EA/EPR/FP3 393ZK/V002	CA11 0JA	672,887
Aycliffe Quarry East	L02 Non-hazardous stable non-reactive waste (SNRHW) landfill	EA/EPR/BP3 890ZK/A001	DL5 6NB	604,454

[33] Environment Agency (2021) Remaining landfill capacity: England as at end 2020

Facility Name	Facility Type*	Permit Number	Post code	Remaining capacity (tonnes)
Approximate distance from the centre of the Project: 65km				
Lillyhall Landfill Stage 3 Approximate distance from the centre of the Project: 96km	L02 Non-hazardous stable non-reactive waste (SNRHW) landfill	EA/EPR/EP3 693ZZ/A001	CA14 4JP	734,248
Allerton Park Approximate distance from the centre of the Project: 97km	L04 Non-hazardous	EA/EPR/SP3 390ZE/A001	HG5 0SD	1,794,022
Augean North Limited Approximate distance from the centre of the Project: 91km	L04 Non-hazardous	EA/EPR/BV1402IC	TS2 1UE	1,994,449
Hespin Wood Approximate distance from the centre of the Project: 75km	L04 Non-hazardous	EA/EPR/HP3 193ZX/S011	CA6 4HB	1,045,081
Harewood Whin Landfill Approximate distance from the centre of the Project: 116km	L04 Non-hazardous	EA/EPR/CB3 430DW/A001	YO23 3RR	498,000
Bishop Middleham Quarry 2 Approximate distance from centre of the Project: 80km	L05 Inert	EA/EPR/RP3 496ZM/A001	DL17 9EB	6,389,456
Old Quarrington Quarry Landfill Approximate distance from centre of the Project: 83km	L05 Inert	EA/EPR/BB3 007CA/V005	DH6 5NN	2,147,822
Asenby Quarry Ltd Approximate distance from centre of the Project: 87km	L05 Inert	EA/EPR/QP3 139XR/A001	YO7 3RB	214,580

Facility Name	Facility Type*	Permit Number	Post code	Remaining capacity (tonnes)
Crime Rigg Quarry Landfill Approximate distance from centre of the Project: 90km	L05 Inert	EA/EPR/FB3 602TW/T001	DH6 1LA	2,354,775
Roan Edge Landfill Approximate distance from centre of the Project: 44km	L05 Inert	EA/EPR/MP3 034SJ/	LA10 5EW	338,762
Goldmire Quarry Approximate distance from centre of the Project: 97km	L05 Inert	EA/EPR/CB3 705TJ/V002	LA15 8BG	1,191,951
Wilberfoss Quarry Landfill Approximate distance from centre of the Project: 153km	L05 Inert	EA/EPR/VP3 634LC/A001	YO41 4DB	375,000

Future baseline

11.6.28 The latest available information on material assets and waste infrastructure capacity has been used to inform the future baseline. Where information on likely trends is available, this is utilised to define the potential future baseline.

Materials

11.6.29 An increased demand on material assets in the UK is anticipated as a result of a number of compounding factors: Covid-19 has affected materials supplies; supply chains have been impacted due to global demand shocks, container shortages and port delays; and construction demand has increased due to new infrastructure projects (The possible impacts of materials shortages in the UK) (Royal Institution of Chartered Surveyors, 2021)[34].

11.6.30 In the UK, the Construction Products Association reported construction activity is anticipated to increase 4.3% in 2022, slowing to 2.5% in 2023 compared to the 13.3% increase observed in 2021 which was in part due to efforts to stimulate an economic recovery from Covid-19 (Construction Industry Forecasts 2021 - 2023) (Construction Products Association, 2022)[35].

11.6.31 The Project will consume large quantities of key materials such as aggregates, concrete, asphalt and mortar, increasing the demand on the existing UK supply chain. The data on key material products used by the Project have been identified in section 11.7

Waste

11.6.32 The Durham County Council, Cumbria County Council, and North Yorkshire County Local Plans present the future expected waste arisings in 2020, 2025 and 2030. Table 11-17: Projected CD&E waste arisings below provides a summary of the Projected annual CD&E waste arisings within Durham County Council, Cumbria County Council, and North Yorkshire County Council.

Table 11-17: Projected CD&E waste arisings

Sub-region	Projected CD&E Annual Waste Arisings (tonnes)		
Year	2020	2025	2030
Durham County Council	623,300	623,300	623,300
Cumbria County Council	940,833	1,176,275	1,070,626
North Yorkshire County Council	871,196	897,639	920,306
Total	2,435,029	2,697,214	2,614,532

[34] Royal Institution of Chartered Surveyors (2021), The possible impacts of materials shortages in the UK
[35] Construction Products Association (2022), Construction Industry Forecasts 2021-2023

Future landfill capacity

11.6.33 It is anticipated that different types of waste infrastructure capacity will continue to be available during the construction and operation of the Project. Landfill will experience some use of available capacity as void space is taken. Government policy measures are also likely to continue to divert waste from landfill.

11.6.34 Permitted capacity data published by the Environment Agency for 2016 to 2020 has been used to estimate the projected landfill capacity for study area 2 (the North East, the North West and Yorkshire and The Humber) for the future baseline to 2026. This relates to the total capacity of inert, non-hazardous and hazardous waste landfill that will be available within all of the regional areas in study area 2 through which route the Project will pass.

11.6.35 The future landfill capacity is displayed in Table 11-18: Future Landfill Capacity in study area 2 (the North East, North West and Yorkshire and The Humber) and is based on the average percentage change in permitted landfill capacity for the years 2016 to 2020 reported by the Environment Agency. The average percentage change has then been applied to the 2016 permitted landfill capacity and projected forward to 2026. This method assumes that the average percentage change in permitted capacity for each class of landfill remains constant. The use of an average value taken from historical data provides an allowance for potential future increases or decreases in permitted capacity for each class of landfill.

11.6.36 The Environment Agency provides landfill capacity data in volume (cubic metres) and this has therefore been converted to mass (tonnes) using the following conversion factors that were identified previously in paragraph 11.6.18.

- 1.5 tonnes per cubic metre for hazardous waste landfill
- 0.83 tonnes per cubic metre for non-hazardous waste landfill
- 1.5 tonnes per cubic metre for inert waste landfill.

11.6.37 The data identifies the future inert, non-hazardous and hazardous landfill capacity across study area 2 (the North East, the North West and Yorkshire and The Humber) for the disposal of CDW arising from the Project.

Table 11-18: Future Landfill Capacity in study area 2 (the North East, North West and Yorkshire and The Humber)

Waste Type	Estimated Capacity (tonnes) 2021	Estimated Capacity (tonnes) 2022	Estimated Capacity (tonnes) 2023	Estimated Capacity (tonnes) 2024	Estimated Capacity (tonnes) 2025	Estimated Capacity (tonnes) 2026
Inert waste landfill	63,806,795	70,328,555	78,131,561	87,423,323	98,446,641	111,485,532
Non-hazardous	62,248,431	57,523,993	53,160,270	49,129,542	45,406,235	41,966,751

Waste Type	Estimated Capacity (tonnes) 2021	Estimated Capacity (tonnes) 2022	Estimated Capacity (tonnes) 2023	Estimated Capacity (tonnes) 2024	Estimated Capacity (tonnes) 2025	Estimated Capacity (tonnes) 2026
waste landfill						
Hazardous waste landfill	19,192,652	18,483,682	17,823,235	17,207,326	16,632,309	16,094,847

11.7 Potential impacts

11.7.1 Based on the design and associated construction activities, the Project has the potential to impact upon Material Assets and Waste during both construction and operation (see sections 11.7.11 to 11.7.12).

11.7.2 The design of the Project, including any embedded mitigation measures that have been incorporated, is described in Chapter 2: The Project. Any key aspects of the design and embedded mitigation are also referenced in this section where they are directly applicable to the Material Assets and Waste assessment.

11.7.3 Potential impacts of the Project are described in this section prior to the implementation of the essential mitigation described in Section 11.8 below. The likely significant effects of the Project, taking into account this essential mitigation, are then described section 11.9. Where effects on material assets and waste have been identified that are assessed to be not significant, these are reported in ES Appendix 11.5: Non-Significant Effects (Application Document 3.4).

11.7.4 With respect to material assets, impacts relate to the extraction of primary raw materials and the production of construction materials. In addition, the Project has the potential to constrain existing or future use and extraction of materials.

11.7.5 The potential construction impacts on material assets included in the assessment, as identified in *DMRB LA 110*, are:

- The sterilisation of mineral safeguarding sites and/or peat resources
- The consumption of virgin materials

11.7.6 In addition, by virtue of the Project's scale a balance between earthwork excavations (cut) and material placement (fill) may not be achieved, partly due to necessary phasing of the Project (meaning that some activities that require fill material have to commence prior to the major excavation activities). As a result, extraction of material from borrow pits within the Order Limits of the Project is likely to be required.

Sterilisation of mineral safeguarding sites and peat resources

11.7.7 As outlined in section 11.6 the Project will overlap several mineral safeguarding sites across Cumbria County Council, Durham County Council and North Yorkshire County Council. As a result, the Project has

the potential to constrain or ‘sterilise’ future utilisation of mineral resources throughout the study area 1.

11.7.8 The assessment of impacts on minerals safeguarding sites and likelihood of sterilisation of those resources is outlined in section 11.9.

Material assets estimates

11.7.9 For the purposes of the EIA, each scheme's key material quantities have been estimated based on the information available at time of writing, taking the approach of a reasonable worst case scenario. The assumptions used to estimate the key materials are available in ES Appendix 7.1 GHG Assessment (Application Document 3.4). Key materials that have been estimated include asphalt, concrete, precast concrete and steel. The key materials estimations are set out in Table 0-19: Key Materials estimates.

Table 0-19: Key Materials estimates

Material	Unit	Quantity								
		Route wide	M6 J40 to Kemplay Bank	Penrith to Temple Sowerby	Temple Sowerby to Appleby	Appleby to Brough	Bowes Bypass	Cross Lanes to Rokeby	Stephen Bank to Carkin Moor	A1 (M) Junction 53 Scotch Corner
Fencing and Barriers										
Fencing	metres	101,545	6,127	19,222	17,200	16,076	9,500	14,000	19,360	60
Noise barriers [36]	metres	14,408	2,496	5,773	95	335	300	2,250	3,159	0
Road restraint system - single sided	metres	45,048	7,564	5,431	4,300	4,019	8,533	6,600	8,601	0
Road restraint system - double sided	metres	36,621	1,604	5,237	8,600	8,038	4,266	4,250	4,626	0
Street Furniture										
Traffic signs	m^2	2,902	442	291	843	56	310	500	460	0

[36] The assessment is based on early design iteration which included a conservative approach to noise barriers that assumed large scale use across the Project. The emerging design has much reduced the deployment of noise barriers. However a conservative approach has been taken to assume the preliminary scale deployment of noise barriers despite the minor over-estimation of these materials.

Material	Unit	Quantity								
		Route wide	M6 J40 to Kemplay Bank	Penrith to Temple Sowerby	Temple Sowerby to Appleby	Appleby to Brough	Bowes Bypass	Cross Lanes to Rokeby	Stephen Bank to Carkin Moor	A1 (M) Junction 53 Scotch Corner
Road lighting and columns - LED lights	no.	75	55	0	0	0	20	0	0	0
Road lighting and columns - Steel columns	no.	57	55	0	0	0	0	0	0	2
Marker posts / signs	no.	360	16	52	86	80	29	42	50	4
Road studs	no.	21,124	1,116	2,360	5,733	5,358	1,305	1,885	3,367	0
Drainage										
Plastic pipework total HDPE	metres	124,587	8,239	16,921	25,932	24,417	14,298	15,260	19,520	0
Total Precast concrete circular pipework	metres	1,712	1,553	159	0	0	0	0	0	0
Precast concrete box culvert	metres	2,735	0	55	437	841	149	646	607	0
Total Precast concrete manholes	no.	2,580	190	289	576	543	333	303	346	0
Gullies	no.	362	32	48	86	81	30	35	50	0
Channels	metres	68,954	2,550	9,904	17,288	16,278	6,000	7,000	9,934	0

Material	Unit	Quantity								
		Route wide	M6 J40 to Kemplay Bank	Penrith to Temple Sowerby	Temple Sowerby to Appleby	Appleby to Brough	Bowes Bypass	Cross Lanes to Rokeby	Stephen Bank to Carkin Moor	A1 (M) Junction 53 Scotch Corner
Damp proof course and impermeable membrane	m^2	245,545	4,350	17,842	61,152	83,039	15,724	20,103	43,335	0
Concrete	m^3	159	44	115	0	0	0	0	0	0
Fill, aggregate and sand	tonnes	8,571	3,371	5,200	0	0	0	0	0	0
Road Pavement										
Kerbs - Total pre-cast concrete	metres	40,871	16,066	23,987	0	0	0	0	625	193
Thermoplastic road marking	tonnes	100	15	10	0	0	18	26	40	1
Asphalt	tonnes	782,750	94,470	104,880	160,302	173,304	46,141	84,541	118,046	1,066
Fill, aggregate and sand	tonnes	912,377	101,632	112,832	190,336	203,154	52,067	97,524	154,680	151
Structures										
High friction surfacing	m^2			0	0	0	0	1,800	0	
In-situ concrete piles	tonnes	2,025	2,025	0	0	0	0	0	0	0
Steel sheet piles	tonnes	190	0	0	0	0	0	90	100	0
General steel	tonnes	4,648	0	399	0	4,179	0	0	70	0

Material	Unit	Quantity								
		Route wide	M6 J40 to Kemplay Bank	Penrith to Temple Sowerby	Temple Sowerby to Appleby	Appleby to Brough	Bowes Bypass	Cross Lanes to Rokeby	Stephen Bank to Carkin Moor	A1 (M) Junction 53 Scotch Corner
Galvanised steel	tonnes	1,399	1,280	0	0	0	35	52	33	0
General precast concrete	tonnes	11,139	2,830	2,336	3,253	0	1,250	586	884	0
High strength precast concrete	tonnes	10,095	1,423	780	0	6,133	1,092	667	0	0
General concrete C40/50	m3	22,731	1,774	897	3,094	14,464	769	958	776	0
General concrete C6/8 (Gen 0, ST1)	m3	246	0	0	0	0	246	0	0	0
Steel bar and rod	tonnes	4,148	269	253	1,082	1,919	251	195	179	0
General asphalt	tonnes	1,960	448	233	0	0	617	451	212	0
Fill, aggregate and sand general mixture	tonnes	14,312	0	0	0	0	8,653	5,659	0	0

11.7.1 Consideration, where practicable and sustainable, will be given to sourcing aggregate based materials from local quarries, based on supply and demand. Chapter 13: Population and Human Health requires the PC will identify measures that enable local businesses to take full advantage of the supply chain opportunities. Key Performance Indicators (KPIs) will be outlined to encourage the utilisation of local subcontractors and suppliers such as quarries. This will ensure that local businesses are made aware of the procurement process and tendering opportunities whilst providing support for those who require it.

11.7.2 However, it is not guaranteed that all material requirements will be fulfilled for the closest quarry to each scheme, for example, recycled aggregates. Therefore, materials may need to be sourced from further afield if needed (refer to 11.8.15).

Waste

11.7.3 In terms of waste, potential environmental impacts are primarily related to the production, movement, transport, processing use and disposal of waste from the Project.

11.7.4 The potential construction impacts on waste included in the assessment, as identified in *DMRB LA 110*, are:

- The reduction in regional landfill capacity
- The reduction in national landfill capacity

11.7.5 The Project has the potential to generate large amounts of CD&E waste which could potentially affect the capacity of waste management infrastructure in study area 2 (the North East, the North West and Yorkshire and The Humber regions).

11.7.6 Potential impacts could include the temporary use of waste management facilities capacity (during treatment) and a permanent decrease in landfill capacity (disposal). Landfill is a finite resource and the ongoing disposal of waste puts pressure on the existing facilities or requires new sites to be developed. Similarly, waste management and waste treatment facilities have limits on processing capacity, therefore there is the potential for the Project to utilise a proportion of the remaining available capacity temporarily for the duration of construction.

11.7.7 Although much of the area surrounding the existing A66 is undeveloped land, there are buildings and existing infrastructure (e.g. services, roads, drains) which will need to be demolished prior to construction.

11.7.8 As this is a large-scale project with eight schemes, the quantities of waste and material resources associated with the earthworks mean that a balance between excavation (cut) and material placement (fill) may not be achieved. If there is more cut material than is required for fill across the Project, the material will be removed offsite for re-use, potentially in third party projects/restoration sites (refer to Table 11-5 section, 11.8.38 and REAC table), recycling, recovery or disposal. Therefore surplus onsite generated material resources and waste arisings may have an effect on the existing landfill capacity. Similarly, if

a net import is required, material may need to be obtained from nearby sources as set out in paragraph 11.6.3 (for example the borrow pits identified for the M6 Junction 40 to Kemplay Bank and Penrith to Temple Sowerby schemes). The earthworks estimates and assumptions are available in sections 11.7.16 to 11.7.25.

11.7.9 The potential waste types that could arise during the construction phase are summarised in Table 11-20: Potential waste sources during the construction phase.

Table 11-20: Potential waste sources during the construction phase

Construction phase	Potential wastes produced	Classification of waste	Potential impacts
Construction	Construction materials, such as concrete, bricks, plastics, metals, plasterboard, timber, paint, etc.	Inert; and/or, Non-hazardous; and/or, Hazardous.	The reduction in regional inert, non-hazardous and hazardous landfill capacity.
	Made ground, soil and sub-soils.	Non-hazardous, and Hazardous if it contains sufficiently high levels of heavy metals.	The reduction in landfill capacity.
	Waste products arising from the presence of construction staff onsite e.g. effluent from portable toilets, food waste and packaging, as well as waste from surplus materials and spillages.	Inert; Non-hazardous and potentially Hazardous.	The reduction in regional non-hazardous and hazardous landfill capacity.
Demolition	Building materials, such as concrete, bricks, plastics, metals, plasterboard, timber, paint, etc. Made ground, soil and sub-soils Asphalt and bituminous products. There is potential that some of the existing structures contain asbestos.	Inert; and/or, Non-hazardous; and/or, Hazardous. Non-hazardous, and Hazardous if it contains sufficiently high levels of heavy metals, or if asphalt contains coal tar or asbestos confirmed in existing structures.	The reduction in landfill capacity.
Excavation	Made ground, soil and sub-soils.	Inert; and/or, Non-hazardous; and/or, potentially Hazardous if it contains sufficiently high levels of heavy metals.	The reduction in inert, non-hazardous and hazardous landfill capacity.

11.7.10 The categories of waste produced by the Project are displayed in Table 11-21: Types of CD&E waste arisings generated by the Project.

Table 11-21: Types of CD&E waste arisings generated by the Project

Activity	Waste arisings	Quantities	Most Likely Waste Management Methods
Site preparation and earthworks	Vegetation strip and tree removal. Existing highways infrastructure such as kerbs, lighting, highways signs, safety barriers, etc.	Only the preliminary earthworks estimates are available.	Re-use onsite. Recycling offsite in local projects. Local recycling facilities. Disposal at an inert/non-hazardous or hazardous landfill site.
Demolition	Existing infrastructure such as farmhouse and road demolition including supports, rails, voids.	Limited qualitative information available regarding properties and structures for demolition. Quantities not currently available, though not expected to be significant given relatively small scale demolition required.	Some material may be suitable for re-use or recycled onsite. Local recycling facilities. Disposal at an inert/non-hazardous or hazardous landfill site.
Construction	Surface planings.	The construction waste forecast is available.	Some material may be suitable for re-use or recycled onsite. Local recycling facilities. Disposal at an inert or non-hazardous site.
	Site won material (hazardous).	Not currently available.	Any hazardous material will be taken to a permitted waste management facility.

Demolition waste estimates

11.7.11 Demolition waste will be generated through the clearance of buildings and existing infrastructure, including services, roads, and drains which will need to be removed prior to construction. These are likely to consist of hard and inert materials, soils, rock and stones, wood (including vegetation), brick, concrete, and miscellaneous metals. The demolition estimations are set out in Table 11-22: Demolition waste estimate.

Table 11-22: Demolition waste estimate

Scheme	Building	Mass (tonnes)
M6 Junction 40 to Kemplay Bank	N/A	0
Penrith to Temple Sowerby	High Barn Farm	1,448
	Lightwater Cottages	476
	Sub-total	1,924

Scheme	Building	Mass (tonnes)
Temple Sowerby to Appleby	John Dodd's Barn	446
	Dunelm Farm	196
	Winthorn House	233
	Green Barn Buildings	166
	Sub-total	1,041
Appleby to Brough	New Hall Farm Underpass	60
	Sandford Retaining Wall	3,000
	Moor Beck Bridge	50
	Ministry of Defence (MOD) Tank Park	3,664
	MOD Compound	3,018
	Toddy Gill Bridge	20
	Sub-total	9,812
Bowes Bypass	Clint Lane Bridge	2,441
	Eastbound Off-slip	1,041
	Old Railway Station Farm Building	1,662
	Old Railway Station Ruins	30
	Low Broats Farm	1,896
Sub-total		7,070
Cross Lanes to Rokeby	N/A	0
Stephen Bank to Carkin Moor	Slurry Tank	440
Sub-total		440
A1(M) Junction 53 Scotch Corner		0
Total		20,287

11.7.12 For the purposes of the EIA, a desk based estimate of the buildings and structures to be demolished as part of the Project to enable the new A66 and associated road infrastructure to be constructed was undertaken. Demolition materials have been estimated based on industry experience. Whilst every effort has been made to provide an accurate estimate, there could be a significant percentage error on the estimated types of demolition materials generated and their quantities due to the limitations of survey information. A precautionary approach has been taken in applying assumptions. In order to ensure the estimate represents a reasonable worst case all buildings and structures that will be cleared have been included in the assessment to ensure the maximum demolition waste is estimated .

11.7.13 The estimated quantities of old carriageway from the Project which will be cleared have been included in the Earthworks estimates.

11.7.14 For the ES the quantities of demolition waste generated by the Project have been included in the construction waste forecast in Table 11-22: Demolition waste estimate

11.7.15 The assumptions used to estimate the demolition waste are available in ES Appendix 11.2: Demolition Waste Estimate ES Volume 3: Appendices, Application Document 3.4).

Earthworks estimates

11.7.16 The Project comprises eight individual schemes that will be delivered at different times within the five year construction period and across a large geographic area. Each scheme will have a cut/fill balance resulting in materials and waste generation. The design will seek to achieve a balance of cut and fill at an individual scheme, package and project level, taking into account the complexity of the phasing of delivery.

11.7.17 The earthworks estimations are set out in Table 11-23: Earthworks estimate have been provided in volume (cubic metres) and have therefore been converted to mass (tonnes) using the Environment Agency conversion factor of 1.5 tonnes per cubic metre used for inert materials.

11.7.18 The aim of the design of each scheme is to achieve a cut and fill balance within the individual scheme extents, where feasible. Where this is not possible due to the nature of the scheme, materials will be shared between schemes, with the aim of achieving an overall balance, where possible, and prioritising use at the closest location to source as possible. This will depend on the scheduling and timing of the construction of each scheme and the nature of the materials available.

11.7.19 Based on the current cut and fill assessments for each scheme, it is unlikely that excavated materials will be required to be exported offsite or imported material will be brought onto the Project. The final cut and fill balance for each scheme is dependent on the detailed design (which will be informed by more detailed materials testing once the PC is appointed) and the detailed phasing of construction, which will be determined by the PC. At this stage, therefore, it is not possible to predict precisely the materials that will need to be moved between schemes to account for phasing and final cut and fill balances.

11.7.20 To assess the reasonable worst case scenario in the ES for waste and materials use, the individual scheme balances have been used with the assumption that there is no sharing of excavated material between schemes – i.e. that any excess material would be exported from the Project, and that any material requirement would be imported. This is in order to ensure that all likely significant effects that could arise through the construction phase are identified, though it should be noted that the aim will be to share material between the schemes where possible in order to achieve an overall earthworks balance for the Project (and, where possible, for each individual scheme). It should be noted that other chapters of this ES (Chapter 5: Air Quality and Chapter 12: Noise and Vibration) do assess the movement of materials between schemes, based on a number of assumptions stated in those chapters, in order to

establish the worst-case environment effects, should material be moved between schemes. The use of separate assumptions for different ES Chapters to identify the worst case scenario does not alter the robustness of the assessment. The materials and waste assessment assumption is used to identify the maximum amount of waste that could be exported from the Project. The Air Quality and Noise and Vibration Chapters assumption is used as the movement within site is the worst case scenario because movements are more concentrated.

11.7.21 Cut and fill balances have been reviewed for each of the schemes with the majority having sufficient permanent or temporary land to retain material arisings in dedicated landscape areas. However, the M6 Junction 40 to Kemplay Bank and Temple Sowerby to Appleby schemes are likely have large surplus arising from the earthworks and may not all be accommodated within each scheme. It is likely that excess material from the M6 Junction 40 to Kemplay Bank scheme and Temple Sowerby to Appleby schemes will be transported to the Penrith to Temple Sowerby scheme for final placement in landscaping areas. A reasonable worst case scenario, as is shown in Table 11-23: Earthworks estimate (and the scenario that has been assessed in this ES), however, is that due to timing or suitability of material, where all surplus material from each scheme will need to be exported off site.

11.7.22 Once the final detailed design is complete, the assumed earthworks movements set out in the ES and in the SWMP will be reviewed and updated to ensure that the final design will not lead to new or different significant effects, and that the mitigation set out remains appropriate. Any changes to the earthworks movements for the Project will be within the Rochdale Envelope measures established within the ES.

11.7.23 There is an assumption in this assessment that there will be a requirement to form two borrow pits on the M6 Junction 40 to Kemplay Bank and Penrith to Temple Sowerby schemes to enable early embankment works to progress, but this material deficit will be replenished as part of the main cut and fill activities. On the M6 Junction 40 to Kemplay Bank scheme the materials from the borrow pit could be used to widen embankments in advance of the roundabout excavation. On the Temple Sowerby scheme the materials from the borrow pit could be used to balance engineering earthworks.

Table 11-23: Earthworks estimate

Scheme	Usable Cut (m^3)	Fill (m^3)	Earthworks Balance (m^3)	Unsuitable Materials (m^3)	Scheme Balance (m^3)	Usable Cut (tonnes)	Fill (tonnes)	Earthworks Balance (tonnes)	Unsuitable Materials (tonnes)	Scheme Balance (tonnes)
M6 Junction 40 to Kemplay Bank	179,500	104,600	74,900	14,500	89,400	269,250	156,900	112,350	21,750	134,100
Penrith to Temple Sowerby	214,500	464,000	-249,500	19,000	-230,500	321,750	696,000	-374,250	28,500	-345,750
Temple Sowerby to Appleby	1,530,500	1,475,000	55,500	124,000	179,500	2,295,750	2,212,500	83,250	186,000	269,250
Appleby to Brough	1,044,000	602,500	441,500	85,000	526,500	1,566,000	903,750	662,250	127,500	789,750
Bowes Bypass	95,400	172,000	-76,600	9,700	-66,900	143,100	258,000	-114,900	14,550	-100,350
Cross Lanes to Rokeby	108,500	250,000	-141,500	11,000	-130,500	162,750	375,000	-212,250	16,500	-195,750
Stephen Bank to Carkin Moor	549,500	415,600	133,900	45,000	178,900	824,250	623,400	200,850	67,500	268,350
A1(M) Junction 53 Scotch Corner	0	0	0	0	0	0	0	0	0	0

Scheme	Usable Cut (m^3)	Fill (m^3)	Earthworks Balance (m^3)	Unsuitable Materials (m^3)	Scheme Balance (m^3)	Usable Cut (tonnes)	Fill (tonnes)	Earthworks Balance (tonnes)	Unsuitable Materials (tonnes)	Scheme Balance (tonnes)
Project wide	3,721,900	3,483,700	238,200	308,200	546,400	5,582,850	5,225,550	357,300	462,300	819,600

11.7.25 Due to the nature of constructing a wider road, there is also additional topsoil on most schemes, thus is also unlikely that any additional topsoil will be required, with the Bowes Bypass, Cross Lanes to Rokeby and Stephen Bank to Carkin Moor schemes experiencing significant volumes of topsoil due to the geological topography. There is an assumption in this assessment that no topsoil will be disposed offsite as waste as the material will either be re-used on the Project, sold as a commercial commodity or donated to community projects.

11.7.26 The topsoil estimations are set out in Table 11-24: Topsoil estimate have been provided in volume (cubic metres) and have therefore been converted to mass (tonnes) using the Environment Agency conversion factor of 1.5 tonnes per cubic metre used for inert materials.

Table 11-24: Topsoil estimate

Scheme	Excavated Total Topsoil (m^3)	Placed Total Topsoil Fill (m^3)	Topsoil (Surplus) (m^3)	Excavated Total Topsoil (tonnes)	Placed Total Topsoil Fill (tonnes)	Topsoil (Surplus) (tonnes)
M6 Junction 40 to Kemplay Bank	44,100	11,800	32,300	66,150	17,700	48,450
Penrith to Temple Sowerby	146,000	39,300	106,700	219,000	58,950	160,050
Temple Sowerby to Appleby	350,500	96,800	253,700	525,750	145,200	380,550
Appleby to Brough	233,500	48,300	185,200	350,250	72,450	277,800
Bowes Bypass	78,900	13,200	65,700	118,350	19,800	98,549
Cross Lanes to Rokeby	156,600	46,800	109,800	234,900	70,200	164,700
Stephen Bank to Carkin Moor	216,500	37,600	178,900	324,750	56,400	268,350
A1(M) Junction 53 Scotch Corner	0	0	0	0	0	0
Project wide	1,226,100	293,800	932,300	1,839,150	440,700	1,398,450

11.7.27 Temporary works in relation to the use of recycled materials could include but not be limited to compound hard standings, haul roads, turning circles, laydown areas, access and egress bell-mouth areas along with crane and piling rig platforms. It is likely that 6F5 or 6F2 material will be used for all of the above, with the addition of asphalt or further capping layers used where required for heavily trafficked areas.

11.7.28 Materials will be generated by the removal of the old carriageway to enable the reconstruction, widening or full removal of the existing A66 highway. Quantities of old carriageway which will be cleared from the Project have been estimated and these have been included in the Earthworks estimates. To enable the material to be recycled, the asphalt will be planed off generating non-hazardous waste as well as hazardous

waste in the form of Asphalt Waste Containing Coal Tar (AWCCT). Pavement layers can be crushed or planed at the end of their lives and be recycled in new asphalt production. Table 11-25: Carriageway removal estimates provides an estimate of the breakdown for each scheme relating to the removal of old carriageway.

Table 11-25: Carriageway removal estimates

Scheme	Mass (tonnes)	Volume (m^3)	Mass (tonnes)	Volume (m^3)	Mass (tonnes)	Volume (m^3)
	Sub-total		Non hazardous		Hazardous	
M6 Junction 40 to Kemplay Bank	4,938	11,024	4,445	9,924	493	1,100
Penrith to Temple Sowerby	7,409	16,540	6,669	14,890	739	1,650
Temple Sowerby to Appleby	4,322	9,650	3,892	8,690	430	960
Appleby to Brough	6,808	15,200	6,128	13,680	681	1,520
Bowes Bypass	3,964	8,850	3,570	7,970	394	880
Cross Lanes to Rokeby	3,449	7,700	3,104	6,930	345	770
Stephen Bank to Carkin Moor	2,764	6,170	2,486	5,550	278	620
A1(M) Junction 53 Scotch Corner	0	0	0	0	0	0
Total	33,654	75,134	30,294	67,634	3,359	7,500

Construction waste estimate

11.7.29 Construction waste has been estimated based on the preliminary design (as shown in the indicative General Arrangement drawings, Application Document 2.5) and the works as secured through the DCO Works Plans (Application Document 5.16), utilising Waste Benchmarking Data developed by Building Research Establishment (BRE) on behalf of the Waste Resources Action Programme (Waste Resources Action Programme and the Building Research Establishment, 2012)[37] for the Project.

11.7.30 The estimated construction waste is summarised in Table 11-26: Estimated construction waste

Table 11-26: Estimated construction waste

Scheme	Mass (tonnes)
M6 junction 40 to Kemplay Bank	1,160
Penrith to Temple Sowerby	3,789
Temple Sowerby to Appleby	6,254
Appleby to Brough	5,889

[37] Waste Resources Action Programme and the Building Research Establishment (2012) SMARTWaste Data and Reporting

Scheme	Mass (tonnes)
Bowes Bypass	2,125
Cross Lanes to Rokeby	3,068
Stephen Bank to Carkin Moor	3,594
A1(M) Junction 53 Scotch Corner	268
Routewide Total	26,146

11.7.1 Using this method, the Project is forecast to generate 26,146 tonnes of construction waste during the construction period. The quantity of construction waste that will be diverted from landfill via re-use, recycling and recovery is based on a landfill diversion rate of 90%. Therefore, as a realistic worst-case scenario it has been assumed that the remaining 10% of construction waste arising will be disposed of offsite to landfill. A review of industry landfill diversion rates (92%) and also the target identified in *DMRB LA 110* to divert at least 90% (by weight) material recovery of non-hazardous CDW demonstrates this to be an achievable diversion rate for the Project. National Highways are committed to diverting waste from landfill and the EMP (Application Document Number 2.7) identifies that a minimum 90% of CDW will be diverted from landfill via re-use, recycling and recovery.

11.7.2 The quantity of construction waste that will require offsite disposal to landfill is estimated to be 2,614 tonnes based on 10% of construction waste arising disposed of offsite to landfill. As outlined in 11.7.1, a review of industry landfill diversion rates and the target identified in *DMRB LA 110* demonstrates this to be an achievable target.

11.7.3 The assumptions used to estimate the construction waste are available in ES Appendix 11.4: Construction Waste Estimate (Application Document 3.4).

Impact on future baseline

11.7.4 A summary of waste quantities estimated to be generated by demolition, excavation activities and construction of the Project are displayed in Table 11-21: Types of CD&E waste arisings generated by the Project.

11.7.5 The estimated quantities of demolition waste have been used Table 11-22: Demolition waste estimate.

11.7.6 For the excavation waste estimates, in order to identify a worse-case scenario the positive scheme balances identified in the earthworks estimates Table 11-23: Earthworks estimate have been used. In reality the estimated routewide excavation waste is likely to be much lower as based on the current cut and fill assessments for each scheme, and it is unlikely that excavated materials will be exported offsite.

Routewide

11.7.7 The quantity of demolition, excavation and construction waste that will be diverted from landfill via re-use, recycling and recovery is based on a landfill diversion rate of 90% and is shown in Table 11-27: Summary of waste quantities estimated to be generated by demolition, excavation

and construction of the Project. This rate has been selected based on a review of industry landfill diversion rates (92%). Therefore, as a worst-case scenario it has been assumed that the remaining 10% of excavation and construction waste arising will be disposed of offsite to landfill.

Table 11-27: Summary of waste quantities estimated to be generated by demolition, excavation and construction of the Project

Activity	Total quantity (tonnes)	Quantity diverted (tonnes)	Quantity for offsite disposal (tonnes)
Demolition waste	20,287	1,315,305	146,145
Excavation waste	1,461,450	952,830	105,870
Construction waste	26,146	23,532	2,615
Total waste	1,507,883	1,357,095	150,788
Proportion	100%	90%	10%

11.7.8 Table 11-27 identifies that the Project will generate 1,507,883 tonnes of excavation and construction waste with 90% (tonnes) of this waste diverted from landfill via re-use, recycling and recovery based on existing industry practice and project targets outlined in 11.7.1, as well as mitigation in the ES and the requirements of the EMP.

Scheme Basis

11.7.9 The quantity of demolition, excavation and construction waste that will be diverted from landfill via re-use, recycling and recovery has also been estimated on a per scheme basis and is shown in Table 11-28: A summary of waste quantities estimated to be generated by demolition, excavation and construction on a scheme basis.

Table 11-28: A summary of waste quantities estimated to be generated by demolition, excavation and construction on a scheme basis

Scheme	Activity	Total quantity (tonnes)	Quantity diverted (tonnes)	Quantity for offsite disposal (tonnes)
M6 Junction 40 to Kemplay Bank	Demolition waste	0	0	0
	Excavation waste	134,100	120,690	13,410
	Construction waste	1,160	1,044	116
	Sub-total	135,260	121,734	13,526
	Proportion	100%	90%	10%
Penrith to Temple Sowerby	Demolition waste	1,924	1,732	192
	Excavation waste	28,500	25,650	2,850
	Construction waste	3,789	3,410	379
	Sub-total	34,213	30,792	3,421
	Proportion	100%	90%	10%
Temple Sowerby to Appleby	Demolition waste	1,041	936	104
	Excavation waste	269,250	242,325	26,925

Scheme	Activity	Total quantity (tonnes)	Quantity diverted (tonnes)	Quantity for offsite disposal (tonnes)
	Construction waste	6,254	5,629	625
	Sub-total	276,544	248,890	27,654
	Proportion	100%	90%	10%
Appleby to Brough	Demolition waste	9,812	8,831	981
	Excavation waste	789,750	710,775	78,975
	Construction waste	5,889	5,300	589
	Sub-total	805,451	724,905	80,545
	Proportion	100%	90%	10%
Bowes Bypass	Demolition waste	7,070	6,363	707
	Excavation waste	14,550	13,095	1,455
	Construction waste	2,125	1,912	212
	Sub-total	23,745	21,370	2,374
	Proportion	100%	90%	10%
Cross Lanes to Rokeby	Demolition waste	440	396	44
	Excavation waste	16,500	14,850	1,650
	Construction waste	3,068	2,762	307
	Sub-total	20,008	18,008	2,001
	Proportion	100%	90%	10%
Stephen Bank to Carkin Moor	Demolition waste	0	0	0
	Excavation waste	268,350	241,515	26,835
	Construction waste	3,594	3,234	359
	Sub-total	271,944	244,749	27,194
	Proportion	100%	90%	10%
A1(M) Junction 53 Scotch Corner	Demolition waste	0	0	0
	Excavation waste	0	0	0
	Construction waste	268	241	27
	Sub-total	268	241	27
	Proportion	100%	90%	10%

Operation

Design and embedded mitigation

11.7.10 The project design will take into account the waste hierarchy as required by *DMRB LA 110* with a view to minimising the overall volume of waste arisings during operation.

Potential Impacts

11.7.11 An assessment is included for the first year of operation, to address any remaining materials from the construction phase (i.e. remaining

stockpiles or waste generated from handover activities). Where available, information is also presented to provide an indication of material use and waste generation likely to occur during the operational phase. It is anticipated that during operation, the material consumption and waste generation will be substantially lower than during the construction phase, therefore an assessment of future operational years is not included as it was scoped out as per the Scoping Opinion and DMRB *LA 110.* Table 11-6: Existing A66 annual operational materials consumption and waste generation provides an estimate of the annual operational materials used and waste generated associated with renewals and maintenance of the existing A66 route

11.7.12 Table 11-29 Potential waste arisings during the first year of operation below summarises the types of waste arisings that may potentially be generated during the first year of operation of the Project. The operational waste streams generated by the Project are likely to be similar to the wastes generated from the existing A66 as demonstrated by existing operational data shown in Table 11-6: Existing A66 annual operational materials consumption and waste generation and Appendix 11.1 Operational Materials Consumption and Waste Generation Estimation (Application Document Number 3.4). Therefore, operational waste generated by the Project is not likely to be difficult to manage or dispose. The approach to assessing operational materials and waste was outlined in the ESR and confirmed through the Scoping Opinion (ES Appendix 4.1: EIA Scoping Report and 4.2: EIA Scoping Opinion respectively, ES Volume 3 Appendices, Application Document Number 3.4).

Table 11-29 Potential waste arisings during the first year of operation

Project Activity	Activities generating waste	Classification of waste	Potential Impacts
Operation and maintenance	Routine maintenance of infrastructure and technology, including surfacing asphalt and servicing of electronic equipment.	Waste arisings during the operational phase are expected to be minimal however there is likely to be hazardous waste such WEEE from replacing lighting and other equipment. Other minimal hazardous waste could include contaminated surfacing following a diesel or oil spill as well as the emptying of any interceptors/pollution control systems. Non-hazardous waste will arise from re-surfacing and other activities.	Operational waste generated by the Project is not likely to result in any potential impacts due to minimal amounts even considering maintenance waste and WEEE.

11.8 Essential mitigation and enhancement measures

Construction

11.8.1 A number of mitigation measures have been developed relating to material assets and waste. The measures have been developed using a

series of principles to drive the minimisation of materials use and waste generation, treatment and disposal, and are set out in the EMP (Application Document Number 2.7).

Embedded Design Mitigation

11.8.2 Embedded mitigation is the design measures which are integrated into the Project for the purpose of minimising environmental effects. Mitigation has been embedded into the design to reduce the potential impacts relating to material assets and waste. Many of the embedded mitigation measures described in this section are also to be delivered by the PC. All the relevant embedded mitigation measures set out in this chapter will be delivered as part of the SWMP, the objectives of which are set out in the EMP (Application Document 2.7).

11.8.3 The Project design alternatives are described in Chapter 3: Assessment of Alternatives.

11.8.4 By considering materials and waste at the earliest opportunity in the design process there are likely to be far more opportunities for resource efficiency. *DMRB LA 110* Section 3.18 identifies that the ES shall include evidence of the adoption of design and mitigation measures (Designing out Waste) for material assets and waste, including aspects such as designing for re-use and recovery, materials optimisation, offsite construction, future (deconstruction and flexibility), and waste efficient procurement. The current examples of Designing out Waste on the Project are provided below. These are set out in the Project Design Principles document (Application Document 5.11), to ensure the principles are retained through the detailed design and construction phase.

Design for re-use and recovery

Demolition

11.8.5 Prior to demolition of each structure or building, a pre-demolition audit will be carried out to quantify materials and investigate opportunities for re-use and recycling. There will be crushing / screening of non-hazardous demolition arisings for use as recycled aggregate and fill materials, which is likely to require a registered waste exemption or an environmental permit.

Excavation

11.8.6 The Project has been designed to achieve as close to a cut and fill balance as practicable in order to help minimise the importation of fill materials and the export of excavation waste. Each scheme has been designed with an attempt to incorporate all the excavated materials arising. Cut and fill balances have been reviewed for each of the schemes, with the majority having sufficient permanent or temporary land to retain material arisings in dedicated landscape areas within the Order Limits.

11.8.7 Any unsuitable material will be mechanically and / or chemically stabilised such as lime stabilisation where possible and used within

landscape areas on the Project. These activities will comply with the *CL:AIRE DoW CoP* and any other requirements and will be set out in the MMP.

Construction

11.8.8 The paving of large sections of the existing A66 highway will be re-used by retaining the existing highway and associated infrastructure, saving materials and reducing waste.

11.8.9 On the M6 Junction 40 to Kemplay Bank scheme:

- All existing pedestrian and cycle connections will be retained on the Penrith South Bridge western side alongside Skirsgill Business Park
- The existing exit from the fire station linked with the current traffic signals will be maintained throughout construction and remain in place once the works are complete
- The existing underpass from Carleton Avenue to the Police and Fire site (to the south of the A66) is to be retained and extended accordingly, to accommodate the widened A66
- The current design assumes that the overbridges at M6 Junction 40 will not be widened, avoiding design complexities
- This scheme will follow the existing horizontal road alignment

11.8.10 On the Penrith to Temple Sowerby scheme there will be full dualling of the existing single carriageway. The scheme would predominantly involve online widening using the existing carriageway to form one side of the new dual carriageway reducing the volume of material required.

11.8.11 The Appleby to Brough scheme comprises the upgrading of an 8km section of carriageway from single to dual carriageway between Coupland Beck and Brough using the existing A66 carriageway as the westbound carriageway. Utilising the existing carriageway will reduce volume of material required.

11.8.12 Approximately 3km of carriageway will be re-surfaced on the Bowes Bypass scheme.

11.8.13 Approximately 2km of carriageway will be re-surfaced on the Cross Lanes to Rokeby scheme.

11.8.14 National Highways are committed to sourcing construction materials with a high recycled content and supporting a circular economy. There is a commitment in the EMP (Application Document Number 2.7) to identify that overall aggregates imported onsite will have re-used/recycled content target of at least 31%; Based on preliminary design it is estimated that the following materials could utilise the following approximate recycled contents:

- 5% of road construction sub-base
- 15% of asphalt base
- 7.5% of surfacing course
- 20 to 40% of concrete
- 40% of the cement could be offset with Ground Granulated Blast-furnace Slag and based on a 420 kg/m3 cement content, this equates

to a global offset of raw material of 7% for each cubic metre of concrete delivered to site.
- 60% of drainage products, most notably with plastic drainage products and kerbs

11.8.15 At present it is assumed that all existing aggregate based material will be incorporated into fill materials on the Project, subject to suitability and any hazardous content. Additional aggregate based materials required will be sourced from local quarries, however it is acknowledged that, based on supply and demand, the closest quarry to each scheme may not be able to provide all material requirements. Chapter 13: Population and Human Health requires the PC will identify measures to encourage the utilisation of local subcontractors and suppliers such as quarries. However it is not guaranteed that all material requirements will be fulfilled for the closest quarry to each scheme therefore materials may need to be sourced from further afield if needed.

11.8.16 For the key aggregate materials, it is assumed that most of the road box construction is made from a quarried type one aggregate. There are instances where crushed secondary aggregates can be used, with demolition waste arisings a good source of aggregate for both concrete and road construction where available.

11.8.17 For road construction sub-base material constructed from recycled materials will be implemented by the PC.

11.8.18 For asphalt base as much material as practicable will be constructed from recycled materials.

11.8.19 For surfacing course as much material as practicable will be constructed from recycled materials.

11.8.20 The Project haul roads and compounds will utilise recycled aggregates from either demolition materials onsite or offsite.

11.8.21 The majority of the steel sourced for bridge beams or ground support solutions will be made from over 90% recycled steel.

11.8.22 Asphalt waste containing coal tar is classified as a hazardous waste where the level of coal tar is greater than 0.1%[38]. Coal tar is still classified as a hazardous waste when it is treated using a cold recycling bound mixture. The treatment of coal tar and then use in construction requires an environmental permit unless the requirements of Environment Agency (Environment Agency, 2014)[38] Regulatory Position Statement 075 are followed. There are specific products that recycle asphalt waste containing coal tar from road maintenance schemes. This reduces the use of virgin aggregates in the production process and also diverts hazardous waste from landfill. It is a cold lay material so also offers similar benefits to warm mix asphalts in the carbon dioxide emissions.

[38] Environment Agency (2014) Regulatory Position Statement 075

11.8.23 The temporary works are being designed to maximise the quantities of materials and potential waste that can be re-used and recycled onsite.

Design for materials optimisation

11.8.24 The PC will investigate opportunities to introduce standardisation across the Project to ensure waste inherent in the design is reduced. Standardisation will be applied to precast concrete components such as central reservations, pavers, kerbs, blocks as well as drainage such as gullies, pipes and chambers. The design of the overbridge structures will also consider the use of standardisation across the Project. The structural form of the substructure can be standardised but each bridge would be subject to different size foundations depending on the specific ground conditions and topography. In addition for local road bridges crossing the A66 the span length and skew angle could potentially be standardised for multiple bridges.

11.8.25 Retaining walls can also be standardised across the Project. The precise height of each retaining wall across the route will be determined during detailed design, the walls will then be classified into one of a number of groups (such as precast concrete L-walls, modular block walls, or reinforced earth walls with modular block facings). This allows for efficiency in materials ordering and use on site.

11.8.26 Site accommodation within the main construction compounds can also be standardised across the route, allowing for efficiency in ordering required materials and equipment, and also providing clarity for workers who are then familiar with the site layout whichever compound they access (including operation and location of waste separation facilities).

Design for offsite construction

11.8.27 The PC will investigate the potential for offsite construction of certain elements of the Project. Offsite construction can drive improvements in the products or processes employed in construction, ranging from innovative products such as asphalt surfaces on a 'carpet roll' to be used onsite through to precast components manufactured offsite. At this stage it will be envisaged to manufacture offsite bridge beams, culverts and short span bridges, parapets, prefabricated concrete units (headwalls and drainage rings), retaining walls, central reserve barriers and steel segments (if selected to be used). Offsite construction will be maximised where possible, however it has not been relied upon for the purpose of this assessment.

Design for the future (deconstruction and flexibility)

11.8.28 The PC will investigate and identify how materials can be designed to be more flexibly adapted over an asset lifetime. The PC will also consider how the deconstruction of elements can be maximised at the end of their first life.

11.8.29 Opportunities for modular retaining walls that rely on shear interlock between blocks that can be deconstructed at the end of their life will be investigated. The backfill behind these retaining walls can be removed leaving the blocks available to be lifted back out in sequence and

transported offsite for future re-use. The blocks themselves can be re-used in the same application. The proprietary concrete blocks can be manufactured from superior high strength materials, making them 100% recyclable at the end of their 120 year design life.

11.8.30 All concrete elements of the Project have the ability to be crushed and graded to form recycled crushed aggregates. These aggregates can be used in new concrete batching or as earthworks layers, depending on the specification of the future scheme. The precast concrete barriers in the central reserve can also be deconstructed at the end of their service if required.

11.8.31 Any temporary site accommodation within the construction compounds will also be designed for deconstruction and re-use.

Design for waste efficient procurement

11.8.32 The PC will identify and specify materials that can be acquired responsibly, in accordance with a recognised industry standard.

Engineering plan configurations and layouts

11.8.33 As part of the detailed design phase, the PC will provide engineering plan configurations and layouts that demonstrate how the most effective use of materials and arisings can be achieved.

11.8.34 The Principal Contractor(s) will continue to identify possible mitigation and enhancement measures including the temporary works, and to identify opportunities to reduce waste.

Essential mitigation

11.8.35 The *DMRB LA 104* describes essential mitigation as mitigation that is critical for the purposes of the assessment. The essential mitigation, which has been relied upon in this assessment is set out below.

Material assets

11.8.36 For the Cross Lanes to Rokeby scheme the design has been refined so as to reduce the overall footprint of the Cross Lanes and Rokeby junctions, thus minimising encroachment into the mineral safeguarding site.

11.8.37 The depletion of finite material resources will occur through extraction of primary aggregates (e.g. sands and gravels). Structures, drainage and signage products will be procured with consideration of the environmental impacts associated with their manufacture, as well as other considerations such as structural design, carbon footprint (PAS 2050), energy consumption, long-life performance, visual impacts, durability and cost. The procurement of sustainable materials will be secured through the EMP and subsequent iterations of the EMP prepared by the PC.

11.8.38 The approach to earthworks, will be set out in the future MMP and this will enable materials excavated onsite to be re-used at areas of the Project where materials are required as far as practicable. This approach will be designed to minimise the amount of material required

from offsite. In addition the PC will be obliged to identify other construction projects located in study area 2 that can re-use the materials for restoration. The Project will also advertise the scheme as a Donor site through CL:AIRE DOW COP scheme in the event that it appears that excess materials are unexpectedly likely to be present.

11.8.39 The approach to earthworks will, however, be influenced by the construction phasing and there may be limitations on how materials can be re-used between schemes.

11.8.40 The location of material storage areas will be determined by the PC following detailed design and detailed construction phase planning, when storage requirements are finalised. The locations and management of the material storage areas will comply with all measures set out in the EMP, including avoiding known constraints highlighted for protection within the ES, the EMP (Application Document Number 2.7) and the Project Design Principles (Application Document Number 5.11). This will ensure that any constraints upon location and positioning are complied with at all times.

11.8.41 To enable construction works to take place, material storage areas will be required at multiple locations to facilitate holding material in the short or long term for compounds, haul roads or permanent works. The areas are likely to be de-vegetated and topsoil removed. Material cut will then be removed where required to larger material deposit locations where it will either be placed within landscape areas or directly within fill areas on the schemes. It is essential that good practice is followed to ensure the material being stored remains in good condition, being adequately sealed and placed in the desired thicknesses to prevent deterioration of material such as topsoil. The location of material storage areas are dependent on materials suitability and any visual constraints for bunded areas along the scheme. The procedures for materials management will be secured through the EMP (Application Document 2.7) and MMP (Annex B8 of the EMP, Application Document Number 2.7) by the PC.

11.8.42 Materials will be moved in the most cost-efficient way possible, taking note of access routes, traffic management restrictions and available storage. Where possible material will be moved away from the Project with independent haul roads being established, either away from where the new carriageway is being constructed or down the new track itself. The procedures for materials management will be secured through the EMP (Application Document 2.7) and MMP (Annex B8 of the EMP Application Document 2.7) by the PC.

11.8.43 For cut material, a maximum stockpile height of 5m unless the material has suitable properties and does not present any slope failure concerns. In addition there may be other relevant factors that will influence the locations of storage areas such as topography or ecology. The procedures for materials management will be secured through the EMP (Application Document 2.7) and MMP (Annex B8 of the EMP (Application Document 2.7)) by the PC.

11.8.44 For topsoil storage a maximum stockpile height of 2m will be implemented if the topsoil material is going to be retained for future re-use on the Project. The requirement to re-use topsoil will be set out in the MMP (Annex B8 of the EMP (Application Document 2.7).

11.8.45 The CL:AIRE DoW CoP will be applied to optimise the amount of excavated materials that can be re-used and recycled across the Project. The requirement to comply with the CL:AIRE Definition of Waste Code of Practice will be set out in the MMP (Annex B8 of the EMP (Application Document 2.7).

11.8.46 The Environment Agency *Quality protocols* (Environment Agency, 2020d)[39] will be used to identify when a waste-derived material can be regarded as a non-waste product and no longer subject to waste controls. The *Quality protocols* could potentially be applied to optimise the amount of demolition materials that can be re-used across the Project, and the requirement to comply with these protocols will be set out in the EMP and subsequent iterations of the EMP drafted by the PC.

Waste

11.8.47 The Project design will take into consideration the upper tiers of the waste hierarchy (refer to Plate 11-1: Waste hierarchy) as required by *DMRB LA 110* in the SWMP (Annex B2 of the EMP, Application Document Number 2.7) with a view to minimising the overall volume of waste arisings via designing out waste and maximising efficient use of materials, ultimately to prevent and minimise waste sent to landfill.

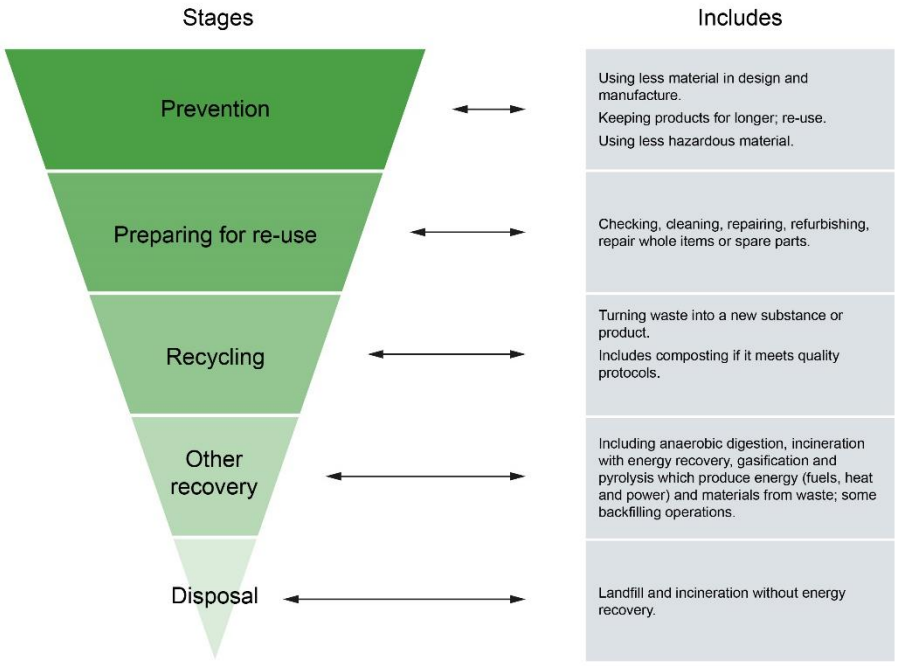

Plate 11-1: Waste hierarchy

11.8.48 The Project will generate material from demolition and excavation, and the PC will be obliged to investigate how demolition materials can be

[39] Environment Agency (2020d) Quality protocols: converting waste into non-waste products

integrated with a future works programme, or be considered for use in other construction projects, to minimise their classification as waste as far as practicable. The procedures for the management of demolition waste will be secured through the EMP (Application Document 2.7) and SWMP (Annex B2 of the EMP, Application Document Number 2.7). The Project will consider the Demolition Protocol (Institute of Civil Engineers, 2008)[40], a resource efficiency model that shows how the production of demolition material can be linked to its specification as a high-value material both onsite and in other construction projects.

11.8.49 The PC will be obliged to investigate the opportunities to re-use existing foundations, structures, pavements, floor slabs and services onsite. Where this is not appropriate the appointed contractor will consider crushing demolition materials for recycling as aggregates onsite. If onsite recycling is not feasible the appointed contractor will identify opportunities for recycling the demolition materials offsite in any National Highways or other suitable local projects, through a recycling contractor or in other external projects. The procedures for the management of demolition waste will be secured through the EMP (Application Document 2.7) and SWMP (Annex B2 of the EMP, Application Document Number 2.7).

11.8.50 In addition to these essential mitigation measures, the Project will be committed to:

- Specifying the use of materials with a high percentage of re-used/recycled content of at least 31%
- Local sources for aggregate supplies within Study Area 2 should be considered whenever possible.
- Utilising supplier or manufacturer packaging return schemes.
- Ensuring demolition (sections 11.7.11 to11.7.14) excavation (sections 11.7.16 to 11.7.25) construction arisings (sections 11.7.29 to 11.7.3) generated are handled, stored, managed and re-used or recycled as close as possible to the point of origin.

11.8.51 All the essential mitigation measures set out in this chapter will be delivered as part of the MMP and SWMP, the objectives of which are set out in the EMP (Application Document 2.7). Other relevant good practice controls during the construction phase (for example segregated materials storage and re-use of inert materials for grading) are also included in these documents.

11.8.52 While reduction of waste should remain the highest priority, where feasible waste produced shall be segregated for recycling. This will allow materials to be recycled and ultimately reduce the amount of waste that has to be finally disposed of. The appointed contractor will establish waste storage and recycling areas, for each scheme or package, for the safe storage and processing of separated waste streams to ensure that opportunities for re-use are maximised. The Project will strive to implement industry best practice with regard to the

[40] Institute of Civil Engineers (2008) The Demolition Protocol

segregation of waste by adopting the Considerate Constructors Scheme (CCS)[41] colour coding system on waste skips. The colour coding scheme is a simple system which colour labels waste skips indicating the types of waste that can be placed in them. Where no other waste management option is found to be feasible, wastes shall be sent to an appropriately permitted waste management facility in accordance with UK legislation and any National Highways requirements.

11.8.53 For any non-hazardous, hazardous or inert waste taken offsite, the Waste duty of care: code of practice (Department for Environment, Food & Rural Affairs, 2018)[17] must be complied with, including the use of registered waste carriers and appropriately permitted sites.

11.8.54 Hazardous waste shall be correctly labelled and will not be mixed with non-hazardous waste. It will be securely contained and disposed of at an appropriately permitted facility via a registered waste carrier.

11.8.55 There is potential that some of the existing structures contain asbestos and this will be confirmed through asbestos surveys prior to demolition. Any contaminated materials will need to be segregated separately from 'clean' demolition materials to avoid cross contamination before they are sent for appropriate and permitted treatment/recovery/disposal facility.

11.8.56 To maximise the potential for recycling, the treatment of coal tar products and their use in construction will adhere to the Environment Agency[42] Regulatory Position Statement 075. If this cannot be achieved an environmental permit will be required in relation to the treatment and use in construction of coal tar products.

11.8.57 Chapter 9: Geology and Soils describes the ground investigation sampling that has been undertaken to date. No existing areas of contamination have been identified to date, however onsite investigation will continue as part of the detailed design. Should this identify the presence of contaminated land, the results of sampling will be used to determine appropriate remediation options and agree the preferred approach with the regulatory authorities. Any contaminated excavated material will be carefully segregated and stored to minimise cross contamination of clean materials.

11.8.58 It is likely the majority of any unsuitable material identified will be mechanically and / or chemically stabilised such as lime stabilisation and used within landscape areas on the Project. There may also be some unsuitable material will need to be exported offsite for treatment or disposal, however it has not been relied upon for the purpose of this assessment. These activities will comply with the CL:AIRE Definition of Waste Code of Practice and any other requirements and will be set out in the MMP.

Environmental management plans (EMP)

11.8.59 The EMP for the Project includes materials and waste commitments in accordance with Section 4 of DMRB LA 110, including those that will

[41] Considerate Constructors Scheme (2017) Colour Coded Waste Skips
[42] Environment Agency Regulatory (2014) Using treated asphalt waste: RPS 75

need to be delivered through the SWMP. The EMP will capture information and data on site arisings recovered or diverted from landfill and waste sent to landfill and specify management requirements for construction materials, site arisings and waste. The PC will further develop the EMP through the detailed design phase, producing a second iteration (the full construction phase EMP) prior to starting on site, based on the requirements of the EMP.

Materials management plan (MMP)

11.8.60 The MMP will be prepared by the PC pre-construction and will include the proposals for the handling of waste material following the protocols within the CL:AIRE Definition of Waste. The EMP sets out the objectives that need to be met by the MMP, and an expanded essay plan for the MMP is included as Annex BX of the EMP (Application Document 2.7).

11.8.61 Any waste arisings of made ground, soils and sub soil should be classified as per Environment Agency[43] Waste Management 3 (WM3) (2015) guidelines for waste classification. The PC will develop a testing and classification regime for these materials to ensure the correct waste sentencing or possibility of re-use.

11.8.62 Not all material produced during the construction process will be classed as waste, but excess material will need to be classified in accordance with WM3 guidelines prior to its removal from site.

11.8.63 The Project will use all the relevant tools to comply with waste legislation and guidance including the Demolition Protocol, Quality Protocol, CL:AIRE DOW :COP, exemptions and / or permits.

11.8.64 The re-use and recycling of demolition waste is likely to require a registered waste exemption or an environmental permit, which the PC will be responsible for obtaining and managing. There may also be the requirement to obtain a mobile plant licence to crush and re-use demolition materials. These requirements are listed in the consents and licences register in the EMP.

Site Waste Management Plan (SWMP)

11.8.65 A SWMP is used to plan, implement, monitor and review waste minimisation and management on construction sites. The SWMP is also used to record how waste is prevented, minimised, re-used, recycled and disposed of on a construction site. The SWMP will be a live document, reviewed and updated regularly during the course of the Project. The outline SWMP for the Project is available the in Annex B2 of the EMP (Application Document 2.7). The outline SWMP will be refined by the Principal Contractor(s) as the Project progresses. Table 11-30: Summary of essential mitigation and monitoring measures displays a summary of the mitigation measures associated with the Project.

[43] Environment Agency (2021) Waste Management 3 (WM3)

Table 11-30: Summary of essential mitigation and monitoring measures

Activity	Impact	Committed Essential Mitigation	Monitoring
Site clearance and demolition	Disposal of demolition waste	Re-use of materials onsite where feasible. Recycle materials onsite. Recycling and recovery of materials offsite at recycling facilities.	The EMP sets out how the SWMP will manage and monitor waste arisings, and the objectives to be met by the MMP.
Earthworks	Consumption of primary resources Disposal of excavation waste	Design to maximise the earthworks balance. Re-use of excavated materials onsite where feasible. Re-use of excavated materials offsite in other local projects where feasible.	The EMP sets out the objectives that will need to be delivered by the SWMP and the MMP for the Project.
Construction waste	Disposal of construction waste	Re-use as pavement planings sub-base in footpaths. Re-use existing planings in pavement construction.	The EMP includes the requirements of the SWMP to monitor waste arisings.

Enhancement

11.8.66 Enhancement measures are over and above what is required to mitigate the adverse effects of the Project. Enhancement measures will be investigated throughout the design and construction of the Project, however have not been relied upon in the context of this assessment. Examples of enhancement opportunities for material assets and waste include:

- Using suitable recycled or recovered materials in community projects, e.g. utilising recycled mulch from tree felling for local projects

Operation

Essential mitigation

11.8.67 The project design will take into account the waste hierarchy as required by DMRB LA 110 and Regulation 12 of the Waste (England and Wales) Regulations 2011 with a view to minimising the overall volume of waste arisings during operation.

11.9 Assessment of likely significant effects

Construction

11.9.1 The potential significant effects have been identified by reference to Tables 3.13 and 3.14 in DMRB LA 110 for material assets and waste. Whilst mitigation is a key focus there remains the potential for residual effects.

Potential significant effects

11.9.2 The likely significant effects specified by *DMRB LA 110*[44] are listed below:

Material assets

- *The sterilisation of ≥1 mineral safeguarding site and/or peat resources; and*
- *Aggregates required to be imported to site comprise re-used/recycled content below the relevant regional percentage target) [in this case a target of at least 31%]; and*
- *Project achieves less than 70% overall material recovery / recycling (by weight) of non-hazardous CDW to substitute use of primary materials; and*

Waste

- *>1% reduction or alteration in the regional capacity of landfill as a result of accommodating waste from a project; and*
- *1-50% of project waste for disposal outside of the region.*

Material assets

Sterilisation of mineral safeguarding sites and peat resources

11.9.3 As outlined in section 11.7, there are a number of MSAs crossing and close to the Project. As a result, there is the risk to constrain or prevent existing and potential future extraction of materials.

11.9.4 The assessment of magnitude of impacts and significant effects to MSAs is provided in Table 11-31: Potential impacts to mineral safeguarding sites for M6 J40 to Kemplay Bank on a scheme-by-scheme basis.

11.9.5 The likelihood of sterilisation and magnitude of effect was qualitatively assigned using professional judgement and in consultation with representatives from each local authority involved in minerals planning matters. Each MSA and allocation was considered to have a value (sensitivity) of Medium, as per the definitions set out in DMRB LA 104 Environmental Assessment and Monitoring (DMRB LA 104)[45] (Highways England, 2020)[46] and in Chapter 4: EIA Methodology.

11.9.6 Several factors were considered such as extent of land take as a result of each individual scheme, existing land use, the sensitivity of the receptor and any prospective mineral extraction developments. All these factors were considered qualitatively, rather than a quantitative assessment of MSAs encroached into, to determine if the scheme would

[44] The Potential Likely Significant Effects have been listed replicating DMRB LA 110. However, there is recognition that the criteria for which to determine significance of effects for material assets and waste in DMRB LA 110 is under review. Therefore, a divergence from the standard and a worst-case approach is applied to this ES Report that considers this list to be 'or' not 'and'.
[45] Note, DMRB LA 104 has also been used to assign impact magnitude of the Project on MSA prior to assigning, or not assigning a significant effect
[46] Highways England (2020) Design Manual for Roads and Bridges LA 104 Environmental Assessment and Monitoring

preclude future extraction of the mineral resource and thus result in a risk of sterilisation.

11.9.7 The interaction between the features of the M6 J40 to Kemplay Bank scheme and minerals safeguarding sites are described in Table 11-31: Potential impacts to mineral safeguarding sites for M6 J40 to Kemplay Bank and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 1 of 10 (Application Document Number 3.3).

Table 11-31: Potential impacts to mineral safeguarding sites for M6 J40 to Kemplay Bank

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
Cumbria County Council	Permanent Land Take (Engineering)	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel resource)	Along entire southern boundary of scheme and to the north of River Eamont.	Permanent land take of MCA due to engineering interventions (widening of carriageway, drainage ponds, verges and earthworks).	Minimal due to proximity of MCA to Penrith, limited scheme footprint beyond existing carriageway and does not diminish from wider resource.	Minor Adverse
	Temporary Land Take	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel resource)		Temporary land take in MCA areas include compound storage, service diversions, access tracks and borrow pit.	Minimal due to temporary nature.	Negligible Adverse

11.9.8 The interaction between the features of the Penrith to Temple Sowerby scheme and minerals safeguarding sites are described in Table 11-32: Potential impacts to mineral safeguarding sites for Penrith to Temple Sowerby and is demonstrated in ES Figure 11.1, Sheet 2 of 10 Mineral Safeguarding Areas (Application Document Number 3.3).

Table 11-32: Potential impacts to mineral safeguarding sites for Penrith to Temple Sowerby

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
Cumbria County Council	Permanent Land Take (Engineering)	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel resource)	Along entire western alignment of scheme to the north and south extending until approximately Whinfell	Land take of MCA areas due to dualling with online widening of existing carriageway and widening to the north to form new carriageway, junction improvement at Whinfell,	Minimal localised potential sterilisation in the western portion of the scheme. However, the scheme would only affect a small proportion of the mineral resource and	Minor Adverse

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
			Park (NY 56750 28862).	drainage ponds, earthworks and verges.	would not diminish access to the wider resource.	
	Temporary Land Take	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel resource)		Temporary land take of MCA areas including compound storage areas at Centre Parcs junction, service diversions in western section and borrow pit.	Minimal due to temporary nature.	Negligible Adverse

11.9.9 The interaction between the features of the Temple Sowerby to Appleby scheme and mineral safeguarding sites are described in Table 11-33: Potential impacts to mineral safeguarding sites for Temple Sowerby to Appleby and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 3 of 10 and Sheet 4 of 10 (Application Document Number 3.3).

Table 11-33: Potential impacts to mineral safeguarding sites for Temple Sowerby to Appleby

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
Cumbria County Council	Permanent Land Take (Engineering)	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel and Gypsum resource)	North of Kirkby Thore (near junction to British Gypsum), and along entire route alignment as it moves southeast out of Kirkby Thore towards Crackenthorpe. Gypsum area South of Sleastonhowe Farm, to the north of the Trout Beck.	The scheme presents significant encroachment into an MCA as a result of new offline carriageway with multiple structures such as multi-span viaduct, new junctions, bridges, drainage ponds and earthworks.	Widespread new engineering structures could impact future extraction around the area. However, when considered in context of wider resource the scheme would not diminish access. British Gypsum lies to the north of scheme and have been consulted	Minor Adverse

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
					throughout scheme design.	
	Temporary Land Take	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel and Gypsum resource)		Areas of temporary land take in MCA, principally as compound storage sites between Temple Sowerby and Kirkby Thore.	Minimal due to temporary nature	Negligible Adverse

11.9.10 The interaction between the features of the Appleby to Brough scheme and mineral safeguarding sites are described in Table 11-34: Potential impacts to mineral safeguarding sites for Appleby to Brough and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 6 of 10 and Sheet 7 of 10 (Application Document Number 3.3).

Table 11-34: Potential impacts to mineral safeguarding sites for Appleby to Brough

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
Cumbria County Council	Permanent Land Take (Engineering)	Mineral Consultation Area (BGS Mineral sites suggests Sand and Gravel)	Along entire route length, particularly to the south of existing carriageway	Encroachment into MCA due to online widening with a new eastbound carriageway to the south of the existing carriageway into the MCA. Major new structures including to cross the Moor Beck, new junctions at Café 66 and to the B6259 to Sandford/Warcop, at Warcop, drainage ponds, local roads.	Widespread new engineering structures could impact or limit future extraction around the immediate vicinity of road. However, when considered in context of wider resource the scheme would not diminish access.	Minor Adverse
	Temporary Land Take	Mineral Consultation Area (BGS Mineral sites		Areas of temporary land take in MCA, principally as compound storage sites between Temple Sowerby and Kirkby Thore.	Minimal due to temporary nature	Negligible Adverse

Local Authority	Land Affected	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
		suggests Sand and Gravel)				

11.9.11 The interaction between the features of the Bowes Bypass scheme and mineral safeguarding sites are described in Table 11-35: Potential impacts to mineral safeguarding sites for Bowes Bypass and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 7 of 10 (Application Document Number 3.3).

Table 11-35: Potential impacts to mineral safeguarding sites for Bowes Bypass

Local Authority	Land Take (Boundary)	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
Durham County Council	Permanent Land Take (Engineering)	Carboniferous Limestone	Southwest of Bowes, directly south of A66 near Swinholme Farm and directly east of Bowes along existing A66 Hulands Quarry lies beyond the western end of the scheme boundary.	Areas of permanent land take due to interventions (widening of carriageway, drainage ponds, verges and earthworks) have minimal encroachment into MSA.	Minimal localised potential sterilisation of carboniferous limestone but would not limit wider resource use.	Minor Adverse
	Temporary Land Take	Carboniferous Limestone		Temporary land take does not encroach into MSA.	Minimal due to temporary nature.	Negligible Adverse

11.9.12 The interaction between the features of the Cross Lanes to Rokeby scheme and mineral safeguarding sites are described in Table 11-36: Potential impacts to mineral safeguarding sites for Cross Lanes to Rokeby and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 8 of 10 (Application Document 3.3).

Table 11-36: Potential impacts to mineral safeguarding sites for Cross Lanes to Rokeby

Local Authority	Land Take (Boundary)	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
Durham County Council	Permanent Land Take (Engineering)	Carboniferous Limestone, River Sand and Gravel	Carboniferous Limestone MSA extends along entire alignment of scheme. There are small pockets of river sand and gravel MSA to the south of the scheme and glacial sand and gravel MSA to the east. The scheme will encroach along the full length into carboniferous limestone and in limited areas of other MSAs.	Encroachment into MSA due to new adjacent eastbound carriageway to the south between the B6277 junction at Cross Lanes and the existing Tutta Beck Cottage access. This will include significant engineering interventions, namely new junctions at Cross Lanes and Rokeby. The new junction at Cross Lanes will also lie within the Order Limits of the Boldron Cross Lanes proposed unallocated mineral site and may have an impact on future development.	Widespread areas of encroachment into MSA may cause localised sterilisation and limit future extraction. However, the design follows the existing carriageway and would only impact a small portion of the wider resource.	Moderate Adverse
	Temporary Land Take	Carboniferous Limestone, River Sand and Gravel		Temporary land take does not encroach into MSA.	Minimal due to temporary nature.	Negligible Adverse

11.9.13 The interaction between the features of the Stephen Bank to Carkin Moor scheme and mineral safeguarding sites are described in Table 11-37: Potential impacts to mineral safeguarding sites for Stephen Bank to Carkin Moor and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 9 of 10 (Application Document 3.3).

Table 11-37: Potential impacts to mineral safeguarding sites for Stephen Bank to Carkin Moor

Local Authority	Land Take (Boundary)	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
North Yorkshire County Council	Permanent Land Take (Engineering)	Limestone, Sand and Gravel, Building Stone	Limestone MSA throughout entire scheme alignment, Sand and Gravel at Browson Bank farm, around Fox Well, north of New Lane. Pockets of Building Stone (in particular at Carkin Moor bridleway).	Entire scheme and all engineering measures (e.g.the new dualling between Stephen Bank to Carkin Moor) will impact Limestone MSA. Pond and drainage works at Fox Well may sterilise Bridleway at Carkin Moor being sunk at corner where it meets A66 so may be land taken on edge which impacts MSA.	The scheme may impact on future extraction of limestone resource. However, it will be localised widening and creation of new highway structures which is unlikely to impact the wider access to the resource which is extensive throughout the county. Other areas of encroachment to other MSAs are very localised.	Minor Adverse
	Temporary Land Take	Limestone, Sand and Gravel, Building Stone		Temporary storage has minimal encroachment.	Minimal due to temporary nature.	Negligible Adverse

11.9.14 The interaction between the features of the A1(M) Junction 53 Scotch Corner scheme and mineral safeguarding sites are described in Table 11-38: Potential impacts to mineral safeguarding sites for A1(M) Junction 53 Scotch Corner and is demonstrated in ES Figure 11.1 Mineral Safeguarding Areas, Sheet 10 of 10 (Application Document 3.3).

Table 11-38: Potential impacts to mineral safeguarding sites for A1(M) Junction 53 Scotch Corner

Local Authority	Land Take (Boundary)	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
North Yorkshire County Council	Permanent Land Take (Engineering)	Limestone	Present throughout entire scheme.	The only component of this scheme is the widening of the Middleton Tyas Lane approach to the A1(M) Junction 53 at Scotch Corner roundabout, from one lane to two lanes. Given the works will occur within	Unlikely to impact access to Limestone MSA resource.	Negligible Adverse

Local Authority	Land Take (Boundary)	Mineral Resource	Location	Potential Impacts	Likelihood of Sterilisation	Magnitude of Impact
				the existing highway boundary there will not be significant encroachment into the MSA.		
	Temporary Land Take	Limestone		Temporary storage has minimal encroachment.	Minimal due to temporary nature	Negligible Adverse

11.9.15 Of all the schemes only the Cross Lanes to Rokeby scheme is considered to present a high risk of sterilisation of a mineral safeguarding site, with a Moderate Adverse impact.

11.9.16 Sterilisation of an MSA has been identified for the Cross Lanes to Rokeby scheme only. This is due to a number of factors including:

- Historic extraction of Carboniferous Limestone at nearby sites such as Hulands Quarry and Kilmond Wood Quarry demonstrates value of the mineral resource
- The scheme will encroach into an area of the Boldron Cross Lanes which is potentially suitable for a new mineral site (it should be noted these sites are not currently supported as allocations by DCC, however for the purpose of this assessment, they have been included for completeness)
- The Order Limits encroach widely into the Carboniferous Limestone MSA

11.9.17 The scheme has been refined to reduce the overall footprint of the Cross Lanes and Rokeby junctions, thus minimising encroachment into the MSA. However, a moderate adverse impact has been identified as a result of sterilisation of a mineral safeguarding site in the Cross Lanes to Rokeby scheme. As a result, both the Cross Lanes to Rokeby scheme and Routewide have been assigned as resulting in a large significant effect, as per DMRB LA110, which states sterilisation of ≥1 mineral safeguarding site constitutes a large significant effect.

11.9.18 The consultation with Cumbria County Council, Durham County Council and North Yorkshire County Council confirmed there are no existing peat resource sites (commercial peat extraction) within study area 2. Therefore, the Project will not sterilise any existing peat resource sites and no further assessment is required regarding peat as a resource. Chapter 7: Climate and Chapter 9: Geology and Soils set out the consideration of peat in the context of soils and carbon emissions.

Importation of excess virgin aggregates

11.9.19 The Project aims to achieve the target that aggregates imported onsite will have re-used/recycled content target of at least 31%. Based on preliminary data, achieving the target of at least 31% of re-used/recycled aggregates imported to the Project can be achieved as the PC is provided with a clear target by National Highways and would not generate a likely significant effect. Therefore, the target and a range of other commitments has also been included in the ES mitigation (refer to 11.8.14 to 11.8.22) and is also set out in the EMP.

11.9.20 Logistics of the Project could potentially be challenging due to the remote location of some of the schemes. In addition, the location of mineral suppliers in close proximity to the Project may make it more cost effective and potentially more sustainable (considering whole life impacts) to import virgin materials, which would require less transportation than secondary and recycled aggregate suppliers. The source of secondary and recycled aggregate suppliers over local quarries could potentially be less sustainable depending on the locations. If the PC cannot achieve the target of at least 31% of aggregates imported onsite will have a re-used/recycled content they

will need to undertake a whole life sustainability assessment of alternative options to demonstrate a sustainable alternative approach.

Recycling and recovery rate of construction and demolition waste (CDW)

11.9.21 Based on preliminary data the recycling and recovery of CDW across the Project will not generate a likely significant effect (less than 70%). The last published data from 2018 indicated that England was achieving a recovery rate of 93.8% for non-hazardous construction waste. Therefore, a recycling and recovery rate of CDW of 70% is expected to be achieved on the Project.

11.9.22 In addition the essential mitigation measures following the principles of the waste hierarchy are outlined in 11.8.47 to 11.8.58 and will be implemented through:

- The EMP and subsequent iterations of the EMP
- The SWMP
- The MMP
- Best practice construction waste segregation as identified by the CCS.

Future Waste infrastructure capacity in study area 2

11.9.23 The following future waste infrastructure capacity in study area 2 (the North East, the North West and Yorkshire and The Humber) has been assessed following the requirements of *DMRB LA 110*:

- Inert landfills
- Non-hazardous landfills
- Hazardous landfills

Future Inert landfill capacity

11.9.24 Inert waste arising from the Project that cannot be re-used, recycled or recovered will need to be disposed to inert landfill. In order to model the reasonable worst case scenario, the total waste identified for offsite disposal arising from the construction of the Project and each scheme has been compared to the total future inert landfill capacity in study area 2 (the North East, the North West and Yorkshire and The Humber) in 2024. The year 2024 has been selected for the assessment as it is the first year of construction. The effect will not increase over the Project's five year programme. The results are shown in Table 11-39 Inert landfill capacity in study area 2 in 2024.

Table 11-39 Inert landfill capacity in study area 2 in 2024

Scheme	Maximum Inert Waste (tonnes)	Future Inert landfill capacity (tonnes)	% Inert waste disposal capacity
Routewide	150,788	87,423,323	0.2
M6 junction 40 to Kemplay Bank	13,526	87,423,323	0.02
Penrith to Temple Sowerby	3,421	87,423,323	0.004
Temple Sowerby to Appleby	27,654	87,423,323	0.03
Appleby to Brough	80,545	87,423,323	0.09
Bowes Bypass	2,374	87,423,323	0.003
Cross Lanes to Rokeby	2,001	87,423,323	0.002
Stephen Bank to Carkin Moor	27,194	87,423,323	0.03
A1(M) Junction 53 Scotch Corner	27	87,423,323	0.00001

11.9.26 The estimated tonnage of excavation and construction waste which may potentially be sent for inert landfill disposal generated from the Project in 2024 is 0.2% of the total future inert landfill capacity in study area 2 (the North East, the North West and Yorkshire and The Humber). According to DMRB LA110 this does not represent a likely significant effect. In addition, each of the schemes estimated excavation and construction waste identified for offsite disposal to inert landfill and does not represent a likely significant effect.

Future Non-hazardous landfill capacity

11.9.27 Non-hazardous waste arising from the Project that cannot be re-used, recycled or recovered will need to be disposed to non-hazardous landfill. In order to model the worst-case scenario, the total waste identified for offsite disposal arising from the construction of the Project and each scheme has been compared to the total future non-hazardous landfill capacity in study area 2 (the North East, the North West and Yorkshire and The Humber) in 2024. The results are shown in Table 11-40: Non-hazardous landfill capacity in study area 2 in 2024 which displays the maximum amount of non-hazardous waste that could potentially be sent to landfill in 2024.

Table 11-40: Non-hazardous landfill capacity in study area 2 in 2024

Scheme	Maximum Project Non-hazardous Waste (tonnes)	Future Non-hazardous waste landfill capacity (tonnes)	% Non-hazardous waste disposal capacity
Routewide	150,788	49,129,542	0.3
M6 junction 40 to Kemplay Bank	13,526	49,129,542	0.03
Penrith to Temple Sowerby	3,421	49,129,542	0.007
Temple Sowerby to Appleby	27,654	49,129,542	0.06
Appleby to Brough	80,545	49,129,542	0.2
Bowes Bypass	2,374	49,129,542	0.005

Scheme	Maximum Project Non-hazardous Waste (tonnes)	Future Non-hazardous waste landfill capacity (tonnes)	% Non-hazardous waste disposal capacity
Cross Lanes to Rokeby	2,001	49,129,542	0.004
Stephen Bank to Carkin Moor	27,194	49,129,542	0.06
A1(M) Junction 53 Scotch Corner	27	49,129,542	0.0001

11.9.28 The estimated tonnage construction waste which may potentially be sent for non-hazardous landfill disposal generated from the Project in 2024 is 0.3% of the total future non-hazardous landfill capacity in study area 2 (the North East, the North West and Yorkshire and The Humber). According to DMRB LA110 this does not represent a likely significant effect. In addition each of the schemes estimated excavation and construction waste identified for offsite disposal to non-hazardous landfill and does not represent a likely significant effect.

Future Hazardous landfill capacity

11.9.29 Hazardous waste arising from the Project that cannot be treated or recovered will need to be disposed to hazardous landfill. There is no information currently available to indicate the proportion of waste that might be classified as hazardous. In order to model the worst-case scenario, therefore, the total waste identified for offsite disposal arising from the construction of the Project and each scheme has been compared to the total future hazardous landfill capacity in study area 2 (the North East, the North West and Yorkshire and The Humber) in 2024. The results are shown in Table 11-41: Hazardous landfill capacity in study area 2 in 2024 which displays the maximum amount of hazardous waste that could potentially be sent to landfill in 2024.

Table 11-41: Hazardous landfill capacity in study area 2 in 2024

Scheme	Maximum Project Hazardous Waste (tonnes)	Future Hazardous landfill capacity (tonnes)	% Hazardous waste disposal capacity
Routewide	150,788	17,207,326	0.9
M6 junction 40 to Kemplay Bank	13,526	17,207,326	0.08
Penrith to Temple Sowerby	3,421	17,207,326	0.02
Temple Sowerby to Appleby	27,654	17,207,326	0.2
Appleby to Brough	80,545	17,207,326	0.5
Bowes Bypass	2,374	17,207,326	0.01
Cross Lanes to Rokeby	2,001	17,207,326	0.01
Stephen Bank to Carkin Moor	27,194	17,207,326	0.2
A1(M) Junction 53 Scotch Corner	27	17,207,326	0.0002

11.9.30 The estimated tonnage of construction waste which may potentially be sent for future hazardous landfill disposal generated from the Project is 0.9% of the total hazardous landfill capacity in study area 2 (the North

East, the North West and Yorkshire and The Humber). According to DMRB LA110 this does not represent a likely significant effect. In addition, each of the schemes estimated excavation and construction waste identified for offsite disposal and does not represent a likely significant effect.

11.9.31 It should be noted that this assessment of future hazardous waste landfill capacity does not include materials that are extracted from the ground that are tested and classified as hazardous. However, given the context of the surrounding area and limited industrial development, it is not expected that the Project will encounter large areas of contamination. Sections 11.8.55 to 11.8.64 identify how contaminated materials will be managed by the Project.

11.9.32 Based on the available data, the assessment of future inert, non-hazardous and hazardous landfill capacity in 2024 has identified a slight effect across the waste management infrastructure in study area 2 (the North East, the North West and Yorkshire and The Humber). According to DMRB LA110 this does not represent a likely significant effect.

Disposal of CDW outside study area 2

11.9.33 The assessment of waste management infrastructure identifies there is sufficient future inert, non-hazardous and hazardous landfill capacity across study area 2 (the North East, the North West and Yorkshire and The Humber) to enable the management of the reasonable worst case scenario in terms of waste arisings from the Project. Therefore it is unlikely CDW will need to be disposed outside study area 2. Therefore, based on preliminary data and *DMRB LA 110*, it has been identified the Project will not produce a likely significant effect in relation to the disposal of CDW outside study area 2.

Operation

Material assets

11.9.34 During operation of the Project, materials use is expected to be limited. Therefore, only the first year of operation is included in the assessment in order to capture any effects arising from materials remaining from construction and assess any potential for effects arising from operational activities.

11.9.35 The materials consumed by the Project will be associated with routine maintenance of the highway, highway infrastructure and road-side technology, such as surfacing asphalt, replacement fencing and barriers and replacement electronic equipment. It is anticipated that during operation, the material consumption will be substantially lower than during the construction phase. Therefore, based on preliminary data the Project will not produce a likely significant effect in relation to material assets during operation.

Waste

11.9.36 During operation of the Project, waste arisings are expected to be limited. Therefore, only the first year of operation is included in the

assessment in order to capture any effects arising from waste generated from the final phases of construction and handover, and assess any potential for effects arising from operational activities.

ICCI

11.9.37 The in-combination climate change assessment has used a future climate baseline that is based on representative concentration pathway 8.5 (RCP 8.5) of the UK climate change 2018 projections (UKCP18). This future climate baseline is presented in Chapter 7: Climate Change.

11.9.38 Table 11-42: Potential ICCI implications to the project relevant to Material Assets and Waste below sets out the potential ICCI implications to the Project relevant to Material Assets and Waste.

Table 11-42: Potential ICCI implications to the project relevant to Material Assets and Waste

Effect impacted by climate change	Climate hazard(s)	Impact of climate hazard(s)	Impact on significance of the effect	Embedded mitigation or additional mitigation/ enhancement
Risk of contamination and impacts to waste landfill facilities	Prolonged heavy rainfall and flooding	Reduced capacity at inert, non-hazardous and hazardous landfill sites	Not significant	No mitigation required
Reduced quantities and qualities of material assets	Increased frequency of extreme weather	Delay in construction programme	Not significant	No mitigation required
Risk of contamination to excavated material	Increase in wetter conditions	Excavated material rendered unsuitable for re-use, requiring offsite disposal or treatment	Not significant	No mitigation required

11.9.39 Impacts of climate change may affect material assets and waste in general terms for the construction phase only. The impacts are shown in Table 0-43 Summary of significant effects (construction). UKCP18 projections suggest that changes to the climate by the 2020s (construction period) are unlikely to have a significant impact on this effect. As a result, no significant in-combination effects are anticipated and as a result no mitigation required.

Table 0-43 Summary of significant effects (construction)

Receptor	Attribute	Receptor sensitivity	Potential impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
Routewide						
Mineral safeguarding sites and/or peat resources	Mineral resources and future resource use	Medium	Sterilisation of mineral safeguarding sites and/or peat resources	Refinement of scheme to reduce Cross Lanes and Rokeby junctions footprint and area of encroachment into MSA.	Moderate adverse	Large Significant
M6 Junction 40 to Kemplay Bank						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Penrith to Temple Sowerby						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Temple Sowerby to Appleby						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Appleby to Brough						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Bowes Bypass						

Receptor	Attribute	Receptor sensitivity	Potential impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Cross Lanes to Rokeby						
Mineral safeguarding sites and/or peat resources	Mineral resources and future resource use	Medium	Sterilisation of Carboniferous Limestone mineral safeguarding sites throughout scheme	Refinement of scheme to reduce Cross Lanes and Rokeby junctions footprint and area of encroachment into MSA.	Moderate adverse	Large Significant
Stephen Bank to Carkin Moor						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
A1(M) Junction 53 Scotch Corner						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects

Table 11-44: Summary of significant effects (operation)

Receptor	Attribute	Receptor sensitivity	Potential Impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
Routewide						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
M6 Junction 40 to Kemplay Bank						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects

Receptor	Attribute	Receptor sensitivity	Potential Impact before essential mitigation	Essential mitigation/ enhancement	Impact magnitude	Residual effect
Penrith to Temple Sowerby						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Temple Sowerby to Appleby						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Appleby to Brough						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Bowes Bypass						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Cross Lanes to Rokeby						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
Stephen Bank to Carkin Moor						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects
A1(M) Junction 53 Scotch Corner						
No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects	No significant effects

11.10 Monitoring

Construction

11.10.1 The PC will develop procedures during construction to control the use of materials and further reduce the impact. The monitoring requirements are set out in Table 6.1 of the EMP which includes the commitments of the SWMP, such as the monitoring of the estimated quantities of waste material and the opportunities for re-use, recycling, recovery or disposal.

11.10.2 The EMP and as appropriate SWMP and MMP shall be reviewed and updated as the Project progresses to report on monitoring of:

1) construction monitoring data on-site arisings and waste generated and assumptions on-site arisings and waste forecast used in the assessment;

2) recording/reporting to ensure all legal documentation (waste carrier registration, environmental permit, waste transfer documentation) associated with the management of construction materials, site arisings and waste is available and retained.

11.10.3 The monitoring measures to be implemented are summarised in Table 11-30: Summary of essential mitigation and monitoring measures above.

Operation

11.10.4 The PC shall produce further iterations of the EMP at both construction stage and at handover stage. The handover/operation iteration of the EMP will be updated as the Project progresses to report on monitoring of the equivalent data for comparison with the assessment forecast during the first year of operation.

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